PERSONAL weekly COMPUTER NEWS

50p April 28, 1984 No 59

BRITAIN'S BIGGEST WEEKLY

MODEM MIRACLE?
Full test of a versatile communicator

CP/M ON THE 64
Will you still love it when it's CP/M?

MAGIC DRAGON
The sprite package that left us spellbound

ORIC PROGRAM
Over the rooftops with Huebert



PORTABLE POWER:
A three- in-one Pro-Test

PLUS
Assembler made easy
Games reviews for Spectrum, Atari, BBC & Dragon

THE NAME IN VIDEO GAMES

Visions

DEMOLATOR

Following the Thousand year war with the Alien Demolators the last remnants of the human race are being transported across the galaxy in cryogenic suspension aboard the B.S. Quinn (Battle Star).

The Demolators however have invaded the cargo bay and it is your job to destroy the Demolators and to protect the human cargo. All you have to defend Humanity with is Xeno (popularly named "the Phobe") the ultimate Robot. You can control his movements on two planes and fire an ultrasonic Cannon to defend humanity with.





EXCLUSIVELY AVAILABLE FROM LARGER BRANCHES OF

Boots

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DEMOLATOR — BBC — MODEL 'B' 001-2. £8.95

Shortage of working days over the Easter holiday has led to a reduction in the size of *PCN*. This has been necessary to enable us to publish at all. But you can see from this issue that editorial content has been maintained.

MENU

April 28, 1984 No 59

REGULARS

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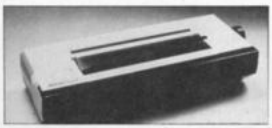
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What do a Welsh micro, an American magazine, an ignition key and a French computer fair have in common? They're all on the back page this week.

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Part two of Keith Hook's guide to easy machine code with the aid of an assembler.

PRO-TEST PERIPHERALS

Atari in print 35
Yet more products in Atari's range of peripherals — two new printers this time. Piers Letcher looks at the 1025 dot matrix and the 1027 letter quality machines.





Cover photograph: Howard Kingsnorth and Sid Hughes.

Cover story
Portable power 12
The industry's latest bandwagon is portability. In this update on the state of play, *PCN* brings you Pro-Test on three new micros for every pocket.

MICROPAEDIA

Pull out and keep
Games galore
Yet more entertainments get the *PCN* appraisal treatment from our review team. This week we round up games for the Spectrum, BBC, Dragon 32 and Atari and separate the wheat from the chaff.



Miracle modem 37
Ralph Bancroft marvels at a feature-packed modem from Minor Miracles — with a magical price tag of £118.



PRO-TEST SOFTWARE

Apple Homeword 38
Looking for a low-cost word processor? Mike Batham takes home Homeword, a disk-based package that offers some advanced features.

64 gets CP/M 40
A Z80 second processor and CP/M for £57? That's what Commodore is offering to 64 owners. If it sounds too good to be true check Peter Worlock's report.



Dragon sprites 41
After last week's review of a hardware implementation, Bryan Skinner looks at a method of producing sprites through software.

PROGRAMS



Oric 1 45
PCN presents Huebert, a colourful, action-filled version of an arcade favourite.

Bodged QL limps in

By Geof Wheelwright

The first 'few thousand' Sinclair QLs will be released at the month's end with 25 per cent of the operating system and SuperBasic programming language hanging off the back of the machine in a small black cartridge.

Sinclair admitted this week to problems in fitting the ambitious QDOS operating system and the SuperBasic programming languages onto the 32K ROM chips set aside for them in the original QL design. Left with the choice of further serious delays in shipping QLs or having to ravage the operating system and SuperBasic to make them fit in 32K, Sinclair has opted for neither and produced instead this 'dongle' which slots into the QL's cartridge software port and without which you cannot use the machine.

Sinclair is currently redesigning the QL circuit board to accommodate the extra 16K chip that is now needed for QDOS and SuperBasic. When that redesign is complete Sinclair will offer free upgrades to people supplied with the early 'dongle' QLs to be shipped this month. This rethink about the QL's design has also meant the exclusion of the originally-promised, battery-backed, on-board, digital clock — which will not feature on either the 'old' or new-design QLs.

Sinclair would not comment as to whether the upgrade for dongled machines will require sending your QL back to Sinclair or whether the change could be made at a dealers. However, since a change is likely to be made in the actual circuit board design — and not just the placement of chips — Sinclair will almost certainly have to swap old circuit boards for new and do their best to recover what parts they can from the early circuit boards. But such a swap would probably require sending machines back to Sinclair, as all the dongled QLs have been ordered from Sinclair by mail and therefore cannot be taken back to shops.

The appearance of dongled QLs does mean that no-one will be in any great rush to bring out cartridge software for the QL, as the QLs with a dongle will not be able to use cartridges until they are upgraded. However, since software houses will be using the same 'dongled' versions of the QL as all early QL customers, they will probably dispense with immediate plans to produce cartridge software and instead use Microdrives.

The good news in all this, however, is that despite reports throughout the industry that there was no way Sinclair could begin shipping the QLs by the 'target delivery dates' from the end of April Sinclair will in fact be able to give people something.

If the cartridge-port dongle had not been used, QLs probably wouldn't have seen the outside of a factory until at least the far side of July — by which time some QL orders would have been outstanding six months.

The other benefit of the dongle decision is that some extra commands have been added to SuperBasic, including a set of keywords to handle turtle graphics. Once the decision was taken definitely to have 48K for SuperBasic and QDOS — rather than the 32K originally assigned to it — QL designers stopped trying to find ways to squeeze the language and saw opportunities to add to it.

Have you ordered a Sinclair QL in the past few months?

If so, you are now the lucky owner of a free RS-232C serial printer cable for your QL. Sinclair announced this week that it will be giving away the printer leads (for which it was going to charge an extra £14.95) with every QL that has been delayed.

The printer lead represents Sinclair's form of compensation for those would-be QL owners who have waited through the long winter months.

BBC tunes up with MIDI unit

MIDI — the Musical Instrument Digital Interface — is available for the BBC at £65.

This system, rapidly becoming a standard among makers of electronic instruments, is a way of telling electronic instruments which notes to play, how they should be and how long they should be sustained.

British and German companies have developed MIDI interfaces for popular micros, including the Spectrum, Commodore 64 and Apple. The BBC version is available from Electronic Research 03744 67221.



PEAK REFERENCE — As befits its name Zenith Data Systems has gone for the top spot for the disk drives on its new Zip portable personal computer. The Zip and the Zenith PC were both launched in the UK last week, after being demonstrated at Hannover earlier in the month (Issue 58). Both claim full IBM compatibility; a 128K system with 360K costs £1,695, with twin 360K disks £1,995, and with a 10.6Mb Winchester £3,395. The systems are built around 8088s and have four expansion slots. The Zip's unusual disk units slide back into the body of the unit when it is packed for transit.

Oric soft soap

Support may be at hand for Oric's Atmos. Five software houses — IJK, Joe the Lion, PSS, Arcadia Software and Severn Software — have banded together to form the Association of Oric Software Houses.

AOSH membership is open to other interested software houses, and the association is intended to form a vehicle for the promotion of Oric and Atmos software.

As yet the group has no formal structure, and John Fletcher of PSS stressed that members would still speak independently. But his own personal feeling was that trade in Oric software had been slack of late, and that something should be done 'to promote ourselves back into the market'. PSS is on the point of launching Electro Storm and Moonbase Alpha Rescue Craft for the Oric/Atmos.

Mr Fletcher felt that AOSH would boost the Oric and the Atmos by fostering interest in the system.

Meanwhile Tansoft has announced a tape exchange scheme for Tansoft Oric-1 programs that are not fully compatible with the Atmos. The games involved are Oric Munch, Base, Forth, Mon, CAD, Zodiac and House of Death, and old taped can be exchanged for new at the price of £3 per tape.

The offer doesn't include Oric Flight or Multigames 1 and 2. New versions of these are on the way, so you'll have to cough up the full price again. Fortunately, all other Tansoft games are fully compatible.

The £3 is accounted for by 'materials, handling and postage.' This would be barely plausible if Tansoft were suggesting you send in the cassette label, and letting you keep the old tape, but *PCN*'s experience of the price of stamps and C15 tapes would point towards a fairly staggering 'handling' charge.

Dealers holding quantities of old Oric-1 programs are to be offered two new programs for three old ones.

But if you've money to spare, send your £3 to Tansoft, Units 1 and 2 Techno Park, Newmarket Road, Cambridge.

ZX windows



Through a glass — ZX windows.

Eat your heart out, Microsoft. Just outside Basildon, in the heart of the Essex Silicon Valley, Timedata (Basildon 418121) claims to have cracked the windows problem on the humble Sinclair Spectrum.

The company's HI-T Screen Enhancer software produces 32 lines of 64 characters, giving scrolling 'windows' in any rectangular part of the screen. Other facilities are 'form filling', with which you can input to any part of the screen without disturbing other data, improved tabulation, and offset printing.

'It is expected that HI-T will appeal to serious Spectrum users . . . who can't wait for a QL,' says Timedata. But why hide your light under a bushel? For £5.95 isn't it worth not waiting for a Mac or a PC with Microsoft Windows too?

Vocational software

Research Machines users could soon find that educational software has taken a sudden turn into very specific vocational training.

RML, in cooperation with Ashton-Tate, has developed a dBase II educational package intended to introduce students to database management techniques via a commonly used piece of software.

Marketing manager Mike O'Regan said that there were no ethical problems in taking a commercial product as a specimen for teaching purposes, merely educational ones — either it works for students or they will find something else.

Educational dBase II costs £99 but it won't be cutting the ground out from beneath the real thing — it allows a maximum of only 63 records per file. The package also includes a disk-held tutorial and sample programs, plus manuals and primers that cover database technology in general as well as dBase II in particular.

It does indicate a new direction for RML, and the company is increasing its software expertise. An educational package based on the Sage accounting software is also on its books, and RML is moving further towards business users by looking for dealers for the first time.

Celebrating its move to new premises last week it also underlined its concentration on educational computing by releasing new storage devices.

A shared-disk system will improve the flexibility of resources and a silicon disk will improve the performance of disk-intensive applications. The shared-disk software costs £33 and the silicon disk is £154's worth of RAM chips and operating software.

RML is now at Mill St, Oxford OX2 0BW Telephone: (0865) 249866.

Chameleon blends either OS



Chameleon — micro of many colours.

PC compatibility apparently is no longer enough. The transportable Seequa Chameleon Plus, distributed here by Ferrari Software (Egham 38811) sports an 8088 and a Z80A, which makes it IBM PC and CP/M compatible.

Ferrari says the Chameleon will run the Microsoft Flight Simulator, (an increasingly used test of PC compatibility).

The machine has 128K internal RAM, expandable to 256K, and takes twin 320K drives. It has a built-in 9in monitor, serial and parallel ports, and comes with SuperCalc 3, TMS Illustrator and C-Term communications software.

The Chameleon Plus costs £1,995 plus VAT.

Oric systems interfaced

Oric and Atmos owners will be pleased to hear that Downsway has released a programmable joystick interface for their machines. The interface costs £29.95, more than twice the price of the interface from Pace, but Pace's isn't directly programmable.

Downsway's unit plugs into the Oric's expansion socket and is compatible via a nine-way socket with Atari, Starfighter, Pro-Ace, Sure-Shot and other joysticks. Eight directions may be programmed.

Contact Trevor Mele on 03727 27222 for more details.



Downsway's slot-in interface — joysticks on board for Oric owners.

Fuller gets a rocket from ad authority

The Advertising Standards Authority (ASA) has upheld no less than 26 complaints against Fuller Microsystems. The members of the public complaining had had difficulty getting equipment, including the FDS keyboard, from Fuller.

The complaints were upheld on the grounds that Fuller 'had failed to satisfy the authority that adequate steps had been taken to ensure that all likely demand could be met.'

Fuller was also criticised for its failure to inform customers about delays, and for its failure to withdraw advertising when it ran into supply problems. Refunds should have been offered, said the ASA.

Fuller itself has acquired another new phone system. Its shop is now on Liverpool (051) 236 4612, and any queries about orders should now go to 051-709 9280 or 051-709 0209.

■ Hardware and software companies also figured prominently in the ASA's report on complaints arising from mail order transactions. Anco Software (three complaints), Anik Microsystems (two complaints) and Odyssey Computer (two complaints) achieved the status of 'warning to the media'.

U-Micro adds 2

Spurred on by Apple's legal victory over Franklin, the UK's most successful Apple-compatible systems builder has produced a new machine.

The U-Com2 System 2 from U-Microcomputers is designed to run DOS3.3, the UCSD p-system, and Apple-format CP/M software. According to U-Micro's Dr Bill Unsworth, the legal action undertaken by Apple in the US and elsewhere has clarified the position and will actually help U-Micro.

'Apple's nominal victory over Franklin has opened up the whole Apple-compatible market whilst eliminating the Taiwanese copies,' he said. 'We have been selling our U-Com2 motherboard to OEMs for the last 18 months and because we have written our own firmware have had no problems with Apple.'

But it isn't only Apple that the System 2 will take on. 'We hope to give the BBC Micro a run for its money,' said Dr Unsworth. The new machine costs £689 but offers 64K with its 6502 besides the choice of OS and built-in disk drive.



U-Com2 System 2 — Warrington's challenge to Apple and the BBC.

MEP software criticised

There may be red faces in the Microelectronics Education in Primary Schools (MEP) scheme. Some of the Government-approved software supplied by MEP has been severely criticised by the Mathematical Association.

Four of the 32 programs in the Micro Primer pack were picked out as particularly poor, and some were described by the association as deficient or logically incorrect. Eight other programs were also labelled inadequate.

The Micro Primer pack has been supplied to some 19,000 primary schools under the Department of Trade and Industry's pound-for-pound scheme to equip schools with micros.

Richard Fothergill, director of the DTI's scheme has asked the Mathematical Association to compile a list of grievances and to meet the authors.

However, it seems that some of the criticisms may have been applied to programs taken out of the context of the package, so the issue may be resolved as just a difference of opinion over the teaching methods.

VIEW FROM AMERICA



Big money in the big league

By Chris Rowley

For all the fuss about Apple's '1984' ad for Macintosh, it only ran 18 times. IBM has now bought the PC Junior ad campaign to full power and since there is already a PC campaign, the new TV thrust means it sometimes appears that Big Blue's Charlie is never off the screen.

But IBM's allocation of $40 million for the Charlie campaign is just one indication of the muscle available to the six largest US companies.

On the first quarter of the year Big Blue reported a 23 per cent rise in net income from revenue of $9.59 billion. Over the past year IBM has cut prices sharply in its high-end mainframe business and sales of the 308X mainframe systems soared as corporate customers upgraded at the new low rates.

Indeed IBM demonstrated anew to everyone in the micro market just why it's such a fearsome competitor. The veritable Big Blue cornucopia opened up with new products slotting in all over the IBM product range: Display Writer software for the PC, a $429 colour monitor for the PC Junior, a $250 kit to give the PC videotex capability, and a $13,000 System 36 that can handle up to 86 terminals.

However, the much expected LAN system was conspicuous in its absence, leading to immediate speculation that IBM has run into technical difficulties.

In addition, if the early reports hold true, sales of PC Junior have been very disappointing. IBM, of course, remains publicly optimistic about Junior, but now that Big Blue is cranking on full thrust towards that envisioned world of networked IBM terminals, Junior may face an uncertain future. New improved PCs are on the horizon — portables and lap-held machines, and micros will emulate a Macintosh with VLSI chips and proprietary ROM codes underlying the software.

Of course that would mean the end of the 'open architecture' concept which helps make the PC such an overwhelming success, but with more than half the market to itself why shouldn't IBM lock customers in forever and maximise profits?

Laser phase

Most interesting IBM story of the month, however, is the news that the PC division in Boca Raton has placed an order for 1½ million digital audio disc players from a Japanese source. They will use double-sided laser discs that can store 400 Mb per side. Laser disc players transfer data at 1 byte per 6.2 microseconds — floppy disks take 32 microseconds, hard disks 1.6.

Meanwhile, Osborne resurfaced from the grave last week and announced the IBM compatible, 265K portable with 7in screen and Osborne keyboard for less than $3,000. If it can get it to market soon it may just catch Osborne loyalists on the upgrade. It will have to be quick though because this is the year the lap portable will come into its own. Apple's 7lb portable IIC has generated considerable excitement with its 128K RAM plus single disk drive for $1,300.

In a few weeks Hewlett-Packard will show off NOMID, the soft 256K lap machine. The 9lb NOMID will cost $3,000 and offer a single 3½in floppy, an "electroluminescent" flap screen, and bundled software in ROM chips including Lotus 1-2-3. The new screen technology will use less battery power and offer display graphs and charts created with 1-2-3.

However, the big sales story of the moment is the venerable Apple IIe which at $1,350 for a single disk, 128K system, is clearly a winner. In fact, since Apple raised dealer margins to 38 per cent, dealer advertising has blossomed all over the computer sections of newspapers and sales have gone above 100,000 a month, which is about as fast as Apple can make them.

For the first quarter Apple reported a 31.6 per cent sales increase to $300.1 million. However, heavy spending on Macintosh dropped profits by 62 per cent to $9.1 million. Strong continuing sales of the IIe indicate that Big Blue's strategy with PC Junior has not succeeded yet so Charlie may continue to grab TV time in the coming months.

Schools in need of education

By Josephine Siedlecka

Schoolchildren are being deprived of computer education because their teachers are not trained to use micros — and it looks as though the local authorities are to blame.

Early results from a BBC national survey suggest that though schools have been rushing to acquire micros under the Department of Industry (DoI) scheme, their understanding of these machines is sometimes limited.

Incredibly, while very advanced technology is introduced into schools, education authorities provide only the minimum of training for teachers in its use.

In Gloucestershire a primary school head teacher gave up after days of struggling to set up the new school micro, and asked the authority for help: the printing on the screen was inverted. An advisor (one of two responsible for the county) arrived to discover the monitor was upside down.

About 120 computers arrived in the first DoI delivery at a West Country Teachers' Centre. Teachers simply came in and took them away, with no instructions. No trained staff were available at the time, and security was top priority. The county advisor said, in retrospect, 'a half day's training session would have been useful'.

Now, along with instructions and a guide with their micros, teachers are given a number to call about any problem.

Over half Gloucestershire schools have sent teachers on one or two-day in-service courses. After 'unpacking instructions, the next priority is deciding 'where to put it', 'how to organise children to sit in front of it', 'where to keep tapes', and 'how to store the micro at night'.

Most teachers in most areas rely on limited advice from overworked teacher centre wardens, and local advisors. In Gloucestershire, software is provided by the local college of technology, and by some sixth formers. In Cheltenham there is a 'superb programming parent'.

With the ratio of micros to pupils dropping from one per 460 pupils to one per 210 last year, this year's figures are expected to show an even smaller ratio. Facilities for giving teachers know-how in new technology appear to be inadequate.

New angle on printouts

A utility that extends the range of a hard copy device towards infinity has been released by Softsel, UK distributor for Funk Software.

The package is called Sideways which is exactly what it does. Applications such as spreadsheets that might produce output too broad for a 132-column printer can be run through the utility and scrolled out sideways.

At the moment only IBM PC users can buy the £42 package. Among the printers it supports are the Epson MX 80/100 and FX 80/100 workhorses, graphics printers from IBM itself and Okidata, and the classy C Itoh Prowriter and IDS Prism models.



COMPUTE-A-FROG

MOST FRENCH PEOPLE (FROG 11-15) INTERESTED IN COMPUTING (VIC, 64, ZX) HOMEWORK TO EXCHANGE PROGRAMS ETC. ?

CONTACT : THE FRENCH CONNECTION SECTION "PATAMATIQUE" COLLEGE PIERRE DUBOIS

Cross-Channel computing

Parlez-vous Basic? A group of young Frenchmen with a nice line in humour wants to hear from you, to exchange programs, and generally to advance Anglo-French cooperation.

They call the scheme Compute-A-Frog and they're interested in Commodore 64s, Vic 20s, Spectrums, Newbrains and others. If you want to broaden your horizons write to Section 'Patamatique, College Pierre Dubois, 71 Rue Victor Boissel, 53017 Laval, France'.

AM's late riser

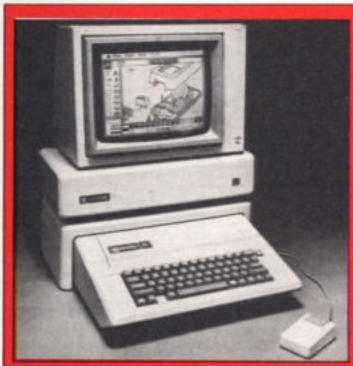
Coming in at the back of the grid but claiming three times the speed, AM International has launched its Stearns Business Micro into the PC race.

AM is better known in the printing and typesetting businesses but it has come in with a fully formed range of micros, starting at a 128K twin floppy system for £2,295 rising to a 256K machine with 20Mb on hard disk and with communications software for £4,495.

The micros run MSDOS, Concurrent CP/M-86 (they are driven by an 8MHz 8086) or an operating system called STDOS. 'But this is not an IBM clone product,' said AM's sales and marketing executive Alex Brisbourne. He added that it was designed to allow many programs to run unaltered — where they won't, AM may customise them.

The version of Concurrent CP/M that AM has implemented is not 3.1 — at the moment this system, with multi-tasking, windows, communications facilities and a degree of IBM compatibility, is under test and the company expects to be able to offer it in mid-June.

The name comes from the Stearns Computer company in the US, for which AM (0442 42251) is sole UK and Eire distributor.



APPLE TOO — Apple is certainly practising what it preaches about Lisa and Macintosh setting standards for Windows/Icons/Mice programs (Wimp). Now even your loveable old Apple II can be transformed by a mouse and accompanying software; Apple UK has launched the Mouse II, a graphics program called Mousepaint, and instructions for writing your own mouse-driven programs. The price is £135. On the face of it this compares well with Arktronics' rival system, called Jane (Issue 54) — Jane costs £314, but that includes a word processor, spreadsheet/calculator and filing system/mailing list. This system is due to be demonstrated in London in coming weeks and should become available shortly afterwards — at the moment Arktronics' distribution is based in Paris. Jane isn't a complete Wimp; the package doesn't rely on a mouse for input. But a feature of these types of packages is that one or other element of the full Wimp system may be missing without necessarily detracting from the whole. Digital Research's Concurrent CP/M 3.1 is a case in point and a potential standard bearer in its own right.

Systems fade as db goes on

One in three has been the hit rate for de Bono Technologies after the heady promises of its appearance at last year's Office Automation Show (Issue 15).

The company, founded by Peter de Bono, hoped to launch a dual processor Home Computer, a 27Mb sub-£2,500 business system, and a portable database called db^2 (de Bono Data Base).

Peter de Bono said last week: 'The machines have faded out for the time being, but the database is alive and kicking.'

In fact, the database is now available for installation on systems running CP/M, CP/M-86, or the Digital Equipment mini operating system RT11/TSX. In a multi-processing set-up the database can be accessed by different processors running under different operating systems. Besides portability from one machine to another the database also holds out the prospect to new users of being able to access and update existing file structures. But at £1,500 (to systems houses) it won't be a casual purchase.

The two micros, meanwhile, are not dead yet. 'There have been certain developments that appear to be coming to fruition,' said Mr de Bono, brother of the famous lateral thinker.

But he would not predict when they might see the light of day as commercially viable products.

SOFTWARE

The new releases

Business

IBM: It sounds like a contradiction in terms, but CACI (01-940 3606) has released a de luxe version of the Volkswriter word processing package, presumably for those who found the original a little too rough and ready. The Volkswriter De Luxe needs 128K, twin floppies, and PCDOS 1.1 or 2.0. Versions for the TI PC and Tandy's Model 2000 are due early in June. The price is £264 plus VAT. A spreadsheet driven by Voicedrive technology — a speech recognition system — has been unveiled by The Micro Technology Group (0892 45433). Just ask it 'What if?' and it hurries away to find out. What for? £995.

Spectrum: Kuma (07357 4335) has implemented its Home Budget software on the budget home micro. It aims to help you keep track of finances and at £5.95 is probably cheaper than bloodhound.

Prestel: Farmlink is the name of a package being supplied for farmers via Prestel, British Telecom's view-data service. So far it is limited to South West England but is planned to expand. Offering up-to-the-minute weather reports, market prices, and EEC manouvring, it should cost £4 a week to the average farmer.



Farmlink — Prestel gets its hands dirty.

Education

Oric: Wordsearch, for the Oric-1 and Atmos, has been launched by CDS Micro Systems (0302 744129); it is described as 'an educational family game'.

BBC: Hotline Quiz from Chalksoft (0905 55192) challenges you to keep open the White House/Kremlin hotline at a time of great international tension. To do this you have to answer a set of questions. It costs £11.95.

Games

Spectrum: Soft Concern (0926 496822) promises a new era in computer games with The Code, a combined spy thriller/puzzle/incentive scheme. It costs £9.95 but could win you £2,500. Less but more regular are the rewards promised by Micro-Gen (0344 427317) to Laserwarp aces — £100 a month to the highest scorer. Laserwarp costs £6.95. Micro-Gen has also issued a 48K Spectrum version of Star Trek for £7.95.

Atari: The English Software Company (061-835 1358) has issued Citadel Warrior for the 400, 800, 600XL and 800XL machines. Hazards include janitors. The game costs £9.95. The company has also released Dan Strikes Back, The Adventures of Robin Hood, and Graphics Wizard, all at £9.95.



Volkswriter — now the de luxe version.

PCN CHARTS



GAMES



			GAME TITLE	PUBLISHER	MACHINE	PRICE
▶	1	1	Jet Set Willy	Software Projects	SP	£5.95
▲	2	3	Chequered Flag	Psion	SP	£6.95
▼	3	2	Fighter Pilot	Digital Integration	SP	£7.95
▶	4	4	Manic Miner	S/W Projects/Bug-Byte	SP, 64	£5.95
▲	5	9	3D Ant Attack	Quicksilva	SP	£6.95
▲	6	11	Fred	Quicksilva	SP	£6.95
▲	7	8	Chinese Juggler	Ocean	64	£6.90
▼	8	7	Atic Atac	Ultimate	SP	£5.50
▼	9	6	Hunchback	Ocean	SP, 64	£6.90
▶	10	10	Flight	Psion	SP	£7.95
▲	11	15	BlueThunder	Richard Wilcox	SP	£5.95
▲	12	13	Night Gunner	Digital Integration	SP	£7.95
▼	13	5	Bugaboo (The Flea)	Quicksilva	SP, 64	£7.95
▲	14	17	Wheelie	Microsphere	SP	£5.95
▼	15	12	Rev. of Mut.C's	Llamasoft	64	£5.95
▼	16	14	Pinball Wizard	CP Soft	64	£5.95
▼	17	16	Lunar Jetman	Ultimate	SP	£5.50
▶	18	18	Blagger	Alligata	64	£7.95
▲	19	23	Space Pilot	Anirog	64	£7.95
▲	20	28	Pogo	Ocean	SP	£5.90
▶	21	21	Forbidden Forest	Cosmi	64	£8.95
▶	22	20	Scuba Dive	Martech Durell	SP, 64, OR	£6.95
▲	23	24	Super Pipeline	Taskset	64	£6.90
▲	24	27	Snooker	Visions	SP,64,AC,OR	£5.95
▲	25	—	The Snowman	Quicksilva	SP	£6.95
▼	26	22	Twin Kingdom Valley	Bug-Byte	SP, 64	£9.50
▲	27	—	Trashman	New Generation	SP	£5.95
▲	28	—	Pilot 64	Abbex	64	£7.50
▲	29	—	Android II	Vortex	SP	£5.95
▲	30	—	Code Name Mat	Micromega	SP	£6.95













MICROS

Top Ten up to £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▲1	3	CBM 64	£200	CBM
▼2	1	Spectrum	£99	SI
▲3	4	BBC B	£399	AC
▼4	2	Vic 20	£140	CBM
▲5	9	ZX81	£40	SI
▲6	10	Electron*	£199	AC
▶7	7	Oric 1/Atmos	£99/175	OR
▼8	5	Dragon 32/64	£175	DD
▶9	9	Apple IIe	£750	AP
▲10	—	Atari 800XL	£250	AT

Top Ten over £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▲1	2	ACT Sirius	£2,525	ACT
▼2	1	IBM PC	£2,390	IBM
▲3	4	Apple III	£2,755	AP
▼4	3	ACT Apricot	£1,760	ACT
▶5	5	DEC Rainbow 100	£2,359	DEC
▲6	7	Wang Professional	£3,076	WANG
▼7	6	Olivetti M20	£2,180	OL
▲8	—	Televideo TS 1603	£2,640	EN, CT, MID
▼9	8	NCR Decision Mate V	£1,984	NCR
▼10	9	Kaypro 10	£2,595	CKC

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the fortnight up to **April 5**. The games chart is updated every other week.

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT.

Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month.

PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.

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Frenzy	QS	£4.80
Fred	QS	£5.90
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Space Pilot	ANIR	£6.90

ORIC/ATMOS

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ATMOS PRINTER	£145.00	
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Oric Munch	TAN	£6.95
Ultima Zone	TAN	£7.95
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Oric Base	TAN	£12.50
Oric Calc	TAN	£12.50
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Please specify Oric 1/Atmos.

All tapes originals-not pirates. **All orders despatched by return.**

All prices *INCLUDE VAT AND POSTAGE.*

Make the most of your micro with these two new books

COMPUTING WITH THE ORIC 1

Ian Hickman



This new book is for all users of the Oric 1 micro. It complements the Oric Manual and can be used alongside it. An introductory section covers the initial switching-on and setting-up and is followed by some simple BASIC programming. Later chapters introduce more advanced BASIC, high-resolution colour graphics, the sound feature and interfacing, with a special section on the printer and another on machine code programming. A number of original programs are included in this practical guide.

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

Confusing controls cause chaos

Having bought my first computer (a 48K Spectrum) in January, I have acquired a number of games, some good, some not so good.

However, I find it extremely irritating that programmers do not stick to the same controls each time, so much so tht I will not now buy any game that does not either use standard cursor key controls (like 'Splat!') or does not allow you to select the keys to be used (also like 'Splat!').

In this respect 'Xadim' is useless since it presents two alternatives, neither of which uses standard (those shown on the computer) keys. 'Hungry Horace' is quite impossible for me as, having reached the exit on 'Splat!' several times, my fingers are educated to use the keyboard notations whereas Horace uses different direction controls.

PCN £10 Star Letter



Incidentally, on reaching the exit on 'Splat!' you still cannot get out as the game reverses to level 1 but at the speed of level 7.

M Jeanes,
Formby, Merseyside

Joysticks might uncross your fingers . . . but you have a point — Ed.

Would you credit this?

Perhaps I should entitle this Abandon Access since it covers my experiences in using the Access credit card for mail order.

In theory, using credit cards for mail order should be a fast, problem-free way of buying products through the post — not so! On September 16 I placed an urgent telephone order with a UK company expecting the product to be shipped that day.

When it had not arrived by September 28 I phoned to see when it had been shipped. I found it had not been shipped at all so I cancelled the order.

I was therefore extremely surprised when, at the end of October, the goods arrived shortly followed by my Access statement. My Access account had been charged on October 3 but the goods not shipped until October 10. Additionally, the address on the goods was incorrect (Chorley, Hants rather than Chorleywood, Herts) and so it arrived, via Hampshire and Chorley, Lancs.

Because of the roundabout delivery the packaging was in a very bad state — incapable of surviving the return journey. I therefore wrote to the managing director of the company advising him of this fact and suggesting the company collect the goods. At the same time I wrote to Access. The only real response was a letter from Access saying it had contacted the retailer who had written to me — not so.

In January I again wrote to Access who showed remarkable lack of interest. The only outcome was that the company phoned me and since they found it impossible to collect the goods I returned them, unopened, in their original packing on February 14.

To date there has been no further response from either Access or the company concerned — possibly the goods did not survive.

The only good point is that at least I have not paid for the goods (although my Access account shows an outstanding balance and ever increasing interest charges associated with it) and I now have a Barclaycard.

J Hall,
Chorleywood, Herts.

Hacking — a homely occupation

While computer 'hackers' and hacking is a serious problem to many people and organisations I must admit the thought of sitting up all night plugging at a mainframe hoping for a break (excuse the pun) sends a tingling up my spine.

I am by no means knowledgeable in the art of hacking, the truth is I just know some things I picked up from reading articles on the subject. The trouble is that, sensationalism being what it is, sometimes fact is replaced by this year's fiction.

I don't know if I am right in saying that in America the hackers are fairly well established and very proficient. I think they have an easier time of it than their British counterparts.

Computers most-used in Britain lack the technology for hacking. I know modems are cheap and commonplace, but they limit the user to Prestel and other databases and are not versatile enough for hacking. Is it possible to link up to a modem and, knowing a phone number, break into an otherwise restricted database without a more powerful machine than the Spectrum or BBC?

Paul Connolly,
Newcastle, N. Ireland.

Even the ZX81 could do it, Paul. No doubt readers will tell us of their success. — Ed.

Roll over Beethoven

I would love to explain why music cassettes cost half the price of computer games cassettes.

Beethoven's 9th runs 1½ hours; does Mr Wigglesworth (Issue 56) claim to have solved the Hobbit in 1½ hours. Further, Beethoven sounds the same every time I play it, and the graphics are poor.

Why should I reward an orchestra for spending 1,000 man hours *not* producing an original work of art. Very few Pacman clones make *PCN*'s best-seller charts.

I am currently writing a game I hope will sell. It certainly can't be written in 100 hours — it needs 10,000 lines of machine code (as much text as a paperback novel) and, unlike pop music, if even one word is wrong it won't sell.

Like all authors of tapes for home use, current Parliamentary legislation will require my tapes to be passed by the British Board of Film Censors and I worry more about corrupt civil servants and professional large-scale piracy than amateurs making back-up copies.

E Jackson,
Simplex Research,
London, E5

As a matter of fact, what about the Lynx?

Kevin Ball (Issue 56) states that small micros do not have factorial functions. This may be true of most small machines but not of the Lynx, which does have this mathematical function, along with a few other uncommon ones. It will return values up to and including 49!; 50! is out of range as 9.9999999×10^{63} is the largest number the Lynx can process.

A Rendall,
Middlesborough, Cleveland.

What price punctuation?

As one of Mike James' publishers, I was interested to read the recent review (Issue 55) of 'Language of the Dragon'.

Big raps over the knuckles having been applied (as commended in the review) over the number of typos, I belatedly tracked down the reviewer to find out just what these errors amounted to. It turns out they amount to nothing more than the odd capital letter here, and a comma there the sort of thing that gets missed somewhere between us, the author and the printer.

So when the reviewer suggests that the book deserves an entry in the Guinness Book of Records (for the computer book with most errors), surely this accolade ought instead be awarded to a book where the errors occur within the programs — which are actually acknowledged by the reviewer to be in perfect working order.

Further, it seems the reviewer has no quarrel with Mike's treatment of the subject matter.

Mike's mistakes, it seems, lies in his use (or rather misuse) of punctuation marks! Surely commas and semi-colons — in text rather than in programs — are not worth making a great fuss about.

Graham Beech,
Sigma Technical Press,
Wilmslow, Cheshire.

Not true, Mr Beech. Errors in text, however small, suggest inaccurate proofreading. Inaccurate proofing suggests errors in programs. This wasn't the case here, but unless we had tried it out, other readers couldn't have been so sure and a useful book might have gone unused. — Ed.

Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

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

ROUTINE INQUIRIES

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It's worth a wait for a printer

Q I have a Sinclair QL on order and want to buy a printer to go with it. The main purpose of the printer is to produce a good quality print when writing reports on the word processor. However, I would like it to be able to print graphics.

At the moment I am considering the Brother EP44 or Silver Reed EXD15, as I gather they can print with 'near daisywheel quality' but I have no idea of their graphics capability. Could user defined graphics be printed, or designs drawn on the TV display be copied?

I would like to be able to produce A5 leaflets which include graphics and writing. Any advice on the printers mentioned would be greatly appreciated.

Obviously I am going to have to wait a few months for the QL to arrive, but do you think it would pay to wait a few months longer for the printer, as better quality dot matrix printers become cheaper?

Also, will colour printers with a letter (or near letter) quality be available in the not too distant future?

C J Flint,
Welwyn Garden City, Herts.

A The two printers you mention will certainly give you good quality print, but there are a few cons as well. First, you'll find thermal paper is a little limp, so if you were sending out business letters on it they might look too flimsy. We haven't seen the Silver Reed, but in the case of the Brother, even when using a carbon ribbon you need light, shiny paper to get the best result.

Now as far as graphics are concerned, you'll be on even dodgier ground. You'll need software to allow you to do a screen dump, and while this should be available for the more popular printers, *ie* Epson, Star, Seikosha, it's unlikely to appear for the more exotic printer/typewriter kind.

You'll also find that those you mention are a bit more expensive than standard dot matrix printers, so if you just wanted a printer, not a typewriter, it would be cheaper to look elsewhere.

There are printers available that would almost fit your bill, but you'd be right to hang on for a while for new technology/-lower prices. There were a number of interesting looking efforts at the Hannover fair this spring, and we should be seeing them in this country during the summer.

You'd be right in thinking that colour printers could fit the bill in a couple of years' time. Dot matrix printers are acquiring denser and denser heads, and the Japanese are currently working on printers that couple super-high density print heads with three-colour ribbons. Once this is sorted out, it will be possible to produce full colour printouts on a sort of RGB basis.

Currah-Atic Atac gossip is untrue

Q I have a Currah Speech system for the Spectrum. The unit itself is excellent, but the advert said that it would work with Ultimate's Atic Atac; however, I find the game NEWS itself when I try to play it. I can play it without the synthesiser, but I've tried many other copies of Atic Atac with the same result.

Colin Cheung,
Wallington, Surrey

A Someone seems to have started a rumour that Atic Atac is compatible with the Currah — it isn't. You don't say whose advertisement it was that made you buy it, but we believe that someone made a mistake at one point, and the rumour started from there.

You'll find some add-ons can interfere with the running of particular programs, and this would seem to be your problem. If you want your money back, and still have a copy of the advertisement, you seem to have a good case for a refund. Otherwise you'll just have to unplug your Currah when you want to use it.

Atmos loading checks are over-careful

Q I intend to purchase an Oric Atmos at the end of this month, but I read that the machine has carried over a tape loading problem from the Oric-1. Is there a tape recorder on the market compatible enough to eradicate this, or at best cut the chances of bad loading?

Also, would the Ikon Hobbit match the Atmos?

P Andrews,
Doncaster, Yorks.

A You're half right about the Atmos. It does indeed have tape loading problems, but they're not carried over from the Oric-1. The Atmos runs through a considerable number of error checking routines to make sure it's loading a program properly, the net result being that the machine often thinks it's failed when it's succeeded. A case of too much of a good thing.

So it's really nothing to do with the tape recorder. The trick is to use the routine on the tape that comes with the Atmos to disable this error checking. The Ikon Hobbit, unfortunately, won't work with the Atmos. If you want to improve your storage, it would be best to save up for something like the Byte Drive 500.

Sound advice for Spectrum

Q Are there any kits (around £50) available to turn my 48K Spectrum into a synthesiser type machine, with full sound, three or more sound channels, and with drum capabilities.

Secondly, I'd like to know if I am able to use joysticks plugged into the Sinclair Interface 2 with games not in ROM form *ie* cassette games.

Robert Goodyear,
Worcester.

A The best you're likely to achieve on this front is to get a separate sound board that incorporates a sound chip. This will give you three sound channels, but you'll have to write most of your own software for it, and no way will it turn your Spectrum into a proper music synthesiser.

Phone Maplin on Southend (0702) 552911 for details of what's available.

Interface 2 is simply a joystick interface that has provision for cartridge games, so you'll have no problem running cassette games with it, provided the manufacturer of the game has made provision for using Interface 2.

More and more manufacturers are doing this, but you'll still run across many games that won't work with Interface 2.

Kempston Interface software update

Q I recently purchased a Seikosha GP-250X dot matrix printer operating from a ZX Spectrum and a Kempston Centronics interface. I have not yet been able to obtain screen copies other than text. I have tried the program listed in the literature for the Epson printer, but this does not help. What software or routines could sort out this problem?

Roger Davies,
Llanfyllin, Powys.

A It sounds as if you have one of the earlier issue Kempston interfaces. The current ones go out with copy software for a number of major printers, including the Seikosha. You can however get a copy of the current software by contacting Kempston (0234) 852997, or writing to the company at Unit 30, Singer Way, Woburn Road Industrial Estate, Kempston, Bedford.

ZX LPrint III compatibilities

Q Could you tell me if the Euroelectronics ZX LPrint III is compatible with Tasword 2, and if the interface operates from the Basic keywords LLIST and LPRINT like the ZX Printer?

D Snowdon,
London E18.

A We haven't seen the LPrint III yet, but as it's an upgrade of the LPrint II it's not likely you'll have any problems using it with Tasword. As an aside, anyone with a printer interface not covered by Tasword 2 might like to contact Tasman Software on 0532 438301, as the company is understandably keen to have Tasword operable with as many interfaces as possible.

The ZX LPrint III can operate with LLIST and LPRINT, and Euroelectronics also sells screen dump software that will allow you to use COPY with a number of major printers. The company's address is 26 Clarence Square, Cheltenham.



MICROWAVES

More hints and tips to make programming a little easier.

If you have found any unusual, clever, neat, or just plain fascinating tricks or tips that you think may be or interest to other readers, why not send them in to Microwaves. We pay £5 for every tip printed and every month we will award £25 for the tip that we consider to be a Megawave.

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

Unlistable Lynx program protection

POKE &621B when added to the beginning of a program will make it unlistable and will cause any input to be rejected once the program has been stopped. For this reason the program must run automatically as soon as it is loaded.

&621B/C holds the pointer to the input syntax checking table, &1560 on power up. The POKE given above changes the pointer to 0000 and any attempts at input will be stopped.

Bob Towers,
Hamilton, Strathclyde

Oric's graphics extended easily

As many readers may know, the Oric-1 boasts a display of 28×40 characters, yet it is impossible to place characters onto the top line without resorting to POKEing them individually. The Oric-1 reserves this line for system messages, just like Ceefax and Oracle.

There is a simple solution to allowing direct access to this line via the print statement. Simply type:

```
POKE#26D,88:POKE#26F,28
```

This sets the start of the accessible display file 40 bytes back from the original position and so incorporates an extra line of 40 characters. The second POKE tells the Oric that there are now 28 lines as opposed to the original 27. It will work on either 16 or 48K models but it does have the following drawbacks:

- Direct use of PAPER and INK statements will not alter the top line (as it does the other lines) until a CLS is executed.
- If PAPER7 is selected the status messages (Loading . . . Saving . . . CAP etc.) will not be seen.
- Whenever the machine is switched from HIRES to TEXT mode, the Oric always resets back to a 27×40 display.

To return the Oric back to normal, type:

```
POKE#26D,128:POKE#26F,
27:POKE DEEK (#26D),0
```

N Jones,
Middlesbrough, Cleveland

Key notes on the Commodore 64

Here is a routine for the Commodore 64 to provide one of three audible tones to indicate a key being pressed. The Return key gives a high pitched tone, the cursor and function keys are indicated by a medium pitched tone and the alphanumeric keys give a low tone.

The keyboard feedback routine could be included as part of a Basic program or used while entering programs. It also provides a convenient means of experimenting with the various waveforms and envelope controls to alter the sound produced.

The keyboard tones are switched off by pressing the Run/Stop and Restore keys, and can be re-initialised by entering SYS 50000. Line 70 will prevent the program from crashing should any of the DATA statements have been entered incorrectly. This line can be removed once the program has been run successfully.

S A Sassoon, Long Stratton, Norfolk

```
10 REMxxxxxxx KEYBOARD FEEDBACK xxxxxxxx
20 POKE 54275,8    :REM PULSE WIDTH
30 POKE 54277,36   :REM ATTACK/DECAY
40 POKE 54278,9    :REM SUSTAIN/RELEASE
50 POKE 254,65     :REM WAVEFORM
51 :
60 FOR D=0 TO 54 :READ MCODE :POKE 50000
+D,MCODE :T=T+MCODE :NEXT
70 IF T<>6539 THEN PRINT "PLEASE CHECK D
ATA":END
80 SYS 50000
90 DATA 120,169,98,141,20,3,169,195,141,
21,3,88,169,15,141,24,212,96,165
100 DATA 197,164,254,136,201,64,240,22,1
62,128,201,1,240,12,162,64,201
110 DATA 8,144,6,201,51,240,2,162,16,142
,1,212,200,140,4,212,76,49,234
```

Data statements in 64's memory

The following program for the Commodore 64 can be used to make writing DATA statements a lot easier. It converts an area of memory into data statements, starting at a specified line.

Run the program and enter the first line number you would like to be used, then enter the start and finish addresses for the appropriate data and watch.

The maximum amount of data that can be used, at any one time, is 144 bytes.

James Marsden, Eastbourne, East Sussex

```
1 POKE53280,8:POKE53281,6
2 CLR:INPUT"■FIRST LINE NUMBER";LN
3 IFLN<300RLN>63999THENRUN
4 INPUT"START ADDRESS";S
5 INPUT"FINISH ADDRESS";F
6 IFS>=FTHENPRINT"■ADDRESS ERROR■":GOTO4
7 IFF-S>144THENPRINT"MAX DATA IS 144 BYTES":GOTO4
8 PRINT"■"
9 PRINTLN;"DATA";:C=C+1
10 FORV=STOS+16
11 IFV>FTHENPRINT"■ ":GOTO19
12 P=PEEK(V):P$=STR$(P)
13 P$=RIGHT$(P$,(LEN(P$)-1))
14 IFV<>S+16THENP$=P$+","
15 PRINTP$;:NEXTV:PRINT
16 S=S+17:LN=LN+2
17 IFS>F ORC=9THENGOTO19
18 GOTO9
19 PRINT"GOTO23"
20 FORV=1TOC+1
21 POKE630+V,13:NEXTV
22 POKE198,C+1:PRINT"■";:END
23 PRINT"■■DATA STAEMENTS ENTERED."
```

Simplified editing on the TI-99

I have recently discovered a tip about editing lines which TI-99 owners may find useful.

As you may know, to edit a line in TI Basic you have to enter EDIT and then the line number (like in extended Basic). Instead, if you just type in the line number you want to edit and then press FCTN 'X' or 'E', that line should come up onto the screen in edit mode.

Shahid Sarwar,
London NW8

Reversing Oric's redefined characters

Many programs for the Oric-1 make use of the user defined characters, but this has the disadvantage that when the program finishes the characters remain redefined. There is a method of correcting this and it requires just a single CALL. Insert CALL#F888 before each END or STOP statement.

The routine at this address in ROM does a number of things. First it resets the VIA and 8912 chips, enabling the keyboard and switching off the sound. Next the cursor, key-click and VDU are enabled, the INK and PAPER colours are set to black on white and the screen is reset to its original format. Then the character sets are defined. (Note that if you only want to reset the alternate character set, CALL #F7E0 will do the job.) Finally Caps is switched on.

Three other addresses to CALL that might be useful are: #F882, #C000, #003.

C Hamilton,
Belfast, N. Ireland

Make your Oric unstoppable

While looking through the Oric's ROM I found the following useful CALL. It allows a Basic program to be executed from machine code. Just CALL or JMP (from M/C) #C765 and the effect is identical to entering RUN.

This may be useful for stopping 'software pirates' who stop auto running programs. Hence using:

```
POKE0,76:DOKE1,#C765:
DOKE#1B,#F426:CSAVE"
PROG",AUO,A0,EDEEK(#9C)
```

should make the program unstoppable.

James W Eibisch,
Cheltenham, Gloucestershire

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Geof Wheelwright, Ralph Bancroft and Richard King enter the realm of the takeaways.

A Party of portables

The world of convenience computers has arrived with a vengeance.

A happy convergence of affordable CMOS memory and similarly available flat-screen technology has recently resulted in a 'first flush' of impressive-looking lap-held or reasonably portable desk-top systems. When it comes to running standard operating systems (and these days that means MSDOS) the larger, disk-based, full-screen luggables still rule the roost, but if you're into real portability and you don't particularly want to run Lotus 1-2-3 then one of these convenience computers could be for you.

The Grid Compass features bubble memory, an 80-column by 24 display, an electro-luminescent screen and a £5,000 price tag. It has the unique distinction of being used on the US space shuttle, where it was code-named SPOC (the Shuttle Portable Onboard Computer).

Second is the Husky Hunter, a very portable portable that is half the size of the NEC PC-8201A and Tandy's Model 100. It has 80K, a CP/M operating system emulation and features a 40-column by 8-line LCD display. Memory can be expanded to 208K and the machine is supposed to be waterproof and unbreakable. The price for the basic machine is £997.

The final micro in this selection is Canon's X-07, the cheapest in the current crop of portables, but also the least powerful. It does, however, have its innovations including a unique 'credit card' RAM storage system. The X-07 is not yet scheduled for release in this country, but is expected to sell for about £250 when it arrives.

The Rolls-Royce of portables, the Grid Compass, is not as fast or as powerful as the technology now allows but is still expensive, thirsty on fuel and with lots of style.

Presentation

Thame Systems, the distributor, supplied the micro and a single disk drive in a zip-up carrying case, that is (like almost everything else) available as an optional extra.

The micro is housed in a slim, trim painted magnesium alloy case, small enough to fit into your average executive style briefcase with room to spare.

The construction is certainly robust. Thame Systems was anxious we should look after the machine carefully, a request we were more than happy to abide by. Unfortunately the micro and accompanying drive did in fact fall off the desk on to the floor, but on subsequent power-up it sprang to life without so much as a whimper.

Pushing two catches at the side, the front portion of the top cover tilts up to reveal a restful amber coloured flat screen.

If the colour of the flat screen is unique among lap-held portables then so is the resolution. A full 80-column and 24-line display is available compared to the usual 40 columns by 8 lines. This remarkable resolution is achieved with a new kind of screen called an electroluminescent display. The result is a screen that was previously only available by way of the traditional bulky cathode ray tube.

The keyboard has the usual keys plus two marked 'Code'. Unfortunately, they were located either side of the space bar which proved inconvenient. A similar criticism applies to the down cursor key that tended to be hit instead of the return key on its immediate left.

Unlike the previous portables, the Grid does not have an integral battery power pack so it is only as portable as the nearest mains socket.

However, for an extra £350, you can get a portable battery pack/charger unit.

In use

The initial enthusiasm for the look and feel of the machine soon gave way to frustration as we tried to get to grips with the Grid operating system. In an attempt at clarity and ease of use the system requires the user to complete an on-screen form to call up an application and its associated data file.

As a result, something as simple as deleting a file means completing four separate fields on two separate forms: a process made easier (but more time consuming) by calling up a menu of possible options for each field. Using the cursor control keys you skip to the option you want



The grid Compass displays its logo to indicate that it is ready for action. A list of control codes is included above the keyboard.



The Grid's separate disk drive — Disk System 2102.



The Compass is propped up on a flap in the bottom.



The disk drive (and the micro) can use 110 or 220V mains.

and press return. On completion, the Grid asks for confirmation.

Many operating system commands are effected using the code and another key. This has the virtue of simplicity but can be confusing to a first time user. Another frustration is the time taken to load a file or application from the bubble memory (or, indeed, the disk drive) and that with a fast processor and maths co-processor. A weak link in the chain somewhere, perhaps.

The Compass has a minimum of connections to the ouside world. A GPIB (or IEEE as it is usually known) connector is used for hooking up the disk drive units. The RS232C/RS422 will help with printers, modems and other serial devices, though the use of a non-standard connector may create unnecessary difficulties for those who already have this kind of equipment. The lack of any kind of monitor output and a Centronics parallel interface is unfortunate.

The Compass also has two sockets marked telephone line and telephone audio. They have been designed to work with an integral modem which is provided with the standard machine in the United States. So far, the UK approved modem is not available, but should be 'in the near future'. It will add £800 to the price of the basic model or £1,060 if you purchase it as an upgrade to your existing machine.

In the States Grid operates a service known as Grid Central which not only provides a means of obtaining software but also for the roving micro user to use it as yet another storage device. When out and about you can send a data file to Grid Central and download it again back in the office. The intention is to offer a similar service in the UK.

Software

If you think the Compass is expensive, take a deep breath. The software costs extra. The Grid integrated management software costs £785 and includes spreadsheet, text editor, filing system, graphics generator and printer and plotter driving routines.

The MSDOS operating system sets you back £135 and applications like Lotus 1-2-3 and Wordstar will cost £435 each.

To take advantage of these applications you will need the disk drive unit. The basic 256K machine can realistically hold two applications together with their associated data files and the operating system. But you can unload files to disk and upload new applications, as you need them, into bubble memory.

The available MSDOS software covers all the top selling titles. Apart from the ones already mentioned MultiPlan, R:Base 4000, dBase II, Condor (series 20-3) and TK!Solver are offered. The full range of Microsoft languages can also be run on the machine.

Verdict

As with a Rolls-Royce, if you need to ask the price you can't afford it. The same epithet must surely apply here. The basic machine plus Grid's own software, plus single disk drive and integral modem will set you back £9,000. Not surprisingly, the manufacturer sees its buyers as top executives in top companies for whom £9,000 for an executive style status symbol is small change.

But does the price justify the quality of the product? The answer must be no. Certainly, it is well made and looks very, very nice. But inside the box is a computer that offers little more than the Sharp PC5000 (Issue 51) priced at £1374 or the Gavilan which costs something like twice that.

The innovative screen technology is undoubtedly the major attraction. But the slow access times on the bubble memory, the user violent menu system and the need for an external power source are major disincentives.

If anyone ever says that you'll never get a 'real proper' computer that you can stick in your pocket, just drag out a Husky Hunter. A shade under 22cm long, 16cm deep and 3.5cm high (8½ × 6 × 1½in), it'll fit in a largish pocket. Inside is a CMOS version of a Z80, 48K of ROM, 208K of RAM and a programmable serial port. Most remarkably it also has CP/M on board.

The Hunter runs an operating system called DEMOS, which provides all the necessary functions, supports an enhanced Basic and in addition manages the four 48K banks of RAM so that the user has a 48K space with the remainder set up to look like a reasonably large disk drive.

Construction

Physically the Husky Hunter would look at home on a tank. It is completely solid, no moving parts, expensive, and obviously aimed squarely at people who get cold and wet in faraway places.

Apart from the sheer chip-density inside which must be about as high as you can get, the main reason for the solid, weighty feel is that the casing is diecast aluminium, and quite a bit of it. It's sealed with moisture-repellent plastics and, apart from the battery-compartment lid which is threaded and sealed with an O-ring, there's no way in for anything.

It's a little smaller, and unlike either the Tandy 100 or the NEC, the keyboard is more like a calculator with small square keys arranged in qwerty-layout. The rectangular matrix allows a couple of extra keys to be fitted in without making the whole thing either too big or too packed, but will slow down any moderately-competent typist.

The screen has eight lines of 40 characters, the bottom line being used for eight function key labels, and the actual function keys being provided as Control-1 to Control-8. The actual LCD itself is rather more deeply-recessed than usual, behind fairly thick acrylic faceplate, which is almost as tough as the metal casing.

On the left-hand end is a 25-way D-connector (male) which provides the RS-232 serial port, and on the back is an unusual 4-way female connector called a LEMO socket, which is used as a single-bit port for use with bar-code wands.

The rest of the case is almost featureless except for the battery-compartment cover, a metal disc 2cm in diameter with a slot for a coin across the face which screws down to form a watertight seal, and a threaded hole in either end of the case, into which a wrist-strap can be screwed.

21▶



Small but heavy — a deftly swung Husky Hunter could prove an effective deterrent to potential muggers.

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◄19

There are quite a few differences between the Husky and other portables, some of which derive from the problems of making the machine really tough, others simply good ideas. One of the former is the contrast-control for the LCD. On most true portables this is a simple thumbwheel, which is all that's needed. However, any additional openings in the case of the Husky Hunter would be unacceptable, so the designers have made this a 'control-UP/control-DOWN' function of the cursor-keys, which solves the problem neatly by involving the CPU and making the entire keyboard 'soft'.

Another feature which falls in the category of 'good ideas' is also a function of the cursor keys, which are organised so that their shifted values cause the whole screen to scroll, thus turning the LCD from a 40-by-8 window into a full-sized 80-by-24 virtual screen.

Documentation

If not particularly well edited or checked, it is very comprehensive, well organised, and as useable as any I've seen. If anything, it's a bit too comprehensive; for example, not only is the complete instruction set for the NSC800 (CMOS Z80) listed, but so is every possible hex value for each instruction, including all the possible addressing modes and register usage.

Admittedly, using these tables you could write and enter quite large and sophisticated machine code programs as data statements in Basic programs . . . but who would be masochistic enough or sufficiently desperate to try?

Apart from that slight case of overkill, the documentation is as complete as anyone could want.

Operation

Apart from the specialised functions described, the operation of the machine is much the same as any other CP/M computer. The Hunter comes complete with Wordstar, and if you want to load it up, Multiplan, SuperCalc, dBase II and anything else you can fit. Whether it's actually worth doing so is something else.

The main problem with the Husky Hunter is that although there may be a complete CP/M computer in there, as big or bigger than many, the keyboard is so slow to react that it's virtually unusable.

It's not possible to examine it, but underneath I'm sure there's a membrane-keyboard, obviously of considerably higher quality than those on the Spectrum or Atari 400, but substantially the same and suffering many of the same faults . . . lack of precision, a rather rubbery feel and so on.

Surely British ingenuity can produce a totally-submersible keyboard or key-switch which is as responsive as any other keys?

When you're writing, you don't want to think about the physical process of pressing the keys . . . it's quite enough trying to put the apostrophes in the right place.

If the Husky Hunter didn't have 'proper' software, thus leading you to expect a given performance from it, perhaps it would be less frustrating.

If the machine couldn't handle Wordstar I'm sure you wouldn't miss it, provided such software as was available worked and wasn't obviously limited by the hardware.

That isn't to say that the Husky Hunter isn't fit to use . . . in the right place it would be almost perfect, but though it may be able to handle the 'ordinary' CP/M applications, I don't feel that it's best suited to them, simply because they are mostly heavily keyboard-bound. For the same reasons, the Husky Hunter won't make a good program-development machine.

Verdict

The Husky Hunter would appear to be best applied as a kind of alter-ago for a regular machine, running large data-gathering or in-field interpretation programs. Any such programs would have to be designed with the Husky Hunter in mind, and since the keyboard is so much less responsive than an ordinary one, it would be a good idea to make extensive use of single-key commands and function keys.

With this proviso, and since there really isn't a lot of choice if you want a machine which you can generally abuse and expect to continue working, I'm sure the Hunter will prove quite popular among those professions which need this kind of quality.

The Canon X-70 is the cheapest in this collection of off-beat portable offerings and is also not yet available in the UK.

The word is that the price will be about £250 and Canon will offer a colour printer/plotter, an RS232C expansion box and both ROM and RAM cards for the X-07. The X-07's strongest suit is not in peripherals, but rather what comes standard with the machine.

Features

The X-07 is a collection of good ideas that seem to have found a halfway house inside a portable that can't hope to make the most use of them. These good ideas inlclude the development of credit card sized 'program cards' which act as either ROM based programs or a battery backed extension to the existing 8K CMOS RAM (expandable to a maximum of 16K inside the machine), the option of using an optical link to send data over a short distance, and the foresight to include a volume control on the side of the machine.

A major problem with all these great ideas is that there isn't a great deal you can make of them on the X-07. The size and nature of the machine's keyboard (small hard-plastic keys similar to those on Tandy's old colour computer) and the 20-character screen severely limit any use the machine might have as a portable notebook in the NEC PC-8201 or Tandy Model 100 league, although the credit card plug-in ROMs would be a great place to offer quick and simple applications programs for just such a notebook.



The full Canon complement of miniature micro, colour printer/plotter and optical link which fits snugly underneath.

The optical coupling communications system would be a great way of doing away with all the cabling usually involved in data transfer, if the X-07 had any decent programs to allow you to collect data in such a way that it would be worth transferring. Although Canon are offering such programs, there are limitations imposed by the hardware.

17 ►

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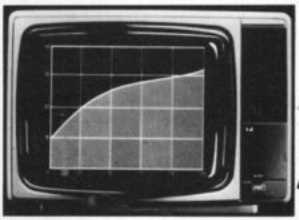
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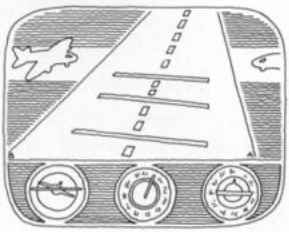
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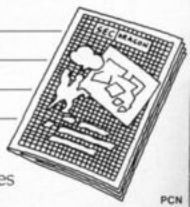
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◄ 15

In use

Having said all this, I still must admit that the X-07 is a greate deal of fun to use. As long as you don't take the machine too seriously, you're not likely to be frustrated by the limitations I've pointed out. It has an excellent implementation of Microsoft Basic, provides much better facilities for playing games than dedicated Game and Watch cards, includes a built-in real-time clock you can use as an alarm and handles both sound and graphics.

If you're in need of a portable for developing programs in Basic that you later might want to transfer to a bigger machine, then the X-07 might even have some practical applications for you. It also has a built-in numeric key pad that lets you use the machine as a calculator, with an alternative set of values for some keys on the right of the machine.

A large international character set is included in the ROM, so you can incorporate anything from French to Japanese in your programs, and two parts of the character set can be redefined as your own graphics characters. A demonstration cassette that comes with the machine makes great use of this in the form of a car-race game, including lots of on-screen traffic and even a detailed pit-stop scene in the middle of the course, all using user-defined graphics.

Storage is provided either in the built-in CMOS RAM, optional memory card or onto cassette tape. The data is stored by being output to a number of pre-defined devices, including the screen, the optical coupler, several types of printer, a cassette recorder and a RAM file. A directory of files in RAM is displayed with the DIR command.

Documentation

The documentatin is comprehensive and helpful. It comprises three small paperback books: the User's Guide, a Programming for Beginners book and a Basic Reference Manual.

The User's Guide is a 135-page document that includes explanatins of how to best use the hardware as well detailed pin configurations for the cassette connector, the serial port connector, the parallel port connector and the 40-pin extension connector.

The Programming for Beginners book is a step-by-step introduction to Basic programming, including a thorough discussion of flow-charting and lots of small example programs that well illustrate the capabilities of the machine.

Verdict

The Canon X-07 is the ZX81 of the portable computer world. It is cheap and quite competent in Basic programming, but it doesn't have too many real or serious applications. You get the definite impression that this machine would have been a real trail-blazer had it been released in the UK a year ago.

A difficult comparison

The three portables in this Pro-Test aren't directly comparable; they're all designed to do different things at different prices.

Grid's machine is a 'price is no object' portable micro in the Ferrari class, using the best flat-screen technology American money can buy and tested by the military and even the astronauts aboard the space shuttle.

As a portable business micro it's perhaps a bit over the top. It costs more than most business machines (actually about two times as much as most business machines), and you're paying the price for state of the art.

The Husky Hunter is much, much cheaper but also offers portable business applications. It's problem, however, is in being too much of a good thing — it's too small. The size has forced the keyboard to be squashed into such a small space that only a hard-top or a spongy keyboard can be used. And even the hard-top keys that Husky has opted for are not really of the quality you'd want for typing.

Unlike the Grid, which is really an extravagance, the Husky does have its place. The fact that it's built like a tank and can survive all kinds of weathers means that its ideal for data-entry in the field (and as such has been taken on by the Ministry of Defense), particularly with its CP/M operating system compatability.

The Canon X-07 is, more or less, just there to have fun with. It's difficult to condemn a machine that's such good fun and has so many good ideas built into it. Alright, you can't use it for word processing or compile much of a database or develop a spreadsheet with it, but if the price was a bit lower it would be worth buying as an enchanting and instructional pastime.

HUSKY HUNTER

SPECIFICATIONS

Price	£1,000
Processor	NSC800-4 (CMOS Z80 running at 4 MHz)
RAM	CMOS 80K with optional expansion to 208K
Screen	LCD — 40 characters by 8 lines
Keyboard	Hard plastic calculator-type, 8 user-defined function keys, 5 cursor-control keys
Interfaces	Full RS232C serial interface (can be used with modems or printers)
Operating system	CP/M emulation
Language	Microsoft Basic
Distributor	DVW Microelectronics, Coventry (0203) 668181

CANON X-07

SPECIFICATIONS

Price	about £250
Processor	NSC800 (CMOS Z80)
ROM	20K with Basic (optional 8K ROMs)
RAM	CMOS 8K with optional expansion to 16K
Screen display	LCD — 20 characters by 4 lines
Keyboard	Hard plastic calculator-type, 49 alphanumeric keys, 6 user-defined function keys, 5 dedicated cursor-control keys
Interfaces	Parallel printer port, cassette interface, serial interface (can be used with optional optical coupler)
Language	Microsoft Basic
Distributor	Canon UK, Croydon 680-7700

GRID COMPASS

SPECIFICATIONS

Price	£5,195 plus VAT
Processor	8086 plus 8087 maths processor
ROM	16K
RAM	256K
Bubble Memory	384K
Screen	6in amber electroluminescent flat panel display. 80 columns by 24 lines, 320 by 240 pixel graphics
Keyboard	57 key standard typewriter keyboard with extensions
Interfaces	GPIB General Purpose Interface Bus (IEEE-488) RS232C/RS422 serial
Operating System	GRiD OS, MSDOS optional
Distributor	Thame Systems, Thame Park Road, Thame, Oxon Tel: 084 421 5471

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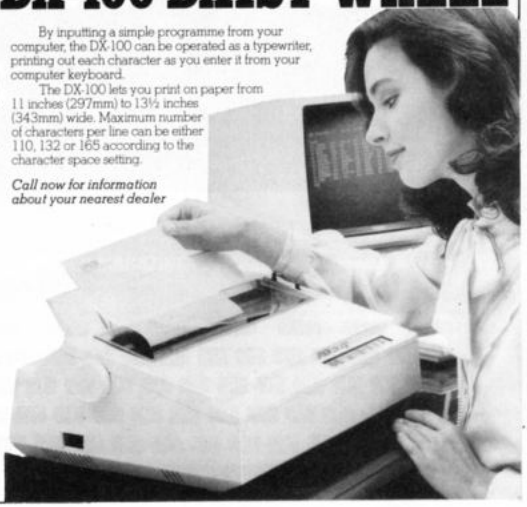
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"Leaves the Atari, Dra and Lynx



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"The first cheap, high performance computer..."

"Double precision numbers ... are ideal for companies with turnovers under £999,999,999,999.99."

Spectravideo SV 318: Memory – 32K ROM expandable to 96K, 32K RAM expandable to 144K: **Keyboard** – calculator type, 71 keys, 10 function keys, built in joystick/cursor control: **Graphics** – 16 colours, 256 x 192 high resolution graphics, 32 sprites: **Sound** – 3 channels, 8 octaves per channel: **CP/M* compatibility** – over 3000 existing software packages: **Storage** – cassette drive, 256K disc drive capacity: **Suggested retail price** – £186.

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An assembler makes machine code manageable, says Keith Hook.

Assembly line

There are two ways to write a machine code program — the hard way or the easy way. The hard way is to hand assemble each instruction into hexadecimal and then poke it into memory. The easy way is to allow the computer to deal with the translating of the code, and a program that enables the micro to do this translating is called an assembler.

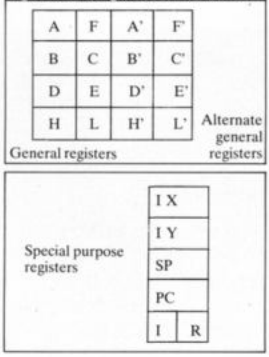
The assembler translates your code, written with mnemonic instructions and called the source program, into the object program, a machine language program which the computer executes when loaded into the machine.

Input into assembler→ Source file
Output from assembler→ Object file

Most assemblers also contain a sub-program called an editor. This allows you to correct or change your object code in just the same way as you would edit a Basic program.

Take a look at how a CPU deals with data and information. In this case we are dealing with the Z80 chip.

Figure 1: The registers of the Z80 CPU



The Z80 contains two sets of eight internal, general purpose registers — A,B,C,D,E,F,H and L: and A',B',C',D',E',F',H' and L'. The registers designated ' are the alternate registers which can only be accessed by the two instructions EX AF,AF' and EXX. These only exchange the contents of the main set with that of the alternate set. Only one set of registers can be used at one time. Following these eight bit registers are four 16-bit registers: IX,IY,SP,PC. The registers I and R are seldom used by the programmer.

The A register is also called the accumulator because many of the arithmetic and other instructions use the contents of the A register as an operand. In fact this is where most of the transfers takes place. The F register is also called the FLAG register because this register sets or resets bits internally to indicate a true or false type of condition and is never used for computations.

The 16-bit PC register points to the current memory location which holds the instruction to be executed and is referred to as the Program Counter. The SP (Stack Pointer) register keeps a check on the position of the 'stack' in RAM. The IX,IY registers are two 16-bit indexed registers with very powerful programming possibilities as we shall see in later articles.

Each of the eight bit registers can be used separately or in set pairs — BC,DE,HL and treated as 16-bit registers.

It is your responsibility, as the programmer, to keep a check on what is contained in each of the registers and then you will know if it is possible to change their contents without affecting your programs.

Assemblers have their own set of rules, but they aren't difficult to learn. To show you how easy it is to convert a Basic program into assembly language, and to demonstrate some of the assembler's special instructions, look at Figure 2.

Figure 2: Basic program

```
10 FOR I = 1 to 10
20 READ A$
30 PRINT@SCREENLOCA$
40 SCREENLOC = SCREENLOC + 1
50 NEXT I
60 GOTO 60
70 DATA
   "1","2","3","4","5","6","7","8",
   "9","10"
```

Object code

```
            ORG 5900H
SCREENLOC:  EQU 4400H
            LD
            HL,SCREENLOC
            LD DE,DATA
            LD B,OAH
AGAIN:      LD A,(DE)
            LD (HL),A
            INC DE
            INC HL
            DJNZ AGAIN
LOOP:       JR LOOP
DATA:       DB
            1,2,3,4,5,6,7,8,9,0A
            END
```

Notes on the object code

ORG 5900H tells the assembler to start assembly so that when the program is loaded into the computer it will start at location 5900 Hex. This location is purely arbitrary and is only governed by your memory layout.

SCREENLOC: EQU 4400H tells the assembler that whenever it comes across the label SCREENLOC it must substitute the value 4400Hex.

LD HL,SCREENLOC will cause the assembler to substitute the value 4400H and the HL register pair will point to that location. LD DE,DATA will cause the DE register pair to point to the memory address of the DATA label.

LD B,OAH means the register now contains 10 decimal.

AGAIN: LD A,(DE) means the A register will now contain the value which is held in the location pointed to by the DE registers. It's similar to LET X = PEEK(DE).

LD (HL),A HL points to the value of SCREENLOC and the value in the A register will be put into that location. Similar to LET A = 191: POKE (HL),A.

INC DE, INC HL causes the registers to increment by one. They now point to the next memory locations.

DJNZ AGAIN Decrement B register, and GOTO AGAIN if B is not equal to zero.

LOOP: JR LOOP means GOTO LOOP.

DATA DB 1,2,..... DefineByte. The assembler loads the ASCII value of 1 into the memory address of DATA and ASCII 2into DATA + 1 memory address and so on.

The convention used by most assemblers is:

```
label   op code  operand  remarks
AGAIN   LAD A    (DE)     ; Load A from
                            DE.
```

The assembler works from source code, which is typed in via the keyboard and stored in a special buffer allocated by the assembler. Each source line normally produces one machine code instruction.

Operation code is a mnemonic instruction for one of the CPU's machine code instructions.

Labels can be used to reference one instruction to another, for example, JP Z,NEXTONE, and is identical to line numbers used by Basic, such as IF X = 0 GOTO 4.

Pseudo operations are special operation codes which are used by the assembler and not by the CPU, to carry out predefined functions:

DEFB or DB means Define Byte.

DF Define Storage. DS 100 Reserve 100 bytes in RAM.

DEFM or DM Define Message. DEFM generates a STRING which can be directed at the screen or printer.

Arithmetic operations are also allowed in most assemblers, for example, EQU LABEL + 20 OF JP START+100.

';' Remarks column. It is important to document what you are doing with a certain instruction, when writing machine code. When you look at your code after a few months, you will find it hard to understand what you had in mind when you first wrote the program. So get into the habit of adding remarks. PCN

The next part of Keith Hook's series on assembler will appear in *PCN* in two weeks time.

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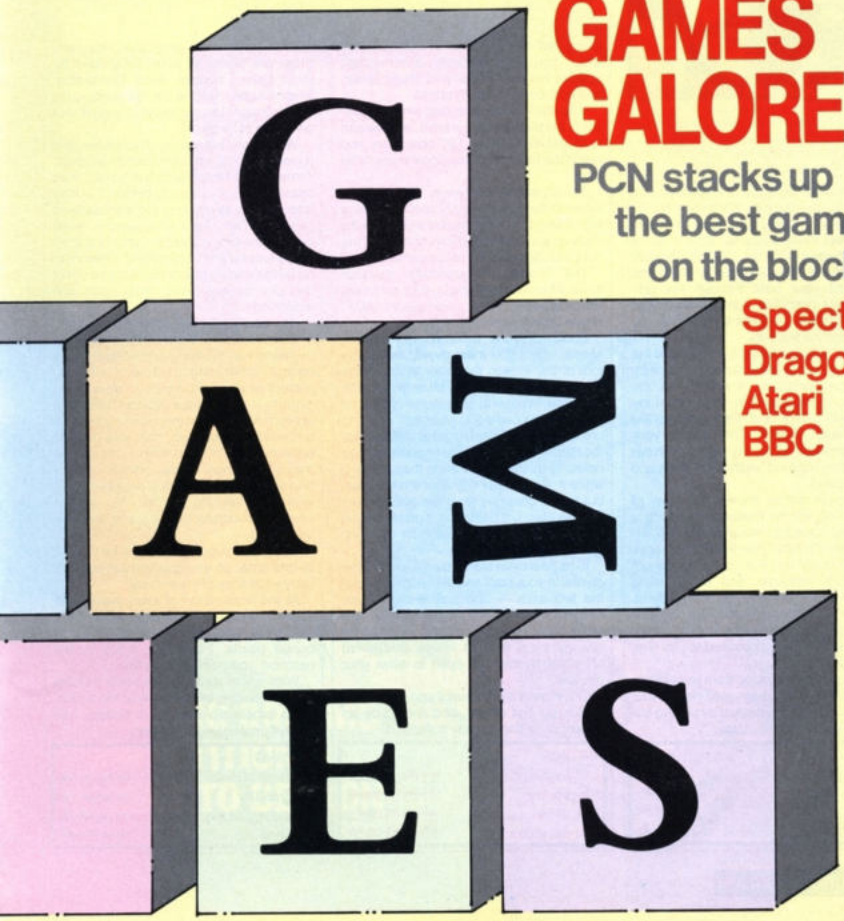
PCN micropaedia
Vol 21 Part 2

PULL OUT AND KEEP

GAMES GALORE

PCN stacks up the best games on the block for

Spectrum
Dragon
Atari
BBC



As promised in our last issue, here is the second part of the games Micropaedia. If you didn't find something to suit your taste last week you'll probably have more luck this time around. The featured micros are the Spectrum, BBC Micro B, Dragon 32 and Atari.

On the following 2 pages we present a selection for the Sinclair Spectrum — both for 16K and 48K machines.



Name It's Only Rock 'n' Roll/Tomb of Dracula **System** 48K Spectrum **Price** £6.95 **Publisher** K-Tel, 620 Western Avenue, London W3 **Format** Cassette **Language** Basic **Other versions** Commodore 64 **Outlets** Retail

The 'A' side of this tape is a simulation in which you play the part of a rock group — yes, all on your own — and must earn £1m and collect three status symbols to show you've made it to the top. 'B' side is a 'Hunt the Wumpus' type of game in which you must plot your path through the grid making up Dracula's Tomb, with simple graphics of the zombies and ghouls you might meet on the way.

The 'A' side is thankfully better, and the first thing you must do is provide a name for your rock formation. I settled on the obvious, The Spectrums, chose from the three skill levels and then viewed the initial Status Report. This shows your managerial status, royalty rate if you have a recording contract, cash in the bank and time elapsed.

The main menu shows the type of options you will be dealing with: write a song, tour, concert, consult your manager, buy a status symbol, make a record or rest. The first major problem, after you've got yourself a manager and a recording contract, is to gain enough popularity so that the recording company will finance you. You start off busking to earn a little money, and can then proceed to pub gigs and club performances.

K-Tel made their name from re-packaging record hits, but they won't repeat that success in the micro market by putting out mediocre software like this.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name The Pyramid **System** 48K Spectrum **Price** £5.50 **Publisher** Fantasy Software, Falconberg Lodge, 27a St Georges Road, Cheltenham, Glos GL50 3DT **Format** Cassette **Language** Machine code **Other versions** None

Every few months a game comes along which you know instantly is something special. For me the last was *Manic Miner*, and now comes *The Pyramid*.

You start in the chamber which represents the peak of the pyramid, and the aim is to get through all 120 chambers and reach the base. You are Ziggy in your little ship.

To appeal to everyone, the cassette wallet includes both a silly scenario owing something to *The Hitchhiker's Guide to the Galaxy*, and a detailed explanation of the controls and purpose of the game.

The Pyramid thoughtfully provides three different keyboard layouts and it will accommodate Fuller, Kempston, AGF/Protek or Microgen joysticks.

Each chamber is filled with floating aliens, which you must avoid, and at the foot of the screen the letter 'A' indicates how many of these you must shoot with your laser in order to release the energised crystal. You need the crystal in order to unlock one of the sealed gates that leads to the next chamber, and the crystals change colour to indicate what state they are in. If white it will destroy any aliens it touches, but then it changes to yellow and contact with an alien will destroy it. You must then start shooting and dodging in order to release another crystal.

In its final cyan state you can collect the crystal in your craft and deposit it in one of the two exits — and just to complicate matters the exits also change colour. You must drop enough crystals in them to change them to their lowest (magenta) level before they will open to allow your escape.

The Pyramid is colourful and quick, well packaged and cheap, and should be an essential addition to any collection.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Earth Defence **System** 16/48K Spectrum **Price** £4.95 **Publisher** Artic Computing, Main Street, Brandesburton, Driffield YO25 8RL **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Spectrum retailers

Missile Command is an arcade classic and there are plenty of versions around for most home micros. Artic Computing, which has been on the Sinclair scene quite a while, has at last got round to bringing out a version of its own.

Wave upon wave of multiple warheaded missiles rain down upon your three cities. Armed with a limited supply of ground to air missiles, it is your task to defend Earth by intercepting as many of the warheads as possible. The aliens also send in smart bombs; these are small yet deadly and try to roll around any detonations. They must be hit fair and square or else blasted out of the sky by saturating their path with explosions.

You control a small cross-haired sight. This moves about the screen very quickly in response to the joystick/keyboard's control. When firing, a marker is left at the current cross-sight position, leaving the sight free to continue moving about the screen. At the same moment, a ground to air missile is launched from your base at bottom-centre of the screen — the missile tracks unerringly to the planted marker and explodes into a cloud on arrival. Any warhead tracking down the screen which encounters the cloud is instantly destroyed.

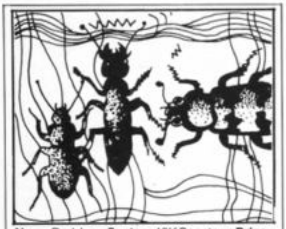
Several of your missiles can be in flight at one time, so you can blanket-bomb a fairly wide area of the screen.

At the termination of every wave your score is totted up and displayed. Every city, base and missile remaining earns bonus points. For every 1,000 points reached, you gain a bonus city.

With each wave, the screen colours change, adding extra variety to the action.

An excellent version of a classic, and exceptional value for money.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Dark Lore **System** 48K Spectrum **Price** £6.95 **Publisher** 8th Day Software, 18 Flaxhill, Moreton, Wirral, Merseyside L46 7UH **Format** Cassette **Language** Basic **Other versions** ZX-81 **Outlets** Mail order

Dark Lore is your good old-fashioned traditional text adventure: no pictures, no prizes, just the simple task of finding the long-lost Sacred Talisman of Yurach by searching through the game's locations. There are over 100 of these, each described fairly vividly at the top of the screen.

Once the title screen has disappeared you're straight into the game with no instructions other than a few on the cassette cover about abbreviated inputs. 'You are outside a small cave at the top of a high mountain. A steep path drops to the north, and a ravine drops to the west. What next?'

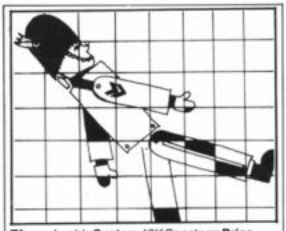
With my map on the table I set off on a straight northward path through a green valley towards a forest, only to be devoured by insects before I'd got going. Fortunately reincarnation is instant.

In another direction you pass through grassy plains to reach a desert where, if you don't get lost, you might stumble across an ants' nest. If you could only get past the massive red ant blocking your path you could perhaps find something useful. Experienced adventurers will know that the way to many creatures' hearts is through their stomach so off you set to try to find something sweet and edible, if you don't already have it with you.

The next problem is dealing with a rather superior wizard, who scarcely acknowledges your presence (nor my presents, come to think of it). If you do progress, the game opens up into encounters with pirates and bird-men, and what secret could a gargoyle hold? For those who get really stuck a help-sheet is available if you write off for it.

This is an enjoyable no-frills adventure, with tasks that tax the ingenuity, and it should keep most people puzzling well beyond the Eighth Day.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Jumbly **System** 48K Spectrum **Price** £6.95 **Publisher** DK Tronics, Unit 2, Shire Hill Industrial Estate, Saffron Walden CB11 3AX **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Spectrum retailers

Remember being frustrated by those flat, plastic puzzles where you had to unscramble a muddle by sliding lettered or numbered tiles around a tray? DK Tronics has brought this type of puzzle kicking and screaming into the electronic age.

The object is to slide the jumbled tiles around and re-assemble the original picture in a set of moves. There are at least 12 different puzzles to solve but you are only told the titles of the first three.

You select your puzzle by entering its title (Letters, Jumbly or Nursery). The chosen picture is displayed, one of the 20 tiles is removed and placed outside the tray and the rest are randomly jumbled. Your target to beat (around 100 moves for the simpler puzzles) and actual number of moves is shown.

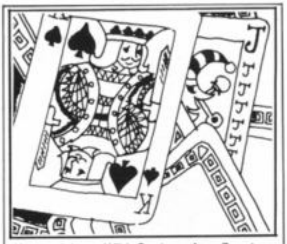
Manipulating the puzzle is easy — each picture has one vacant square so by using joystick (or keyboard) you move a tile up, down, left or right into the empty slot. There is a wide variety of musical accompaniments and you can switch back to the puzzle solution.

If all this sounds fairly ordinary, wait until you see the puzzles themselves — they are alive. The Nursery puzzle includes a winking, leg-swinging dolly, twin cannons blazing away at each other, a twitching monkey, a drum-beating rabbit, a spinning top, a marching guardsman and a bouncing jack-in-the-box.

Some of the harder puzzles are not only animated, they also scroll, in wraparound fashion, off the edges of the tray. You can freeze the picture — that helps a bit — and if you're desperate, remove the scrolling.

An old mechanical puzzle brought sparklingly up to date. The random shuffling and mobile pictures present a tough challenge yet the game manages to remain hugely enjoyable.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Jokers Wild **System** Any Spectrum **Price** £9.99 **Publisher** Phoenix Software, Spangles House, 116 Marsh Road, Pinner, Middlesex, 01-868 3353 **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order/retail

Phoenix continue their interesting policy of offering one action and one adventure cassette in the same package, success at the first bringing you the running code you need to play the second. The setting this time is a funfair.

In the arcade-style action you collect four playing cards from the corners of a grid and deposit them in a box in the middle while a number of knaves whiz round trying to prevent you. At the end of each skill level you're given a clue for the adventure, and at the end of the fourth you're given the running code, though there are still three more skill levels if you want to continue playing. Armed only with a pack of cards you then step into the funfair, which is of course manned by our intergalactic enemies whose idea of fun is to capture people's souls. You have to put a stop to this naughtiness.

Much as I enjoyed the action, the adventure proved a welcome haven of peace and quiet. You are set down outside the Bunko Booth, whatever that is, and have only a pack of cards with you, plus the clues you've earned from the action.

You explore the funfair, trying to find a way in to see people like the Fortune Teller and the Bearded Lady, and naturally you're collecting objects as you go.

Initially the adventure seems fairly easy and you can amass a great number of objects, but then you begin to run up against problems that will be familiar to seasoned adventurers, like how do you get past an elephant standing in your way?

I preferred this to Phoenix's earlier *Death Mines of Sirus* for the Dragon, though I think its main appeal will be to the arcade buff who also wants a little fun from an adventure you don't need to be a genius to get into.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name The French Tutor **Application** Educational **System** BBC (all systems) **Price** £9.95 **Publisher** Salamander Software, 17 Norfolk Road, Brighton BN1 3AA **Format** Cassette **Language** Basic/machine code **Other versions** Disk later **Outlets** Retail

The French Tutor is designed to help those wishing to grasp the intricacies of the French language up to and beyond O level. It consists of three main programs giving practice and testing of vocabulary, phrases and irregular verbs.

Menu driven, the program starts with a rendering of the 'Marseillaise' and asks the user to select the category required. The relevant section is then loaded in, and a further menu calls for a file name. The 10 files of words for the vocabulary section each give 100 words. They are grouped into different areas: outdoors, homes, body, travel, etc. The computer gives you the option of deciding if you want French/English or English/French.

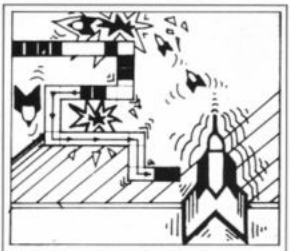
Since I took GCE O level French more years ago than I care to remember, I ventured forth into the program with some trepidation.

I was pleasantly surprised to find that the words used were of the useful variety and the phrases the sort encountered in everyday use. Because some phrases were idiomatic it is a pity that the program is so pedantic. It's no use returning a literal answer, for example, if the programmed answer uses 'it's' instead of 'it is', you will be marked wrong if you use the latter. Handily, however, before each set of five phrases you are given the option of seeing them with the answers. After each test the computer assesses your progress with a percentage marking.

A further option allows you to set up your own tests and a short program helps you with the necessary French accents and punctuation.

All in all I found this interesting and worthwhile program to be worth the money for the student wishing to brush up on his or her idiomatic French.

RATING	
Features	
Presentation	
User interface	
Overall value	



Name Gorf **System** BBC B **Price** £7.95 **Publisher** Dr Soft, Peterborough **Format** Cassette (Disk £10.95) **Language** Machine code **Other versions** None **Outlets** Mail order and retailers

Another arcade hit transferred to the home micro, Gorf is that good old standby, aliens meet lone heroic Earthling.

In play you are at the bottom of the screen, a solitary space ship with pulsating rocket, looking extremely vulnerable. A changing, brightly coloured arc stretches across the screen, just above your ship.

Using keyboard or joystick, your ship can be moved left or right but is otherwise rooted to the planet's surface. When firing your missiles the longer you keep the firing button depressed, the higher the missile will fly before detonating.

First up come the invaders, a three line whip of waving aliens who march steadily across and down the screen.

In laser attack, two bands of bird-like kamikaze creatures either plummet like stones or swoop and arch around in an attempt to crash into you.

Firebird is a dazzling screen where enemy ships, one blue and one yellow, lurk in the centre of a wheel-like structure with spokes extending outwards. The brown ship cannot be destroyed — it tries to drop in on you and serves only to distract from the more vulnerable blue craft. This spirals outwards increasingly faster and must be hit amidships. The sole aim in this section is to survive.

Mothership first presents two aliens, both of whom resemble Orville in sunglasses, who are easily dispensed with. Not so easily disposed of is a large mothership. You can destroy this only by erosion — keep potting away, chipping bits off, until there's nothing left. If it reaches the bottom of the screen with even so much as a tail fin left, you're dead.

A nice implementation of the arcade game. Good graphics and sound effects plus responsive controls make it great fun to play.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Crossword Puzzler **Application** Educational/game **System** BBC (all systems) **Price** £5.00 **Publisher** National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN **Format** Cassette **Language** Basic **Other versions** None **Outlets** Retail.

Crossword Puzzler contains two programs for crossword generation and crossword playing. The package is aimed at all age groups, and can be used by teachers for educational purposes or by more avid crossword fans to generate and execute their own.

Supplied with the two main programs are four data files, an easy child's puzzle, a modified version of the first-ever crossword published in 1913, an easy adult's puzzle and a puzzle originally published in the Cambridge Evening News.

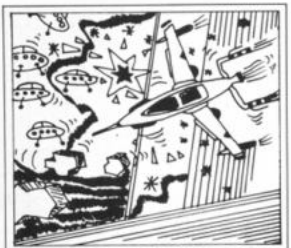
When loaded, the screen prompts for a file name and after finding the file displays a screen squared and numbered like a printed crossword. First select a number, then A or D and you are given the clue and asked if you wish to have the answer. If no, you are prompted to type in the answer. On return your answer is put in the squares on screen. If correct the answer appears in CAPS, if incorrect the letters you failed on are displayed in lower case. You can carry on having as many goes as you like until you get it right.

Side two of the cassette is a must for the real crossword buff. The crossword generation program leaves you to work out the clues and answers. First you must work out your plan on paper using a maximum of 15 × 13 format. The maximum number of clues is 60.

After the title page the computer responds with a series of questions for which you supply the appropriate answers. The manual uses one of the puzzle provided on cassette as your yardstick and shows how to compile the puzzle from scratch.

I can envisage a sort of crossword user club sending crosswords to each other in the post.

RATING	
Features	
Presentation	
User interface	
Overall value	



Name 3D Space Ranger **System** BBC B **Price** £7.95 **Publisher** Microbyte, Cornwall **Format** Cassette (disk £11.95) **Language** Machine code **Other versions** None **Outlets** Mail order and retailers.

Joining the ranks of the 3D games is this latest from Microbyte.

Your target is a death star wherein lurk antisocial beings from the cyborg empire. The death star has a vulnerable spot — the thermal exhaust ports lead smack-dab into the main reactors. If you can reach the encircling planetary trench and then launch a photon charge into these ports, it will be bye-bye death star.

The craft's shields, vital for protection, can be turned on or off. Use of shields and weapons drains the energy banks and failure to monitor and conserve energy might lead to mission failure.

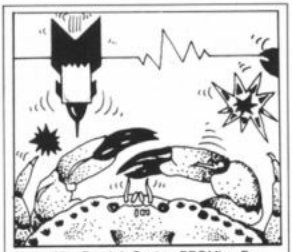
The game starts with your ship warping through hyperspace towards a first encounter with red and white deep space saucers. These weave toward you singly before flying away again — they don't fire but every collision affects your energy level.

Following the saucers are the asteroids. Nothing much you can do here except bob and weave; it's a matter of luck more than skill how much damage you take. More squadrons of different craft attack. Dispose of these and you go into orbit around the death star before entering the trench itself.

The trench sequence of a scrolling blue and yellow base is graphically impressive. While battling with more saucers, you must position yourself in exactly the right path. Your photon charge is released automatically, then it's out and away back past the various squadrons.

Although you never actually get to see the death star, an explosion tells you whether or not your mission was successful. It seemed a bit arbitrary whether you survived or exploded during a combat sequence but pictorially the game is excellent.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Alien Break-In **System** BBC Micro B **Price** £6.99 **Publisher** Romik Software Ltd, 727 Argyll Avenue, Slough, Berks **Format** Cassette **Language** Machine Code **Other versions** Electron **Outlets** Mail order and dealers.

You might think that there was not a lot of mileage left in the basic Space Invaders format. After Invaders, Galaxians, Pheonix etc, what is left but to combine them all — at six times the speed.

As the last remaining guardian of a distant planet, you have to defend the surface against a wide variety of alien nasties who are determined to take the place by force.

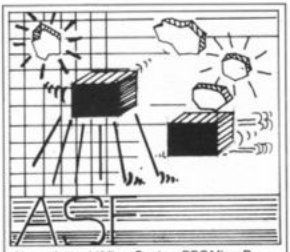
The program loads in three parts, the first giving instructions and allowing the control keys to be defined to your preference — a very good idea. The second part provides a title screen.

The game positions you at the base of the screen defending a small strip of green which is intended to represent the planet's surface. Above you strings of aliens do circuits and bumps in a variety of eye-stretching manoeuvres intended more to confuse than be hostile. They drop the occasional bomb, but these are generally easy to avoid. The speed at which the aliens move makes it difficult to think of taking aim and it is largely down to luck whether you make a killing or not.

The main worries later on are the mother ships which slide smoothly around at the top of the screen dropping 'pods'. These explode on landing to produce red 'crabs' which scurry off to the edge of the screen and destroy your ship if they make contact on the way. You can dig up to five holes per game in the surface of the planet. The crabs will fall into these if they come across them and immediately fill them in.

The game itself is extremely well-written, very fast and smooth and offers a display mode and a sound-off option. I feel it may pall after many plays, however, as at the higher levels (there are 8) it is just too fast to test either skill or speed of reaction.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Asteroid Miner **System** BBC Micro B **Price** £6.95 **Publisher** Optima Software, 36 St Petersgate, Stockport SK1 1HL **Format** Cassette **Language** Machine Code **Other versions** None **Outlets** Mail order and dealers.

As pilot of a space mining vessel, you have to manoeuvre to take on board mineral-rich asteroids, which you must then transport back to base to gain points. A rival vessel has the same intentions and employs a number of underhand tricks to deprive you of the rocks.

The program loaded first time to display a very attractive Optima logo and then the instruction screen of the game itself.

Control of your mining ship is via clockwise and counter-clockwise rotations and an accelerator similar to the Asteroids arcade game. These controls are not as easy to use however, as the rotation keys are very sensitive and the accelerator decidedly sluggish.

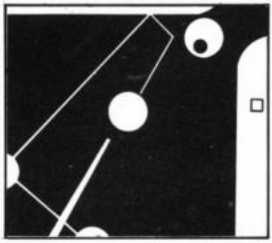
After I had discovered which was the front of my ship (the end with the simulated rocket exhaust) and got somewhere near mastering the controls, I tried to capture some of the rocks that were floating around the screen. The green are the only valuable asteroids, scoring ten points each when delivered back to base, but they will destroy your ship if they touch it anywhere but at the front.

Your opponent, controlled by the computer, will also destroy you if you get too close, and has the equally antisocial habit of turning red rocks green and planting time-bombs in them to catch the unwary. If you do inadvertently swallow a not-really-green rock, there is a chance to redeem yourself by pressing the key corresponding to the character displayed in the corner of the screen — a novel touch.

To gain points you have to dock with BASE (just between the 'A' and the 'S'), which is no mean feat.

After a while I managed to end a game with a positive score, which was encouraging, but not sufficiently so to make me want to play regularly.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Eight Ball **System** Dragon 32 (joysticks) **Price** £8 **Publisher** Microdeal, 41 Truro Road, St Austell, Cornwall **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Retail/mail order

Though you won't need a cue, chalk or a pocketful of change, some experience of pool is a help. Unfortunately, the instructions on the cassette inlay are set in minute type — so getting in the mood with a beer or two, makes reading the rules doubly difficult.

Of the sixteen balls on the table, seven are solid colour (lows), seven are striped (highs) one is the cue ball, the other the eight ball. Highs and lows are the equivalent of what you may know as spots and stripes. The first person to sink a ball continues with the same colour until all seven are down, then they must sink the eight ball or black to win. But pot the black before your own colours are down or sink the white while going for the black and you lose the match.

No scoring is needed for Pool, as sinking the ball gives you an extra shot.

You are restricted to a plan view of the table, and the cue-ball; pressing the V key switches the balls' path on or off.

Once you are satisfied with the angles, a larger ball and a power meter appear above the table. By moving the joystick around, a small dot travels around the ball. Place it at the top and you get top spin and so on. How hard you press the joystick button chooses how hard the ball is hit. As soon as the button is released, the ball moves off.

Pool table pockets are larger than those on snooker tables and these seemed larger still. No skill levels are built into the game, but a random element is built into the strength selector giving the occasional mis-cue.

The graphics are good but restricted by the game, and the high-resolution (black and white) are the easiest on the eye. The sound is as realistic as you could get, apart from the odd irritating beep here and there.

RATING	
Lasting appeal	
Playability	
Use of machine	
Value	



Name North Sea Oil **System** Dragon 32 **Price** £5.95 **Publisher** Shards Software, 189 Eton Road, Ilford, Essex **Format** Cassette **Language** Basic/Machine code **Outlets** Retail/Mail order

This strategy/simulation game is written by an offshore engineer. Somewhere in the North Sea is an oilfied; all you've got to do is find it, extract the oil, and reach a target of $100million. You are cast in the role of Offshore Installation Manager — you're responsible for anything and everything.

To reach that important target, you have a weekly budget of $1million to spend, and a workforce of 200. You can spend money on drilling parts, maintenance spares, food or berths for replacement crews.

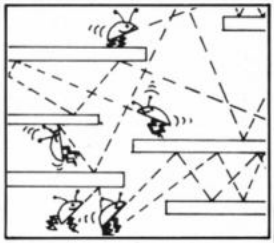
Depending on how you divide up your cash, your crew aboard the rig will starve, get too fat or drilling will stop due to lack of parts. Under- or overspend means redoing your sums. Next, you navigate the supply ship out to the oil rig. A chart is displayed with details of wind and tide.

Your vessel moves ten knots; the rig is moored 260 miles out, so it should take 26 hours to reach the rig. However, the elements throw you wildly off-course. The more attempts and the longer you need to reach the rig, the more of your supplies are washed overboard.

Once on the rig, the workers divide into drillers, maintenance men and services. The number of wells you can drill is dependent on the size of the workforce and the amount of supplies left on the rig. You can drill for oil wherever you wish, except for the shallows, and different wells have different yields.

Once all the wells have been dug, a page of details about the status of the rig appears. You are told why drilling has stopped and whether you need to allocate some of the next budget to replacement crews. A balance sheet gives your progress — or lack of it. So it's back to Aberdeen, buy more supplies then navigate out to the rig again. A game which requires foresight and planning.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Leggit! **System** Dragon 32 **Price** £5.50 **Publisher** Imagine, 5 Sir Thomas Street, Liverpool **Format** Cassette **Language** Machine code **Other versions** Atari and Spectrum (as *Jumping Jack*) **Outlets** Mail order, most dealers

In this one-player game, you control Leaping Lenny, who must jump from the foot of the screen up through the eight levels above till he reaches the top and then starts on another slightly harder screen.

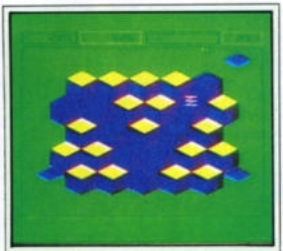
Lenny moves up by waiting for a gap to appear above his head, and he jumps through this onto the next level . . . or falls down a level if he allows the moving gap to get under his feet. Initially there are two gaps, one moving up the screen and one moving down, but for each successful leap a new gap appears, the first three moving down the screen, the next three up the screen, till the maximum of eight gaps is moving up and down. Now this obviously means more gaps to jump through, and equally obviously more to fall down through. You avoid the gaps beneath your tootsies by running off the screen to left or right, when you'll scroll round and appear on the other side, and the tricky bit comes when a descending gap meets an ascending gap and you're left without a leg to stand on.

For each level you get through, an obstacle appears — one of assorted characters that run across the screen and render you unconscious on collision. The shapes don't always appear on the same level each time, so even if you don't get very far you see a variety of snakes, crocodile heads, axes, and even men with umbrellas.

The graphics and sound are both good, with Lenny's legs moving nineteen to the dozen.

The game is of the sort that is a ridiculously simple idea, but hard to do and totally addictive. There's a high-score record kept, and with a maximum of 20 hazards possible it should set a challenge.

RATING	
Lasting appeal	
Playability	
Use of machine	
Value	



Name Bloc Head **System** Dragon 32, joysticks **Price** £7.95 **Publisher** Dragon Data, Kenfig Industrial Estate, Port Talbot **Format** Cassette **Language** Machine code **Outlets** Most shops/mail order

Bloc Head is an enjoyable, easy to play game. As you hop from one cube to the next, each cube you touch will change colour. You must land on all 27 cubes before being killed. It all sounds nice and easy, but while you hop around a variety of creatures do their best to catch you.

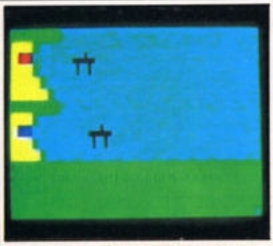
Some are on your side and landing on them gives you more points, but others definitely want your blood. At the start, two tiddleywink counters drop down, and if one lands on you, or if you are unlucky enough to hop onto one, that's a life gone. The counters are fairly easy to outrun, as they only move down the screen.

At least, most are easy; one turns into a spring when it reaches the bottom and chases you around. At the bottom of the screen, on either side of the shape are two flashing 'bus-stops'.

Hopping onto one of these transports you safely back to the top. If you can trick the spring into following you, kamikaze-like over the edge (while you land safely on the bus stop) you gain points. The bus stops will only last for one landing though. Landing on all the cubes gives you yet more points and takes you onto the next level. After the first two screens, the third level is played on an invisible board. Definitely suicidal and guaranteed to drive you mad.

At the start, you can elect for the easy or tough versions. On the latter, every screen completed means a new monster. Good graphics and sound make this one of Dragon Data's best for ages.

RATING	
Lasting appeal	
Playability	
Use of machine	
Value	



Name Oil Baron **System** Dragon 32 **Price** £5.95 **Publisher** Whitsoft, 42/45 New Broad St, London EC2 **Format** Cassette **Language** Basic **Outlet** Mail order.

As with North Sea Oil, you must extract oil, but this time the target figure is £1000m.

Here, the rights of two oilfields are on offer, one of which — Avalon — has the potential of a bigger yield. In the solo version, you may have to bid against the computer for drilling rights. Depending on its mood, it tries to outbid you or simply to make you squander the budget.

Having settled drilling rights, you need an exploration rig, so it's off to Jock's yard to buy a rig. Depending on his mood, you may be lucky and strike a bargain unless the price is already fixed, whereupon Jock adopts a take-it-or-leave-it attitude.

You must decide while towing the rig to the oil field whether or not to pay out bonuses. There's a certain amount of risk (naturally) and you can easily end up broke trying to beat your rival. The weather varies during the tow, from force 9 gales to total calm.

Once you have some oil to pump ashore, it's back to the canny Scot to buy a production platform.

The platform is towed out as before, with you offering bonuses to your crew or not, as you please. Sometimes the first one to get a rig in position will get a bonus but don't depend on it.

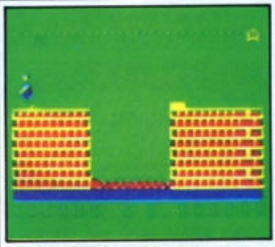
The pipeline is then laid and once connected, the oil flows ashore.

Though the graphics are limited to solid chunks, that doesn't detract too much from the game.

While your precious oil comes ashore, newsflashes appear tickertape-style across the screen. The spot price for oil fluctuates from as low as one dollar a barrel to over five dollars.

The target is reached fairly quickly and all too soon the game is over. Depending on your skill, at the end of the game, you'll make company President — or pump attendant.

RATING	
Lasting appeal	
Playability	
Use of machine	
Value	



Name Crusader **System** Dragon 32, 1 joystick **Price** £6.95 **Publisher** J Morrison (Micros) Ltd, 2 Glendale Street, Leeds **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order, retail

Monty Python didn't quite make it, leaving you to take up the Quest for the Holy Grail in this arcade style game.

Instead of instructions you get a demonstration game showing the first few screens to give you the idea. The first screen demands nothing more strenuous than climbing up the steps to the city walls. As this wouldn't be too thrilling on its own, you also have to jump over a marching column of scorpions which may have inter-bred with Scottie dogs somewhere along the way. Whatever their ancestry, they have a tendency to leap up and get you by the throat if you don't manage to leap over them cleanly, using the fire button.

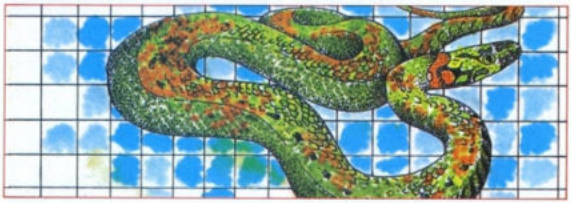
The second screen is similar, requiring you to walk along the city walls leaping over the same scorpions, but this time the last in the line is even more vicious. Get past that and you must cross a moat by carefully timing your leap onto a handy overhead pulley, which takes you to screen four, a lake containing a series of moving columns, and our intrepid hero must leap from one to the other before each descends beneath the surface.

The graphics are disappointing considering the Dragon's capabilities, but they're still entertaining enough and while there's not a lot of sound the main pleasure is in trying to get your timing right and not lose any of your four lives. When you die, a black ghost rises from your body and shimmers to the top of the screen, while the bottom of the display shows your score, high score, level reached and lives remaining.

The game proves a challenge because it's almost impossible to get past that last scorpion on the second screen without losing at least one life, which makes experimenting with later screens difficult.

RATING	
Lasting appeal	
Playability	
Use of machine	
Value for money	

ATARI IN ARCADIA



ARCHON

Take one chess-like board, give the squares changing properties, add a set of strange, varied-power pieces, throw in a combat sequence and you'll have a rough idea of Archon. A graphical game that combines arcade action with strategy, Archon depicts a struggle between forces of Light and Darkness.

The game is played on two screens. On the first, the strategy screen, you and your opponent (or the computer) take turns to move your pieces using a joystick. When a piece lands on an enemy occupied square the action switches to a second screen, the combat arena, where the two animated pieces battle for supremacy.

The strategy screen is filled with a board of 72 shaded squares. The darker the square, the more powerful it is to the forces of Darkness, and *vice versa*. The squares constantly change their colours, and thus their properties, throughout the game. Ranged on either side of the board, just like the start of a chess match, are the two forces each with 16 different pieces.

Each creature has different properties and is at its strongest when on a square of its own colour. Each has its own method of fighting. These include hurling boulders, lightning bolts or fireballs, sword or club swinging, breathing fire, screaming, creating a wirlwind, etc. Fighting is always one against one on the combat screen which is an open area containing various obstacles or barriers.

The wizard and sorceress can also cast spells which summon elements to do battle in their place, heal wounds, teleport, exchange places, shift the flow of the board's colour-change cycle, imprison an enemy or revive a lost piece.

There is a wealth of detail, action, strategic interest, and variety in this game, providing hours of entertainment. Highly recommended.

SERPENTINE

Mazes are a favourite setting for computer games. Serpentine is one of the better ones, though Caterpillar might have been a better title since that's what the snakes most closely resemble.

Controlling a short, blue, segmented serpent you must manoeuvre around a maze avoiding your longer, pink cousins who are out for their morning slither. If a pink one touches your blue boa, it's goodbye to the latter. In this world it's snake eat snake, and if you can get behind one of your pink brethren you can nibble away at its tail segments — each such segment gobbled will increase the length of your own snake.

Emitting a deep-throated 'Ribbit' a lovely, goggle-eyed green frog goes hopping around the maze. Whichever snake gets to eat him becomes longer and stronger. All snakes, including your own, can lay eggs which will hatch unless eaten by another snake or frog. When a screen of antisocial serpents is cleared the game advances to the next level where there's a new maze and a fresh supply of enemies.

Smooth graphics and fast action make this a compulsive game. I can't think why the snakes make a noise like a steam train though (probably puff adders).

HAZARD RUN

Just like in the TV series with a similar name, the sheriff is after you for some unspecified offence. The only way to shake him off is with a bit of dare-devil driving through one of the Hazard Runs.

There's Chicken Run (the shortest), Walton Pond, Bryan's Pond, Hell's Canyon (the longest), and Rainbow Run to choose from. To the sound of a police car siren you jump into your car and race off. An aerial view shows part of the course, mostly dirt tracks set amidst plenty of trees. The car revs up and moves smoothly forward, the screen scrolling down to reveal more of the countryside ahead.

Should you sideswipe a rock or tree, your car flips onto its side — riding along on two wheels is very useful for squeezing through some tight passages. You can flip back to four wheels with a touch on the joystick but if you flip the wrong way, you'll end up turning the car right onto its back.

When you head straight for a bridge, creek or pond the first few notes of 'Dixie' are played and the screen shows a side-on view of your leap across the water. Hit the near-side bank at too slow a speed and your car won't make it to the far side. The pursuing police car will go into the drink, even if you don't.

Neat stylised graphics, responsive controls and fun sound make this a testing and entertaining game.

ET PHONE HOME

The official game of the film, this one from Atari is more suitable for the younger player. ET needs several pieces of equipment to build his phone. The only one who can help him collect them is Elliot.

Elliot must rush round the town in search of the objects, avoiding scientists and agents who may try to take them away from him and hide them. Once Elliot has returned all the pieces to his house you are rewarded by the sound of ET speaking those famous words 'ET phone home' — he sounds just like he did in the film.

The final phase has ET running to find his ship's landing site in the woods. When he does, the ship arrives and ET gets to go home.

A simple game made charming by the presence of ET. Younger fans of the lovable alien will adore it.

All games available from Silica Shop, Sidcup, Kent. Tel: 01-301 1111.
Archon (32K — not XL disk, £29.95) Electronic Arts, USA.
Serpentine (48K disk, £21.45) Broderbund, USA.
Hazard Run, (24K cassette 32K disk, £19.75) Alirian Software, Hayes, Middx. Tel: (0753) 45201.
ET Phone Home (16K cartridge, £28.95) Atari UK, Slough.

Micropaedia editor: Geof Wheelwright
Design: Paul Clarkson
Contributors: Jim Ballard, Bob Chappell, Bill Davies, Mike Gerrard and Simon Williams

NEXT WEEK

We begin a five-part series of detailed graphics techniques for the BBC Micro, the Acorn Electron, the Oric Atmos, the Oric-1, the Atari series of home computers, the Commodore 64 and the Sinclair Spectrum.

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The Spectrum Peripherals Guide *by Ian Scales*

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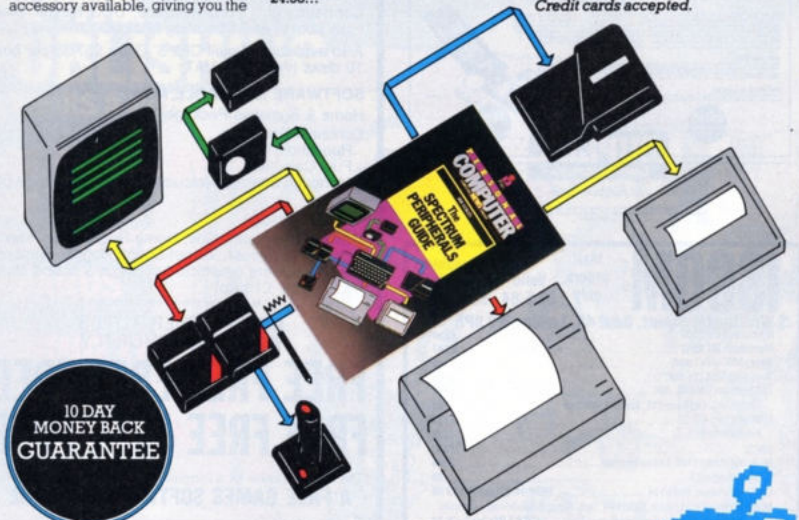
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Atari in print

Are Atari's two new printers a case of too little, too late asks Piers Letcher?

Atari has produced two full-width printers as part of its new range of peripherals. The 1025 dot matrix (£350) is slow and uses typewriter ribbon technology; the 1027 letter quality (£300) uses the rubber stamp and ink principle. These replace the first Atari printers, the much maligned thermal printer and the Centronics with an Atari badge.

First impressions

The 1025 is fairly squat at about 12in by 7in by 3in, and has few controls — an on/off switch on the back, platen knob and paper lock release on the side and main print switch on the front.

In contrast to this the 1027 looks smart, matching the new-look XL range. It has a single push button, a paper-feed slot and a rather odd 'Access door' on top. There's a platen knob on the side, an LED on the front and power socket and peripherals ports at the back.

Documentation

Both come with A4 folder style documents, printed with maximum illustration and minimum text. A section at the end of the 1025 booklet shows how to alter line spacings and get European character sets, which are switched from software rather than the more common dip switches.

The corresponding section for the 1027 explains how to get international characters using escape sequences. Line spacings cannot be altered because of the way the printhead works.

Setting up

It's not difficult to set up these printers provided the instructions are followed carefully. With the 1025 you plug in the power and peripherals leads, install the ribbon, which is fitted like a normal typewriter ribbon, and finally put the paper into place. This can be single sheet or tractor feed, but can only be removed forwards; turning the platen knob anti-clockwise usually tears the paper.

The 1027 is set up in much the same way, but the messy typewriter ribbon section is replaced by a messy ink-roller section — there seems to be no way to avoid ink-stains on your fingers. Fitting the paper is easier, and again you can use single sheets or tractor-feed paper, but first you have to tear off the sprocket holes.

Features

The 1027 upsets the general belief that 'letter-quality' means daisywheel. It uses letters mounted onto a cylinder, which spins making the letters collect ink from a sponge pad before stamping the paper.

The 1025 uses standard matrix printing, but has a matrix only seven deep by five wide. Not long ago this would have been fine, but with printers now offering a matrix of 24 by 18 it seems small and rules out descenders, which need a matrix of at least nine deep.



Atari printers in black and white: the 1027 letter quality, slim but slow, and the 1025 dot matrix, the return of the typewriter ribbon.

In use

Getting the printers to work is as simple as typing LPRINT from Basic. This sends the relevant control characters to the printer, along with whatever you want printed. The manual suggests "MY ATARI 1025 PRINTER WORKS" (or 1027). I would suggest "MY ATARI 1025 PRINTER WORKS SLOWLY".

Compared to other new products, these printers are slow. Although advertised as running at 40 characters per second (slow compared to most dot matrix printers) the 1025 actually runs at an average of 15cps. The letter quality printer is even slower — an average 8.3cps. This can be slowed to 5cps for certain strings of characters. To give some idea of what this means, the 1025 takes about 20 minutes to print a 10-page document (50 lines per page, 10 words per line). The same material would take an hour to print on the 1027.

As well as being slow, neither printer is adequately protected against the unwary. Removing the 1025's lid while it's printing reveals the head going back and forth. It probably wouldn't take off your fingers, but it could draw blood. The 1027 is more dangerous. The printhead doesn't move particularly fast laterally, but it is spinning round five times a second, and could inflict a nasty wound. Added to this is the design drawback that it doesn't check for the presence of paper, so the printer works away, spreading ink all over the platen. At least the 1025 stops when the paper runs out.

Another criticism of both printers, and one peculiar to Atari, is that neither print Atari's special control characters. You wouldn't expect other printers to cope with this, but I'm disappointed Atari still hasn't made these characters printable.

Although the characters from the 1027 are nicely formed they look more like the results of manual typing (and appear slightly slower than a fast typist could manage), than those of electric. This is partly due to the up and down movement of the cylinder which causes slight misalignment on the page.

Verdict

These two printers fall into the 'too little, too late' category. They are too expensive for what they offer and it's a pity that they don't match up to the standard set by some other new Atari peripherals, like the touch-tablet or Trak-Ball.

Much better printers can be used with Atari's 850 printer interface. This costs £135 and allows you to connect up any standard serial or parallel printer. Since you can get much faster and better quality printers like the Walters WM80 for under £230 you can connect up better quality at an almost identical price. The cost of standard printers is likely to drop further this year so the printer interface and a good dot matrix represents much better value than Atari's printers.

Product Atari 1025 dot matrix printer **Price** £349.99 inc VAT **Speed** 15cps average **Options** 5, 10, 16.5 chars per inch; 6, 8 lines per inch; 64, 80 chars per line

Product Atari 1027 letter quality printer **Price** £299.99 inc VAT **Speed** Fastest 8.3cps, slowest 5cps, av 8cps **Options** International characters

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Thoroughly Modern Modem

PCN PRO-TEST PERIPHERALS

Ralph Bancroft marvels at an innovative modem.

The Minor Miracles WS2000 modem could turn out to be the peripheral you can't live without. Not only does it communicate at all the most commonly used baud rates (an achievement itself) but it also operates on both European and American carrier frequencies. All this in a box costing (currently) £118.

The secret is the chip at the heart of the device. Generally referred to as the world standard modem chip, it is the AMD 7910 and contains on one piece of silicon all the logic to speak in several tongues.

Other manufacturers have made or are making modems that use this marvellous piece of wizadry but Minor Miracles is the first company to exploit its capabilities to the full.

Construction

The WS2000 is a compact cream coloured plastic box. On the front are three switches. A large one to select the speed and US/European standards, and two smaller ones to switch the modem on line and toggle between 1200/75 and 75/1200 baud. A small switch selects originate or answer mode. Four LEDs indicate power, carrier, on-line and data being sent.

At the rear are the mains on/off switch, RS232 socket (using a DIN plug) and a series 600 jack socket for the telephone. Two leads come out of the box — one is for the mains supply and the other plugs into a series 600 wall socket to connect with the telephone system.

Inside the box are two sparsely populated circuit boards. In the middle of the main board is space to plug in the optional auto-dial/auto-answer board.

In use

At the moment it is illegal to use the Minor Miracles modem as it has yet to receive full approval from the British Approvals Board for Telecommunications (BABT).

It takes several months and thousands of pounds to get even a simple modem using standard components through the process.

Wisely, Minor Miracles sought the advice of BABT before finalising its design and is hopeful that it should get through the procedure with the minimum of delay. Official approval is expected at any moment.

PCN is an official test site for the product, so we can use the modem with a degree of 'official' sanction. However, it cannot be emphasised too strongly that while it is legal to buy a WS2000 modem, using one is strictly forbidden unless it carries a BABT seal of approval sticker.

The (illegal) WS2000 costs £118, but when approval comes through, Minor Miracles expects to charge more.

The modem is relatively easy to use. For BBC users, it's almost a question of plug in and go. The documentation supplied (not the final printed version in our case) included a Basic listing to turn the BBC into a simple terminal. A number of ROM, disk and cassette programs are available that add more advanced features.

Other users should check with Minor Miracles to see whether it can provide purpose-made leads to work with other micros.

To talk to a remote computer simply set the modem to the standard required, dial up the number using the attached phone, turn the on-line switch when you hear the carrier and away you go.

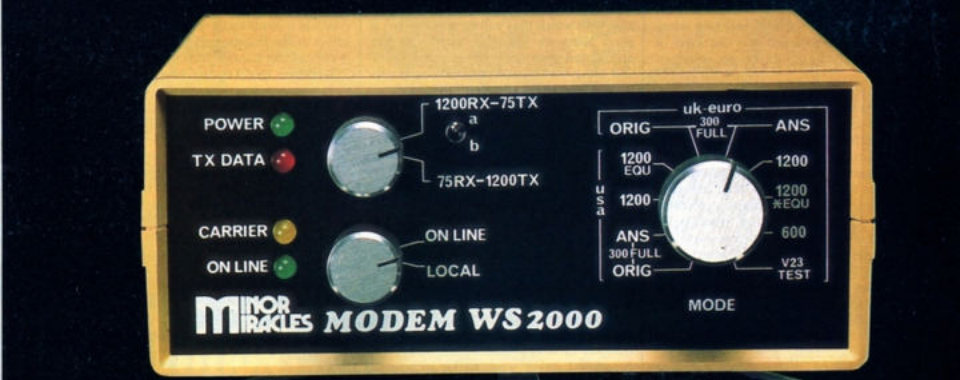
The modem was used with a number of services and bulletin boards without a hitch, even a bulletin board in the United States. The only disconcerting thing was the time taken to echo back a character.

Verdict

It is not surprising that bulletin board hackers have nothing but praise for the WS2000. It has all you could want from a modem and a little bit more. At the price it is a bargain (even half-way similar modems traditionally cost two to three times the price). But this could change as other manufacturers jump on the world standard chip bandwaggon.

But the Minor Miracles modem is likely to be in many homes by then, particularly when it gets BABT approval and the promised auto-dial, auto-answer board.

Price £118 including VAT, due to increase when approved by BABT **Baud rates** 300/300, 1200/75, 75/1200 full duplex; 600, 1200 half-duplex **Standards** Bell 103/113/108/202 CCITT V21/V23 **Interface** RS232 with DTR, RTS, CTS, DCD handshaking **Equalisation** Selectable in 1200 baud modes **Options** Auto-dial, auto-answer board to be released shortly at £45; control lead for external selection of baud rates £11 **Manufacturer** Minor Miracles, Ipswich (0473) 50304



HOME SECRETARY

An Apple word processor for home users at a less-than-business price, says Mike Batham.

User-friendliness is the watchword of the eighties as far as software manufacturers are concerned. So it's not surprising that Sierra On-Line's latest personal word processor, appropriately named Homeword, fits this trendy description beautifully. Lisa-like icons and pictorial menus abound, as do clear and simple instructions and prompts for each operation.

Documentation

The designers appear to believe that how to use Homeword will be immediately clear, so they've provided a minimum of documentation. Strangely enough, their belief is justified. After reading the slim 30-page manual and listening to the instruction tape I felt in complete control.

That the manual is written for the complete novice is patently obvious on the first page. With the help of (supposedly) amusing line drawings the user is given a 'Noddy's guide' to the micro in general and Homeword in particular. Unfortunately, some concepts are simplified to the point of condescension.

A particularly nice touch is the inclusion of a customer service number at the back of the manual. You would, however, run up quite a large bill calling this one: it appears to be in California.

Getting started

The instruction tape is supposed to introduce you to the program by acquainting you with the typing area, the menus, editing on screen and initializing disks. I'm afraid I didn't take the tape very seriously, however. I couldn't help laughing when the first thing I heard was the kind of soothing canned music you get in supermarkets.

The typing area has been kept deceptively simple: it contains all the immediately relevant information such as page number, free memory and free disk space, and yet remains uncluttered. One of the most ingenious features of Homeword is found in the bottom right hand corner of the typing area. It is a miniaturized sketch version of the formatted page being worked on. It shows the complete 80-column format and adapts to changes in the layout within seconds.

To get from the typing area to the primary menu (and *vice versa*) simply press Escape. The text section of the screen remains intact; this occupies the top 2/3 of the screen.

Features

The primary menu gives access to six secondary menus under the headings: Print, Edit, File, Layout, Customize and Disk Utilities. Each is represented by an icon selected by moving a frame using the arrow keys. Pressing Return brings up the relevant secondary menu.

A major criticism of menus is their slowness, and one problem with several of the secondary menus is that you are automatically returned to the typing area when an operation has been carried out. Luckily all the File, Edit and Layout functions can be accessed using direct 'open apple' (Apple IIe) or 'Shift CTRL' (Apple II and II+) commands. Not being able to use direct commands is as much a safety precaution as anything else. It wouldn't do to have a document printed out every time 'open apple P' instead of O (centre next line) is hit accidentally.



The Edit functions provided in Homeword are much the same as in other word processing packages: erase, insert, find, find and replace, copy and move text. The direct commands for these and all other functions that can be accessed direct are included on a single A5 card.

The Layout options are also pretty standard, but what *isn't* standard is the ease with which they can be applied. It's a good idea to use the menu to get acquainted with the various possibilities and using the direct commands once you have mastered the system.

This is, in fact, the hallmark of this package. The menus and submenus provide enjoyable initial instruction while the CTRL or open apple commands speed up the process later.

The File menu includes the obvious options of saving and loading documents as well as facilities to insert and combine several documents to a larger whole.

Using the Print menu you can indicate the type of paper you're using, change the page numbering, scroll the final document across the screen before printing and print the document. The scrolling function provides a last chance to see that everything is in order, and having used this function I never want to be without it again.

The Customize menu allows you to prime the program to your system by telling it what printer card you're using, what size the paper is, how many disk drives you have and what printing format you intend to use most of the time. Temporary changes to the printing format can be made via the Layout menu or commands, but the program will revert to the selections stored under Customize every time the memory is cleared.

One drawback with the print format selection, however, is that you can't see all the criteria at once (as you can with other Apple wordprocessors) to ensure that you haven't missed anything and that your choices aren't contradictory.

Like any really useful word processing package, Homeword provides all the major disk operations in a simple, easy to use format — the Disk Utility menu. This allows you to initialize disks, erase documents and catalogue the stored files.

Naturally, this Apple applications package, has a Help menu. It contains the same information as the aforementioned A5 card. Both give the CTRL commands for displaying and inserting the ASCII value of a character, yet nowhere in the documentation is their use referred to. Not much good to a novice.

In use

Homeword can be used on any Apple IIe and on Apple II and II+ machines that have been expanded to at least 64K. A shift modification is not essential, but makes life much easier. The Shift CTRL commands will not work without one.

One problem I ran into concerns Escape commands to my printer (Epson MX-80F/T). I simply couldn't use them, so emphasised printing, condensed lettering and other features of the printer were inaccessible. It is possible that Homeword contains a command to switch off the usual effect of the Escape and CTRL keys, but it's not in the documentation.

I wonder, shall I try and ring California?

Verdict

If you are interested in the efficiency of a high-powered word processor package, look elsewhere. Homeword is not aimed at the business market for the simple reason that it would not succeed there. If, however, you want a word processor that is easy and fun to use at an affordable price, then Homeword for the Apple could be just what the doctor ordered. PCN

RATING (/5)

Features	★★★★
Documentation	★★★
Performance	★★★★
Usability	★★★★★
Reliability	★★★★
Overall value	★★★

Name Homeword **Application** Word processor **Price** £35 **Publisher** Sierra On-Line **System** Apple **Format** Disk **Other versions** Commodore 64 (Atari soon) **Outlets** Softsel Dealers (Freefone Softsel or (01) 844 2040)



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The long-awaited Commodore 64 CP/M operating system has arrived, and Peter Worlock says 'better late than never.'

From the earliest days of the 64, Commodore maintained it would offer the facility to add a second processor with a CP/M option. The months passed with no sign and it began to look as though the second processor curse which has afflicted Acorn and others had also burned fingers at Commodore.

Many users of home micros may be wondering why manufacturers bother. The answer, simply, is software compatibility. The bane of computing is that a program written for one machine will not generally run on another. Digital Research solved the problem in the 8-bit business field by coming up with CP/M — Control Program for Microcomputers, a rather grand name for what is little more than a core of common operating routines which allow you to manipulate and use disk files (files in this sense including programs as well as data).

The idea is that CP/M provides this common core of the system and takes care of such details as accepting input from the keyboard, sending output to the screen, and acting on the disks. When writing a program for CP/M you don't need to worry about how the micro handles these features. You simply call the relevant CP/M routine to do the job for you. So any program that runs under CP/M on one micro runs under CP/M on any micro. The theory is that having CP/M available on your machine gives you access to a large source of programs. The only catch is that CP/M works only with the 8080 or Z80 processors.

Now that it is at last available for the 64, has it been worth waiting for? Technically yes; but the practical aspects bring a resounding 'maybe'.

Features

The package comes in a neat, attractive box folder containing the Z80 processor in a large black cartridge, a single disk holding the CP/M system software, and a 240-page ring-bound manual.

The product is really a double bill. The Z80 cartridge and CP/M can be considered as separate products despite Commodore's calling it a CP/M cartridge. The name, in fact, implies a possible alternative approach which is currently making headlines: CP/M on a chip. It would have been possible for the CP/M system to have been placed on a ROM chip within the cartridge giving the extra bonus of having it almost immediately available.

There are several possible reasons why this wasn't done. First, the 64 puts all cartridge software just above the middle of memory which is fine for games but nonsense for a new operating system which ought to be as high up as possible to free the maximum amount of RAM. This could have been solved by including a relocating program to copy CP/M to top of memory and then switch out the CP/M chip.

The second potential problem is that one of CP/M's features is the option to customise it to your own preference, and having a fixed version in ROM loses some of its appeal, though again this could be solved by saving your customised version to disk and booting that when needed.

The probable reason for not putting CP/M on a ROM chip is cost. The ROM implementation would gain in ease of use but carry a higher price.

The cartridge has the advantage that you can run Z80 code from within programs running under the 6510 and for some applications the Z80 is easier to program or is more efficient. Because they share the same memory, passing data between the two is no problem and in theory it would be easy to write a program that constantly switched between them. The switching routine is only about 20 bytes of code.



The Z80 cartridge plugs into the expansion slot at the rear of the 64. It does not reproduce the slot however.

Documentation

The manual bears the slightly misleading title of 'CP/M Operating System User's Guide' — misleading because it won't teach you how to use CP/M. It has been designed as a reference guide to this implementation and it fulfils this function adequately.

It contains sections on connecting up the system, attaching disk drives and printer, and how to boot CP/M on to the 64. This chapter contains the manual's only irritating flaw in that the section dealing with making a copy of the system disk is not absolutely clear on procedure (see the In use section below for details).

The heart of the book is a dictionary of the CP/M commands and utilities including the syntax and purpose: what you don't get is a full tutorial on how to use them.

Although Commodore's documentation generally receives a lot of criticism, it is consistently good in giving detailed and clear information on hardware and systems software. Provided you have the ability to make use of it, there are no mysteries or secret areas. The same holds for this manual and it includes everything you need to know about memory maps and hardware, including schematic diagrams

— even down to complete disassembled listings of the systems software itself.

There are also example programs showing how to switch control back and forth between the Z80 and 6510 processors so you have the power of both CPUs available.

However, the manual is not sufficient for newcomers to CP/M or if you want to use the Z80 itself. You'll need a basic CP/M tutorial (try *CP/M and the Personal Computer* by Dwyer and Critchfield from Addison Wesley) and a good book on Z80 machine code.

In use

Setting up this system is easy. The cartridge plugs into the cartridge slot at the rear of the 64 and then you power up. The 64 is still running under the 6510 at this point. You then load a 6510 program from the CP/M disk which boots CP/M and switches control to the Z80. The whole process takes slightly under a minute.

The first thing to do is make a copy of the systems disk. It is not protected and you should never work with the master disk; lock it away somewhere safe. Ideally you should make two copies and also put away the first copy, working only with the third.

However, this is the first major snag of 64 CP/M. Working with only the serial 1541 disk drive will prove sorely trying with CP/M. The copying of the systems disk takes 18 minutes and a dozen changes of disk from master to slave and back again. It is here that you encounter the flaw in the manual.

It suggests you make a backup disk using the COPY utility. When run this offers you the choice of copying only the systems software, or copying the 'entire disk' including the utilities. However, the second option really means 'only the utilities'. The systems tracks are not copied so when you try to boot CP/M from your new copy the machine hangs up looking for software which isn't there. You must use the first option first to copy the systems tracks (or use SYSGEN, a separate utility), then the second option to copy the utility programs.

All in all the disk contains 11 utilities and commands.

Disk management is a dream after the clumsy DOS of the 1541. To read the disk directory simply enter DIR. File names are formatted across the screen so it's rare to get things vanishing off the top of the screen before you've read them.

The wildcards? and * allow you to be more selective in your search. For example, DIR *.ASM will display only the assembler files on disk. DIR BASI?.* will display files of any type beginning with those letters *eg* BASIC.COM or BASIL.DOC. The three-letter file extensions are also helpful, most being automatic for things like DOCuments, DATa, BASic and COMmand files. However, you have the option of overwriting these.

Other built-in commands include ERA which erases files, and REN which renames them. One of the most useful is TYPE which will read an ASCII file and display it on screen but without overwriting a program in memory.

Note that from within CP/M you cannot read a directory or use a program from a disk formatted for the 64 under the 6510 (what the manual calls 'native mode'). CP/M disks are incompatible with the 64 in native mode and vice versa.

This brings you to the whole point of CP/M: the vast range of software available, more than 15,000 CP/M application programs according to the documentation. Unfortunately, while CP/M may be a standard operating system, there is no standard disk format and the truth of the matter is that at the moment there are no programs you can run under 64 CP/M.

For the present, you'll have to knuckle down and write your own programs in Z80 assembler.

The question is, how much software will be converted to the 64 disk format and when will it become available? The problem here is the 64's limitations as a CP/M system besides the torturously slow disk drive. Most CP/M software is configured for an 80-column screen, not the 64's 40-column display, and you only have 48K of usable RAM — generous as home micros go but mean by the 64 and 128K standards of business machines for which most software is written. These are by no means insuperable hurdles but indicate that software conversion will involve more than just dumping programs to compatible disk formats.

Of course, since CP/M is a standard you could undertake your own conversions if you can get hold of listings for other CP/M programs. In fact, other than the screen size, no conversion is necessary — it's just a matter of entering the assembler code. I'm not recommending this, you understand — typing in huge machine language programs for an unfamiliar processor could seriously damage your mental health — but it can be done.

The problem of slow disk access times can be overcome by using Commodore twin drives with an IEEE interface, but unless you already have this set-up it's a large expense you'd need to consider seriously. 64 CP/M comes configured for a 44K system — which is what you have with twin drives, 4K being required by the IEEE interface. Creating a 48K system is straightforward using MOVCPM and SYSGEN — so Commodore is obviously aware of the problem and no doubt 'recommends' twin drives.



Other hardware difficulties include the fact that the Z80 cartridge does not reproduce the cartridge slot so if you have a printer interface that uses this port, and/or an 80-column cartridge, you will need to buy a motherboard as well.

Reliability

64 CP/M is an absolutely standard implementation of CP/M version 2.2 and there are no oddities that I could find. I entered several Z80 machine code programs, making calls to the operating system, from a standard guide to CP/M and they worked perfectly. The documentation is good enough to ensure that any problems you might encounter can be solved quickly.

Verdict

The delay in producing 64 CP/M, while not necessarily fatal, has placed considerable difficulties in its way. Had it been available very soon after the 64 itself there would be a wealth of software. Now, however, so much good software running under the 64's own 6510-based operating system is around that the need to get at CP/M software is much reduced.

Given the limitations of the hardware, coupled with the absence of CP/M software, is there any reason for buying the package? Well, yes. Commodore has devoted considerable time and undoubtedly a large amount of money getting it out so you must assume it will not languish for lack of software. It may take time but the company will certainly bring out its own CP/M programs even if third party publishers choose not to do so.

But there are two other good reasons for buying. First, there are precious few machine. And there are signs that CP/M, so long the mainstay of the business micro, may be moving in force to the lower end of the market (witness the Coleco Adam and the MSX range of micros). 64 owners have a chance to be in at the start.

Second, the 6502 and Z80 processors virtually have the micro market sewn up between them (the QL notwithstanding). This package gives you both in one machine.

Finally there is the price. When, for example, a Z80 alone costs £47 for the Apple, the processor plus CP/M for only £57.50 seems remarkable value. PCN

RATING

Features	★★★★
Documentation	★★★
Performance	★★★★
Usability	★★★★
Reliability	★★★★★
Overall value	★★★★★

Name CP/M **Application** Disk operating system **System** Commodore 64 with minimum of one disk drive **Format** Disk plus cartridge **Price** £57.50 inc VAT **Publisher** Commodore Business Machines, Slough 79292 **Outlets** Retail.

PCN PRO-TEST SOFTWARE

SUPER SPRITES

Superb sprites for the Dragon impress Bryan Skynner.

If you've got a Dragon, what on Earth are you doing without Sprite Magic?

Knight Software's program not only gives your Dragon sprite capabilities, but also offers such attractions as Break key disable, lower case, mixed text/graphics, extended sound commands — and that's just for starters.

The sprite handling is superb. You can make sprites chase after or flee from sprite zero (the main one); there's full collision detection with optional autoreversal; you can elect to have sprites under keyboard or joystick control and to cap it all, sprites go like the clappers.

Presentation

Sprite Magic comes in a large plastic wallet. There's a single tape with the main program followed by seven demos, including a character definer. The manual is slim and in small print; it's detailed and fairly clear but more examples would have helped. There's listing of one of the demo programs and suggestions are made for playing around with it to get familiar with the system.

Getting started

Loading Sprite Magic takes no time at all, being a shortish piece of machine code. How did Knight Software get so much into so little?

Sprite Magic extends the normal interpreter, so from here on in you treat programming as normal, while it gives you an extra four dozen or so new words. Keys have user-definable auto repeat, and there's even a MAZE ON command to take all the hard work out of programming.

Knight has sensibly kept to mBasic syntax, so learning the new words is not too difficult. That said, some of the commands and their interactions require much thought and planning. This is not so much a criticism as a reflection of Sprite Magic's complexity and flexibility.

In use

Say you want to define one of the 128 available sprites. The first thing is to decide whether to redefine one of the existing characters using the program DEMO 2, the function CHR, or set up a larger sprite.

The latter involves drawing the shape with (0, 0) as its top left coordinate, then DGETing it, as in DGET0, (7,7) which would get drawing 0 as the shape drawn in the box between 0,0 and 7,7.

The size of a sprite is limited to 256 bytes, roughly 40 by 40 pixels in SMODE4. For really big sprites you could split a drawing over two sprites and handle them as 'Siamese Twins'.

The first eight sprites can make use of seven drawings, so some pretty neat animation is possible. You could define seven bats with their wings in slightly different positions. Then, each time you moved the sprite, you could also select a different drawing to make it look as if the wings were flapping up and down. All this is handled by ANIMATE 0, (14,21) which uses drawings 14 to 21 in turn for each move of sprite 0, then starts again at number 14.

Once you've defined your drawings you must initialise each sprite with SGET, which means defining a drawing number for the sprite, its initial direction and a set of optional attributes. SGET 5,(6,d+a) is the general format. This gets sprite number five as drawing number 6, 'd' is the initial direction (0 to 8) and to this you can add 'a' which will be the sum of four possible flags. These are: 16 if the sprite is to disappear when it hits the screen edge, 32 if it is to bounce off the edges, 64 for collision detection and 128 for status reporting. You can alter any of these during a program.

Next, you might set the screen size using SDIMS = (10,10)-(230-180). This would set up a virtual screen for the action. The numbers are the top left and bottom right coordinates. Having SPUT the sprite on the screen, you might want to set the SPEED at which it travels, between 1 & 15 pixels per MOVE, and put it under keyboard control with FLETCH. If you'd rather use a joystick, you'll have to choose between ANALOG ON, which means the sprite's speed and direction correspond to the position of the stick, and ANALOG OFF, which moves sprites in one of the eight directions at top speed. The full list of possibilities with Sprite magic is formidable.

If you were designing a Pac-Man type game, you'd use MAZEON, draw the maze, then set up any of 255 possible nodes (coordinates and possible exit directions for maze junctions).

MOVEM will move all sprites on the screen, each heading towards sprite zero if you've set CHASEON. Set FLEEON, and they move away (you can change mid-program.) MOVE can shift sprites singly or in groups *eg* MOVE 3,15 would move sprites 3 to 15.

There are three sound commands; BEEPn gives one of 16 preprogrammed sound effects and AUTOBEEP can be set to give one of these effects when a sprite reaches the edge of the screen, collides with another object or is fired. Using BEEP you can vary the period (1/2 cycle duration of the sound), its period rate of change, start volume, volume rate of change, cycles and type, giving you access to a wide variety of sounds.

Some of Sprite Magic's other commands are shown in the table, but there isn't space here to do full justice to the package.

I found it surprisingly easy to convert a game I'd written using the Dragon's GET and PUT commands to work with Sprite Magic. The difference was outstanding.

Sprite Magic commands

@POS	move next cursor
ATTR	get or adjust sprite attributes
BUTTON	test joystick fire button
CHASE ON/OFF	sprites chase sprite 0, or not
COLOUR	as COLOR
COX	sprite x coordinate
COY	sprite y coordinate
DIR	return or alter sprite direction
DRWNG	return or alter sprite drawing number
HIT	return lowest crashed sprite number
HOLD	prevent n top screen lines from scrolling
INKEY	return ASCII code of key pressed
KEY	wait for key press and return ACSII code
PAGE ON/OFF	wait for key press if screen full of text
REPORT	number of crashed sprites
REPORT (n)	flag for crash of sprite n
SCORE	print score and replace text cursor

A simple Sprite Magic program.

```
10  PRINT CHR$(12);"V";:REM CLS, 'V' IS TO
    BE SPRITE
20  DGET5,17,7:REM GET DRAWING 5
30  SGET0,15,1+16+32+64
35  REM INITIALISE SPRITE 0 - DRAWING 5,
    DIRECTION 1+ ATTRIBUTES
40  PRINT CHR$(12);:REM CLS
50  SPUT0,(100,100):REM PUT SPRITE 0 ON
    SCREEN
60  SDIMS=(50,50)-(120,120):REM SET SCREEN
    LIMITS
70  MOVEM:REM MOVE ALL SPRITES
80  IFREPORT(0)THENDIR(0)  =DIR(0)+4:SPUT
    (0):REM  IF  COLLISION, BOUNCE AND
    REPLACE SPRITE
90  GOTO 70:REM CARRY ON
100 REM add FLETCH(0) to line 70 for
    keyboard control
```

Verdict

Fantastic. What we have here is far more than just a sprite utility. It's a games designer and Basic extension which no Dragon owner should be without. In fact, the only problem is that it's on the Dragon — you're still limited to the Dragon's colour sets for example. But despite that, it made me feel like I'd got a new micro — it literally upgrades the machine.

It's fairly easy to use, but you've got to be very familiar with Dragon programming to get the most out of it.

RATING (/5)

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

Name Sprite Magic **Price** £17.25 **System** Dragon 32 **Publisher** Knight Software **Format** Cassette **Other versions** None **Outlets** Merlin Microsystems, 93 High St, Eston, Middlesbrough, Cleveland (0642) 454883.

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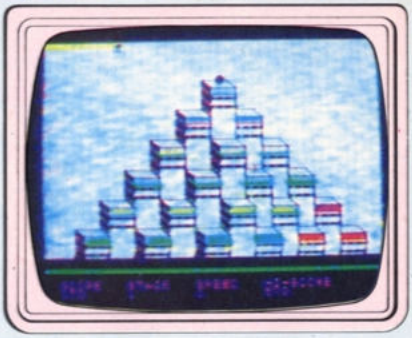
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HEUBERT



Heubert, from T W Phoeng of Utrecht in Holland, is an excellent version of a well-known arcade game. The player has to guide a small creature, called Huebert, from one roof to another on a set of tower blocks. These change colour when jumped on which gains Heubert some points.

The jumping is controlled with the keyboard or a joystick. The game can be configured for the PASE joystick system, right hand socket, though this does affect the sound a little.

The object of the game is to change the colour of all the buildings to the colour of the top building. You must avoid two objects: a falling ball, which, when it falls off the buildings, will reappear on the top roof, and a rabbit which is after you.

When hit by one of these two objects you lose a life. With every new stage you can jump off the buildings once but this will cost you some points. When you have used this escape facility, jumping off results in the loss of a life.

When all the buildings are the same colour, a spacecraft appears on the screen to take you to the next stage with increased speed and more colours. In every fifth stage there is a black building which you should avoid, and in every sixth stage the buildings turn back to their original colour the second time they are jumped on.

The author offers one tip, if you cannot get on the spacecraft, even though every building is finished, try jumping onto the top roof.

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Title: *Heubert*
Machine: *Oric-1 48K*
Language: *Oric Basic*
Application: *Game*
Author: *T W Phoeng*

5-25	Goes through the program to produce a checksum. This should be 45089066 and if any of the listing is incorrectly entered the checksum will differ.
50-80	Check joystick move.
100-125	Check key pressed.
200-275	Display jumping Huebert.
210	Jumped off.
220	Jumped on rabbit, ball or black building.
225	Jumped on top building
230-250	Change building colour and when finished, display spacecraft.
255	Display the new score.
300-330	Display the jumping rabbit.
305	Calculate jump direction for chasing Huebert.
325	Jumped on Huebert
335-380	Display the falling ball.
340	Get random fall direction.
345	If ball falls off then go to the roof top.
365	Fallen on Huebert.
400-420	Display Huebert hit by the ball or rabbit or Huebert jumped on black building.
425	Jumped on spacecraft.
430	Jumped off, escape facility already used.
435-455	Escaped by jumping off, display the decreasing score, display red bottom line.
460-485	Display falling Huebert.
490-505	Lose one life.

```
5 PRINT"PLEASE WAIT, CHECKSUM:";
10 FORA=DEEK(154)TODEEK(156)-1STEP2
15 B=B+DEEK(A):NEXT:PRINTB
20 PRINT"PRESS ANY KEY":GETA$
25 GOTO1000
50 CALL1026:A=PEEK(1024)
55 CURSETX(H),Y(H),3
60 IFA=174THENH=H+6:GOTO200
65 IFA=173THENH=H+7:GOTO200
70 IFA=182THENH=H-7:GOTO200
75 IFA=181THENH=H-6:GOTO200
80 L=L-1:GOTO270
100 A$=KEY$:CURSETX(H),Y(H),3
105 IFA$="X"THENH=H+6:GOTO200
110 IFA$="C"THENH=H+7:GOTO200
115 IFA$=CHR$(8)THENH=H-7:GOTO200
120 IFA$=CHR$(10)THENH=H-6:GOTO200
125 L=L-1:GOTO270
200 CHAR33,1,2:CURMOV0,-7,0:CHAR33,1,2
205 WAIT5:CHAR33,1,2
210 IFC(H)=0THEN425
215 CURSETX(H),Y(H),3:CHAR40,1,2
220 IFH=PORH=QORH=RTHE~CHAR41,1,2:GOTO40
0
225 IFH=42THEN255
230 IFC(H)<COTHENC(H)=C(H)+1:GOTO245
235 IFZ=0THEN255
240 C(H)=17:F=F-1:SOUND2,0,0:SC=SC-P0
245 CURMOV-3,11,3:FILL5,1,C(H)
250 IFC(H)=COTHENF=F+1:SC=SC+P0:IFF=20TH
ENSOUND2,20,V:CURSET90,30,0
:GOSUB800
```

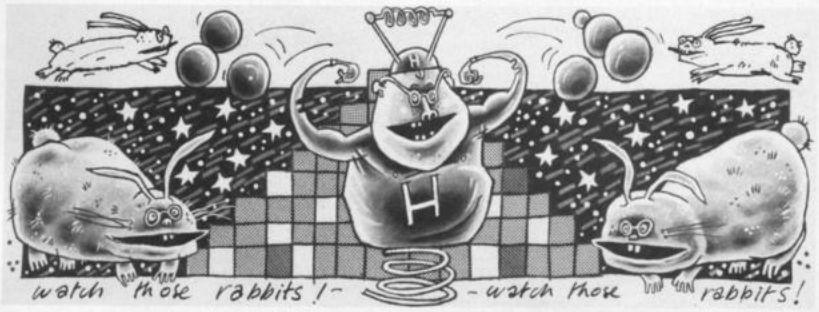
510-540	End of game.
600-630	Display flying spacecraft.
635-685	Play victory tune.
690-705	Change variables for new stage.
710-730	Music data.
800-810	Subroutine for spacecraft flying.
900-910	Subroutine for displaying or removing ball and rabbit.
1000	Set the top of user memory properly.
1005	Set fore and background colour in TEXT mode.
1010	Dimension arrays.
1015	Gosub 3000, set play.
1020	Cursor and keyclick off.
1025-1030	Set the fore and background colours in HIRES mode.
1030-1095	Display left buildings, set X(A) and Y(A) arrays.
1100-1150	Display right buildings, set X(A) and Y(A) arrays.
2000	Set variables.
2005-2010	Display Hueberts on the top of the screen.
2015-2040	Get sound Volume and start level.
2045-2055	Display the score, stage, speed and high score.
2060-2105	Display building colour.

```
255 SOUND1,75,V:POKE617,2:PRINTSC;
260 CURSETX(H),Y(H),3:CHAR41,1,2
265 L=L-5:SOUND1,0,0
270 IFL>SPTHENGOTOKJ
275 L=26:GOTOK
300 K=335:CURSETX(P),Y(P),3
305 IFY(P)<Y(H)THENA=(X(P)>X(H))-6ELSEA=
7+(X(P)>X(H))
310 P=P+A:IFP=QTHENP=P-A:GOTOKJ
315 CHAR35,1,2:SOUND1,25,V
320 CURSETX(P),Y(P),3:CHAR35,1,2
325 IFP=HTHEN400
330 SOUND1,0,0:GOTOKJ
335 K=300:CURSETX(Q),Y(Q),3
340 A=INT(RND(1)*2)-7
345 Q=Q+A:IFQ<7THEN375
350 IFQ=PTHENQ=Q+(A=-6)-(A=-7)
355 CHAR34,1,2:SOUND1,200,V
360 CURSETX(Q),Y(Q),3:CHAR34,1,2
365 IFQ=HTHEN400
370 SOUND1,0,0:GOTOKJ
375 IFP=42THENQ=Q-A:GOTOKJ
380 Q=42:GOTO355
400 FORB=1TO15
405 CHAR33,1,2:SOUND1,600,V
410 WAIT7:SOUND1,0,0
415 NEXT
420 GOTO490
425 IFH=41ANDF=20THEN600
430 IFE=0THEN460
435 E=0:CURSET0,190,0:FILL2,1,17
440 FORB=1TO2*PD:WAIT4
445 IFSC>0THENSC=SC-5
450 POKE617,2:PRINTSC;
455 SOUND1,B*3,V:NEXT:GOTO495
460 B=19:IFA=174ORA=182THENB=-18
465 IFA$="X"ORA$=CHR$(8)THENB=-18
470 CURMOVB,0,3
475 FORA=1TO9:SOUND1,A*20,V
480 CURMOV0,3,3:CHAR33,1,2
485 WAIT2:CHAR33,1,2:NEXT
490 HU=HU+1
495 SOUND1,0,0:GOSUB900
500 CURSET36+HU*B,1,0:CHAR33,1,0
505 IFHU<3THEN2130
510 SOUND2,0,0:A$="GAME OVER"
515 IFSC>HSTHENHS=SC:A$="GREAT JUMPER,"
520 PRINT:PRINTA$,"ANOTHER TRY? Y/N";
525 GETA$:IFA$="N"THENEND
530 IFA$<>"Y"THEN525
535 CURSET78,30,0:FILL8,3,64
540 CLS:GOTO2000
600 SOUND2,2,V
605 CURSET78,30,3:B=39
610 FORA=1TO10
615 FILL8,3,64:CURMOV6,-A/2,0
620 GOSUB800:WAIT70/A
625 NEXT:FILL8,3,64
630 GOSUB900:SOUND2,0,0
635 IFST<8THENW=8-ST
640 RESTORE:D=42:E=7:F=2
645 FORA=1TO48:READB
650 C=3-(B<0):B=ABS(B)
655 MUSIC1,C,B,V:MUSIC3,C+2,B,V
660 CURSETX(D)-3,Y(D)+11,0
665 FILL5,1,CO-F:G=(D=E*6)
670 D=D+G*(15-E):E=E+G:D=D+1
675 IFE=1THEND=42:E=7:F=F-1
680 IFA>2THENWAITW
685 SOUND1,0,0:NEXT:SOUND3,0,0
690 Z=0:CO=CO+1:ST=ST+1
695 IFCO=23THENCO=18:Z=1
700 IFSP<20THENSP=SP+1
705 GOTO2050
710 DATA-3,-1,12,8,8,3,8,8,12,8
715 DATA12,-3,-1,12,-1,10,10,3,10
720 DATA10,-1,10,-1,-5,-3,-1,12,8
725 DATA8,3,8,8,12,8,12,-3,-1,12
730 DATA-1,12,-1,10,-3,-1,12,8,8,8
800 CHAR38,1,1:CURMOV-6,0,0
805 CHAR8,1,1:CURMOV-6,0,0
810 CHAR36,1,1:RETURN
900 CURSETX(P),Y(P),3:CHAR35,1,2
905 CURSETX(Q),Y(Q),3:CHAR34,1,2
910 RETURN
1000 HIMEM38911:TEXT:CLS
1005 PAPER0:INK5
1010 DIMC(49):DIMX(42):DIMY(42)
1015 GOSUB3000:PLAY7,2,0,0
1020 HIRES:POKE618,10
1025 INK0:FILL9,1,19:FILL170,1,23
1030 CURSET60,0,0:FILL9,1,23
1035 FORA=6TO2STEP-2
1040 H=3+A*6.5:D=159-A*3:E=150-A*24
1045 CURSETD-3,E+10,0
1050 FORB=1TOA
1055 D=D-18:E=E+24
1060 X(H)=D:Y(H)=E:H=H-7
1065 CURMOV-1,48,1
1070 DRAW0,-24,1:DRAW-6,-6,1
1075 DRAW-18,0,1:CURMOV0,-1,3
1080 PATTERN253:FORC=1TO7
1085 DRAW0,25,1:CURMOV1,-24,3
1090 NEXTC:PATTERN255
1095 NEXTB,A
1100 FORA=5TO1STEP-2
1105 H=3.5+A*6.5
1110 D=(5-A)*3+123:E=(5-A)*24+30
1115 CURSETD+14,E+34,1
1120 FORB=1TOA
1125 D=D+18:E=E+24
1130 X(H)=D:Y(H)=E:H=H-6
```

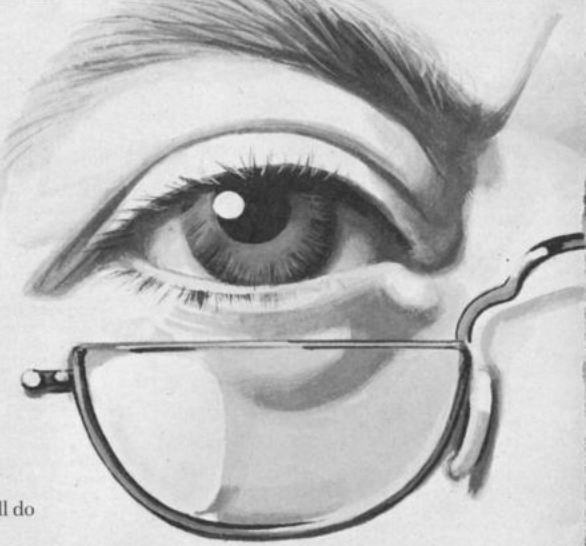
PCN PROGRAMS: ORIC-1 48K

2110 Display green bottom line: escape (jump off) facility can be used.
2115 Set variables for new stage.
2120-2125 Display black building (every fifth stage).
2130 Set variables.
2135-2145 Display Huebert, rabbit and ball, start action.
3000 Skip music data.
3005-3055 Redefine some alternate characters.
3100-3125 POKE addresses for joystick use.
4000-4115 Use keys or joystick?

```
1135 CURMOV0,18,1
1140 DRAW0,-24,1:DRAW12,0,1
1145 DRAW8,6,1:DRAW0,24,1
1150 NEXTB,A
2000 CO=18:ST=1:SC=0:HU=0:Z=0
2005 CURSET44,1,0:CHAR33,1,1
2010 CURMOV8,0,0:CHAR33,1,1
2015 PRINT"ENTER SOUND VOLUME (0-9)"
2020 A$=KEY$:GETA$:V=VAL(A$)
2025 PRINT"ENTER START LEVEL"
2030 PRINT"1=EASY TO 4=HARD"
2035 GETA$:A=VAL(A$):IFA<1ORA>4THEN2035
2040 SP=5*A-4:PO=A*5+5:CLS
2045 PRINT"SCORE","STAGE","SPEED","HI-SC
ORE"
2050 POKE617,10:PRINTST;:POKE617,18
2055 PRINTSP;:POKE617,26:PRINTHS;
2060 FORA=0TO5:B=42-7*A
2065 FORC=BTOB+A
2070 C(C)=17:CURSETX(C)+15,Y(C)+10,0
2075 FILL7,1,23:CURMOV-18,0,0
2080 FILL1,1,16
2085 FILL5,1,17-(A=0)*(CO-17)
2090 FILL1,1,16
2095 CURMOV0,8,0:FILL3,3,51
2100 CURMOV0,7,0:FILL3,3,51
2105 NEXTC,A
2110 CURSET0,190,0:FILL2,1,18
2115 E=1:K=300:F=0:R=0
2120 CURSET126,89,0
2125 IFCO=22THENFILL5,1,16:F=1:R=29
2130 H=42:B=37
2135 CURSET123,30,0:CHAR33,1,2
2140 P=22:O=30:GOSUB900
2145 A$=KEY$:GOTOKJ
3000 FORA=1TO48:READB:NEXT
3005 FORA=47368TO47439
3010 READB:POKEA,B:NEXT
3015 DATA30,45,30,12,18,18,36,18
3020 DATA12,30,55,63,0,63,30,12
3025 DATA17,9,10,4,49,22,30,12
3030 DATA0,0,0,15,63,31,7,0
3035 DATA0,0,63,3,33,63,63,62
3040 DATA3,7,15,63,62,62,31,0
3045 DATA14,21,14,36,29,63,63,60
3050 DATA0,0,30,45,33,12,12,18
3055 DATA30,45,0,33,51,30,40,0
3100 FORA=1026TO1060
3105 READB:POKEA,B:NEXT
3110 DATA72,173,1,3,72,173,3,3,72,169
3115 DATA192,141,3,3,169,128,141,15,3
3120 DATA173,15,3,141,0,4,104,141,3,3
3125 DATA104,141,15,3,104,96
4000 PRINT"* HUEBERT *   by T.W.Phoeng,
1984"
4005 PRINT:PRINTCHR$(27);"I!"CHR$(27);
4010 PRINT"HHello, I'm Huebert. Please h
elp me"
4015 PRINT"change the buildings' colour
to the"
4020 PRINT"colour of the top building by
 letting"
4025 PRINT"me jump from roof to roof. Bu
t avoid"
4030 PRINT"balls, rabbits and black buil
dings."
4035 PRINT"With each new stage I may jum
p off the";
4040 PRINT"buildings once."
4045 PRINT"When the task is fulfilled, a
 space-"
4050 PRINT"craft will appear. Jumping on
 this"
4055 PRINT"craft will take me to the nex
t stage. "
4060 PRINT:PRINT"JUMP-CONTROL:"
4065 PRINT"LEFT-UP . . . KEY 'X'"
4070 PRINT"RIGHT-UP. . . KEY 'C'"
4075 PRINT"LEFT-DOWN . . CURSOR-LEFT KEY
"
4080 PRINT"RIGHT-DOWN. . CURSOR-DOWN KEY
"
4085 PRINT:PRINT"Or do you have a PASE j
oystick-"
4090 PRINT"interface? Y/N";
4095 GETA$:IFA$="Y"THENKJ=50:RETURN
4100 IFA$="N"THENKJ=100:RETURN
4115 GOTO4095
```



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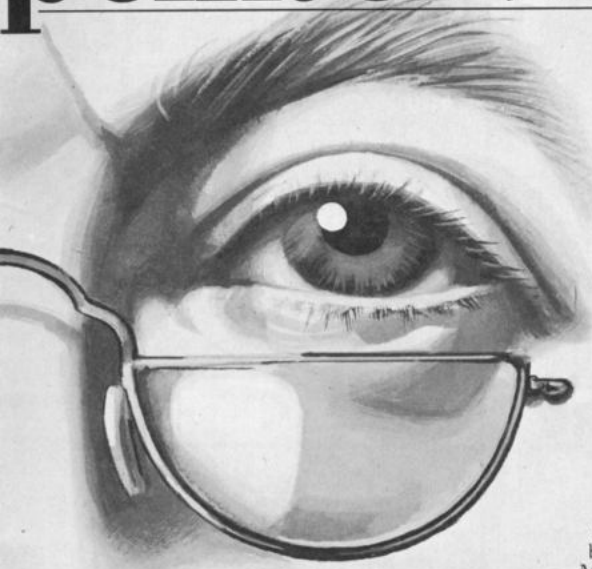
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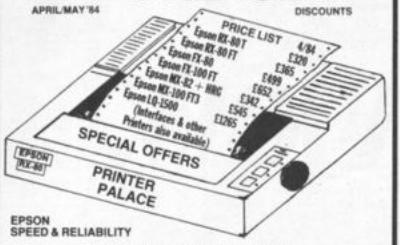
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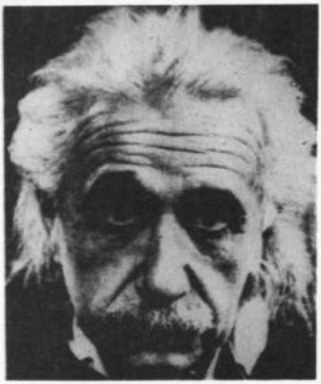
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NEXT WEEK

Five leaves left — Start collecting the five-part *PCN* guide to graphics.
Handy Tandy — *PCN* Pro-Tests the latest portable from Tandy.
Quirky keyboard — The Quinkey adds a new dimension to getting data into a BBC.
Programs — Listings this week are a Commodore 64 game and a utility for the Oric-1.
Gameplay — *PCN* reviews games for Colour Genie and Dragon.



Communicator range. This offers multi-tasking, windows and comms, Sharp-eyed readers will also spot that it has upgraded the starting handle on its disk units, replacing his outmoded technology with an MG ignition key.

Postmen Bytten

Apparently November's issue of the giant US micro magazine Byte arrived late in many subscribers' postboxes. The issue was 728 pages thick. Postmen were reluctant to deliver more than three or four on a round.

Inter-office rivalry

GEC has spent about £1 million on BBC micros and is selling them to its staff at a discount, and with easy repayment terms thrown in.

Its Marconi Avionics subsidiary is said to have bought 1,500 of the machines.

This is all very praiseworthy, but you'd have thought that somebody would have told them that another GEC subsidiary, GEC McMichael, is trying to sell Dragons.



SYNTAX ERRORS

The program Ape King in issue 56 went bananas in lines 40 and 60. The beginning of line 40 should have been:
40 POKE 36876, 0:POKE M, 32
the rest is as printed.

Line 50 should have been:
50 POKE M,G:POKE M+C,7
and again, the rest as printed.

Electron mystery

Ampalsoft seems to have made a shock discovery about the Acorn Electron. 'Great news for micro/and Electron/ users,' burbles the company's current ad for its Cheshire Cat educational software.

But if the Electron isn't a micro, what is it? After a quick consultation with the best technical brains in Britain, *PCN* can reveal that it's not a central heating thermostat or an electric car. Does anyone out there have any ideas?

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.

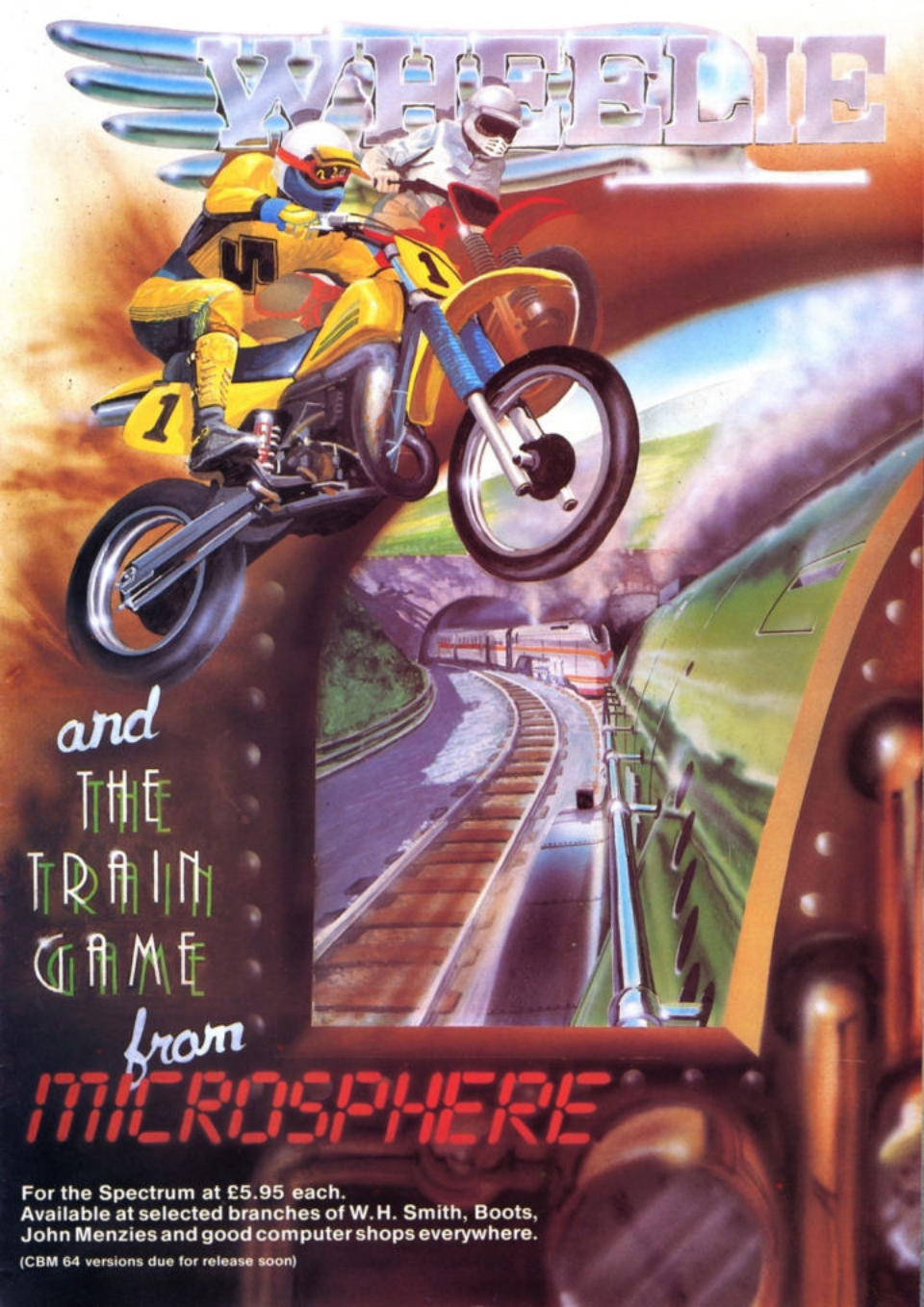
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DEC User Show	May 15-17	Cunard International Hotel, London W6	Contact David Evans 01-837 3699
Walthamsoft '84	May 19	Main Exhibition Hall, Waltham Forest Technical College, Forest Road, E17	Londox 01-554 5039/3498
RIBA Computer Exhibition	May 22-24	Bloomsbury Crest Hotel, Coram St, London WC1	RIBA Services, 01-637 8991
Apple '84	May 24-26	Fulcrum Centre, Slough	Database Publications 061-456 8383

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Computerised Office Equipment Exhibition	May 1-3	Rosemont, USA	Cahners Exposition Group, 0483 38085
Data Processing, Computer & Automatic Systems Fairs	May 9-12	Lyon, France	Societe d'Eploitation due Parc des Expositions de Lyon. S.E.P.L., BP, 6416 69413 Lyon Cedex 06.

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