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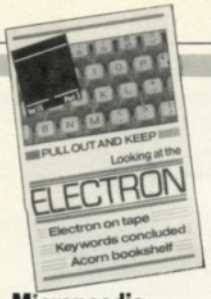

Micropaedia

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Tiger orphaned as HH crashes

Harrison Industrial Developments, parent company of HH Microcomputers, has called in a receiver, throwing into doubt the future of the Tiger microcomputer.

The receiver was called by the firm's bankers two weeks ago, confirming rumours that have been circulating in Cambridge over the last few months that the company was in financial difficulties.

Ernst and Whinney, the firm of accountants appointed as receiver, has refused to reveal the extent of the financial problems but indicated that it is looking for a buyer 'on a going-concern basis'.

Harrison's main interest is in the manufacture and sale of public address and electronic components. The HH Microcomputer subsidiary is a relatively new venture launched last year to manufacture the Tiger (*PCN* Issue 36) which was based on a design bought in from Tangerine.

A spokesman for Ernst and Whinney says it will consider selling the two operations separately. 'I don't see that it is necessarily the case that people interested in microcomputers would be equally interested in public address equipment,' he said.

PCN has already received one call from a company which refused to be named, which says it is interested in buying HH Microcomputers. Ernst and Whinney says it has also had other expressions of interest. The firm is sending out a resumé of the company's position to interested parties.

One company that may be interested in HH is its Cambridge neighbour Torch. The two companies were involved in an exchange of accusations last year over the cosmetic similarities between their rival machines. Both have built-in modems, CP/M compatibility and high resolution colour graphics.

However, Torch's interest is more likely to be in HH's manufacturing facilities and staff than the Tiger micro itself.

Suggestions that HH might be in difficulties surfaced towards the end of last year when the company revealed that it was not placing any further advertising. The company had been running a £250,000 advertising campaign in the trade press in advance of the Tiger's launch.

The parent company made a £560,000 loss in 1980 and a further £830,000 loss in 1981.

Apple set to add mice to II and III

By Ian Scales

Apple is preparing to release mouse products for both the Apple II and III.

The capabilities of the mouse system with the two early Apples are not claimed by the company to match the power of Lisa, but they must provide some sort of commonality in Apple's present range of products. Apple tends to view its mouse technology as something of a holy mission; 'every user should expect nothing less' seems to be the general philosophy, so some form of mouse hardware and software for the II and III is almost a necessity.

The company also hopes that present Apple II and III owners can be induced to upgrade in their direction once they have become accustomed to the friendliness of manipulating a mouse rather than poking at a keyboard.

Apple is secretive about details of the products. The user interface is bound to share many general features of the Lisa software — icon graphics, desk-top representations and so forth. The Apple II version will present a monochrome display while the III will feature colour. The adaptations do not require the addition of extra processors, just ROM on a card, software and a mouse.

Olivetti UK safe from US M10 row

Olivetti has hit a snag with its M10 lap-held portable in the US — but the problem shouldn't affect it in the UK.

The M10, Pro-Tested in this issue, is built for Olivetti by Kyocera of Japan, which also supplies Tandy with its Model 100. Tandy claims exclusive US marketing rights to the machine, specifying it on-board modem as part of the deal. Olivetti's machine in the US also has the modem, and it has been forced to hold back on selling the system until negotiations with Kyocera are completed.

The UK version of the M10 has no modem and is therefore not affected by the US dispute.

■ Olivetti in the US has launched an IBM-compatible micro, the PC Model MAT. With 128K, dual disk drive, monitor, keyboard, MSDOS, GW Basic and a bundle of Micropro software it is selling for $3,295. Olivetti has no plans to sell the machine in Europe.

The Wren — a new feature in Prism's branches.

Prism breaks into systems for first time

Prism Microproducts has branched out further into hardware with its own micro, and at the same time has launched a form of software distribution that could blaze the trail for many other suppliers.

Prism's micro is called the Wren. It is a transportable (luggable) micro with CP/M 3, a Z80 version of BBC Basic and comes with the Perfect range of software — Writer, Calc and Filer. It has an autodialing modem built in, allowing connection to Prestel and Micronet, dual disks — 200K per drive — and an amber screen. RGB output is provided for an external colour monitor. It will cost £1000 and is aimed at business users.

Prism has also announced a new software distribution system involving IBM-based micros in high street shops. These are connected to Prism's mainframe, back at base.

To buy or rent software the customer has a cartridge which plugs into the IBM and the software is downloaded. The IBM also allows the customer to see a catalogue of available software including 'up to the minute' prices. The mainframe is, or will be connected to computers in France, Sweden and the US allowing instant, or almost instant, availability of up-to-date software.

Osborne UK bounces back

Osborne Computer Corporation is alive and kicking, with the announcement of the Osborne-PC.

With a completely new dealer network, and a freshly-painted Osborne Shop in Milton Keynes, the *'enfant terrible'* is back in the ring and looking for blood. The latest entrant to the IBM-PC marathon, Osborne's PC is the 16-bit version of its successful Executive model, and is aimed right into the heart of IBM's marketplace.

In the classic Osborne sewing-machine cabinet, the PC offers all of the Executive's features (80-column screen, two disk drives, fan cooling, handle), as well as all the ingredients of a true IBM specification microcomputer.

'One hundred per cent software compatible', enthused Mike Healy, Osborne UK's managing director, at a pre-release presentation for the members of the official Osborne User's Group last Saturday. 'We're running a competition to find any software which will not run on both the IBM and Osborne PCs', he said, 'and Flight Simulator was no problem!'

The Osborne PC unfolds to reveal a genuine US-made IBM keyboard inside its lid. The technical complement includes 5¼in double-sided double-density IBM format floppy disk drives, two serial I/O connectors, 7in amber monitor display, and 256K of RAM as standard.

Delivery is a matter of some speculation, as is price, since the new US management has yet to secure a manufacturing subcontractor. The only machine in the country at the moment is a hand-made prototype, supplied complete with American electronics expert, both of which are on view at today's Which Computer? show in Birmingham.

Price is hovering around the £2,500 mark, and subject to negotiations in the US Osborne UK hopes to be in a position to supply machines from the third quarter of 1984.

The Osborne-PC launch coincides with Osborne UK's announcement of a bumper catalogue of 'approved' Osborne 1 software, the appointment of 12 official dealers (rumoured actually to be only five), and the opening of the Osborne Shop, in what previously was part of the Milton Keynes factory's showroom.

Sinclair takes a leap

By Geof Wheelwright and Ian Scales

Sir Clive Sinclair declared war on the business computer market last week with a £399 128K 32-bit micro that looks set to stunt the growth of IBM's Junior and tune out the BBC Micro.

With a sculpted typewriter keyboard and two 100K built-in Microdrives, as well as windows and four substantial applications packages included, the new Sinclair QL (Quantum Leap) computer must be an early contender for the best buy of 1984. Sinclair has promised to start filling mail orders by the end of February and should have machines in the shops by late summer.

An ambitious expansion program for the machine makes it even more attractive. Though the QL comes with an unheard-of 128K for its £399 price, it can be further expanded to 640K with a 0.5Mb RAM pack that plugs into the left-hand side. Also planned for the QL is a C compiler, an assembler for the 68000 processor, a terminal emulator, an analogue/digital converter, a hard disk (Winchester) interface, modem, IEEE interface and a parallel printer interface.

One of the machine's prime features is the way the operating system, QDOS, uses the power of the 32-bit processor to run multitasking. There is a powerful windowing capability which allows several programs to be run concurrently in different parts of the screen.

The QL's price is the same as Acorn's BBC Micro and Sir Clive made no bones about his contention that the QL is vastly superior.

But Sinclair means to do more with the QL than simply go after Acorn's market. According to Sir Clive, the QL has been designed to appeal to a completely new user. In effect he's taking a slight gamble for the machine falls neatly between the home computer and personal business market. The danger for Sinclair is that the machine may appear too expensive to the home user and too down-market for the business user.

Upgradable QL — the new Sinclair machine with 0.5Mb plugged in.

The prospects for the QL appear to depend largely on the changing cost/performance ratio of RAM against disk storage. Dropping the conventional floppy disk drive has gone some way towards making the machine the sort of product the company knows best — it's almost all chips, cheap, and portable enough to send through the post.

It's the inclusion of the Microdrives rather than conventional disk storage which has particularly kept the price down.

It may well be that the Microdrives are seen more as back-up storage. The best bet is that the machine's real capabilities will only be realised with the promised .5Mb RAM upgrade.

At first sight, the software products appear impressive. It could be argued by Sinclair and the software producer Psion, Sinclair's star software house, that the bundled software is worth the price of the system alone.

There are four standard packages — a spreadsheet, a word processing package, a sophisticated database system (which Psion seems the most proud of), and a business graphics package.

Stylish Oric

The new Oric ROM has surfaced in unexpectedly stylish guise — a new 48K Oric micro.

Called the Atmos, Oric's new system was due to be launched this week at the Which Computer? show. It will be available from the end of January for £170.

The most obvious advance of the Atmos over the Oric 1 is in looks. The case is re-styled in black and red with a full-pitch typewriter keyboard. The Oric printer and the fabled micro drives will also be available in the classy new livery.

The machine's innards aren't too different from the Oric 1's. Built around a 6502A, with 16K of ROM holding the Basic interpreter and operating system, it comes in 16K and 48K models. The notorious ROM, Oric claims, has been sorted out by Oric and its software suppliers. 'Between us we've greatly improved the ROM and removed all its quirks,' said Dr Paul Johnson, Oric's director of research and development.

But sources close to Oric suggest some of the quirks remain: the TAB function still prints spaces, for example.

The Oric disk drives are the Hitachi 3in units, giving 320K on doubled-sided, double density disks.

The company also claims to have devoted considerable attention to cassette tape loading, including Verify, Store and Recall of arrays. It has also written a utility to sidestep some of the most common loading faults.

The Oric Atmos — putting on the style.

Oric Products is known to feel that it has had a rough ride from the UK technical press over the flaws and delays that afflicted the Oric 1 — late arrival of the 16K model, idiosyncracies of the Basic, disk delay and others. The improvements may be seen as too cosmetic to redress the balance.

Robots are star turn

Lights, celebrities, dancing girls and lasers all vied for attention at the first micro media extravaganza of the year, but the show was stolen by three phlegmatic robots.

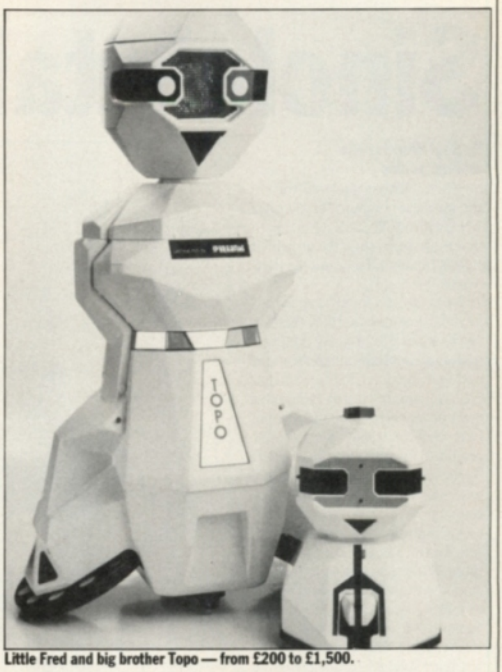
Prism spared no expense or taste at its press launch in presenting Topo and Fred, the Androbot machines (Issue 44). While dancing girls cavorted, a trio of Freds remained motionless, nor did they bat a lens or twitch a servo during the laser light show.

Prism calls them 'the ultimate add-on peripheral'. Fred is essentially a turtle and will be aimed at the Logo graphics market. He (it) stands about 1ft high and wears a nice white plastic coat. Under the control of an Apple he can speak, but with a vocabulary of just 45 words he is as short of chat as he is of dress sense.

He should be able to hold a pen, hence the turtle tag, and he is expected to be available in the late spring for about £200.

Topo is Fred's big brother and stands about 3ft tall. He is connected to the computer, currently only an Apple II, via an infra-red link. Topo can talk using phonemes — units of speech that can be linked together to form intelligible speech, allowing users to define their own vocabulary. The speech can then be stored in Topo's computer's memory for later use.

Topo is built to be upgradable — add-on parts, such as arms and eyes will be available eventually. As with Fred, Topo has a white plastic body shell, and is driven by two wheels, which tend to produce a strange rocking motion when he stops. The price will be about £1,500 and Topo will be available in February or March.



Little Fred and big brother Topo — from £200 to £1,500.

Tall Trees pack memory into PC trunk

The 640K memory barrier for the IBM PC has been broken. Advanced Peripheral Products (01-844 1200), which specialises in importing tried and tested PC peripherals from the US, is now marketing the Tall Trees Systems JRAM card. It offers memory expansion in 512K increments up to 2.5Mb, and operates with the aid of a hardware pager in the form of a software-controlled high-speed memory chip. This allows each 64K baud of memory to be referenced through any 64K address boundary accessed by the CPU.

APP is at the moment offering the cards at an end-user price of £795, but is currently negotiating to have cards shipped without chips. This means it might be possible to use cheaper chips obtained in this country.

Anniversary ball for BBC

On the third anniversary of its computer literacy project, the BBC has announced its plans for moving further into information technology. The anniversary also marks the publication of an overview of the project in a slim volume.

The BBC has outlined several TV and radio computer-related programmes for the spring and autumn and its plans extend well into 1985.

The BBC sees itself in a 'missionary' role and likes to think it's largely responsible for the 'revolution in the mind of the public' in terms of computer awareness. Rumoured to have collected at least £3.5m from various computer-related sales, Auntie clearly has more that just a public service in mind.

On the subject of its micro, the BBC is 'talking to a number of micro manufacturers', but no-one would go further than to say the BBC had never considered a cheaper machine.

The Acorn 6502 and Z80 second processors were on cue and on show. Curiously, the Z80 box (apparently running CP/M 2.2 BIOS 0.14) was turned off, but *PCN* did establish that it would run Graphplan — a CP/M package. Acorn is to offer CP/M with a software bundle including Memoplan, Graphplan, CIS Cobol, etc. While the choice of software may be dubious, there is the possibility that CP/M may be made available on its own at a considerable price reduction.

There are to be two spring programmes: 'Computers in Control' will introduce robotics and 'Electronic Office' will explain the revolution in office technology. In the autumn there will be a regular evening programme, probably on BBC2.

Radio will also feature in the new year's lists: 'The Chip Shop', a 'topical, weekly magazine programme', introduced by that well-known computer buff, Barry Norman, was due to start at 5pm on Radio Four VHF on January 14.

TV programmes in 1985 will include 'The Learning Machine' and 'Technology and the Handicapped'.

Coleco puts CP/M on Adam

In the red, but given a breathing space by its bankers, Coleco has strengthened the Adam further by putting CP/M capability on to the controversial machine.

Coleco announced last week that it expects to report a loss for the fourth quarter of its latest financial year. A spokesman said that for the year as a whole it would show a profit, but that production problems in the pre-Christmas period has hamstrung it in the last months of the year.

Its agreement with its bankers, led by Chase Manhattan, will permit it to carry more debt than previously.

But possibly the most important recent development in the chequered career of the Adam is the implementation of Personal CP/M, supplied as a plug-in cartridge at a cost yet to be determined.

Ideal Toys, which will sell the Adam in the UK, said that it couldn't be sure when, or for how long, CP/M would be available. The Adam itself is expected to start appearing here in the summer, but it should be possible to upgrade a Coleco games machine from next month.

Voice breaks

The producer of the Retrieve data management system has taken the logical next step — spoken enquiries.

Derwent Data's Voice Drive system is as pricey and restricted as most speech recognition systems but it marks an important new phase in the use of the technology. Voice input is being turned to serious business applications, after spending its infancy in more frivolous uses.

The Retrieve system has been modified to function with speech recognition equipment and will be available at first for the IBM PC. The hardware and software needed is likely to cost about £1,500, and should be in retailers' hands from mid-February. The price is split roughly half and half between hardware and software, and Retrieve II, the database system with Voice Drive, is only £200 more than the speechless variety.

Derwent is working on a similar system for the TI Professional, although this will be sold in the US at first.

The Voice Drive has obvious advantages for handicapped and disabled people who cannot use a keyboard, and also in hostile environments where grease, paint and dust make keyboards impractical.

Voice-driven technology is still slow, and although whole sentences can be input and understood, the words have to be interspersed with distinct pauses.

The vocabulary is also limited, but to a certain extent this has been overcome by software that expects specific types of words.

Contact George Perfect at Derwent Data Systems for further information on (0783) 652026.

STC offers Xtra

Standard Telephone and Cable (STC) has thrown down the gauntlet to all those micro makers who claim IBM compatibility — 'Prove it,' is the challenge.

This is one way of making sure the launch of its own IBM PC-compatible machine won't sink unnoticed into the shoal of look-alikes; STC is more than usually confident. If the other manufacturers don't respond to the challenge it will flex its £800 million turnover, buy their systems, and test them itself — under the scrutiny of an independent overseer. Watch this space for future developments.

STC Business Systems' marketing manager Stewart Goldberg said that for the benefit of users the question of compatibility should be sorted out once and for all; he didn't quite accuse anybody of pulling the wool over the public's eye but it was close.

The STC machine, built by its US parent ITT and called the Xtra, is said to be 'operationally compatible' with the PC.

The only reservation Mr Goldberg would admit to concerned those add-ons the company hasn't had time to check yet.

The Xtra is built around an 8088 running at 5MHz. The basic system has 128K of RAM expandable to 640K, twin IBM-format 320K floppies or a hard disk, an operating system quaintly called ITTDOS 2.0, GW-Basic and more software developed by ITT.

STC's Xtra — PC compatibility and a challenge to the pack.

ITT has designed some enhancements, particularly to the keyboard, and its system has a smaller footprint than the PC. A mouse is available as an option. The basic system costs £2,500; a hard disk system will set you back £3,995.

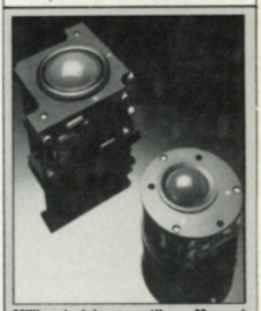
STC's experience of micros is limited but it claims 20 per cent of the UK market in IBM 3270-like terminals.

It plans to present the Xtra to dealers at the Which Computer? Show this week, and the machine should be widely available two to three months later.

Tandy opens new round of price cuts

The price-cut season is upon us again (as it seems to be every season). The standard Tandy TRS-80 Colour Computer, previously at £50 off the 'regular price' of £239.95, has now become 'save £100' at £139.95.

The Extended Basic Colour Computer (16K) is now £179.95, and the 32K version is £249.95. Tandy UK is on 0992 648181.



Military training — until now Marconi has produced only specialised military and air traffic control track balls at around the £400 mark. The new 2.25 and 3in models shown here are expected to sell in the £50 to £100 and £150 to £200 price ranges respectively. Compared to Atari's Trakball they are undoubtedly heavyweight items, but they do have a very smooth action. Whether they can compete with £7 joysticks is another matter.

SOFTWARE

PCN rounds up the software releases.

Games

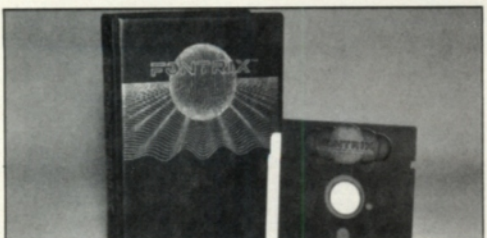
Lynx: Gem Software (0908 565007); is championing the cause of neglected Lynx users with three new cassettes, Oh Mummy, Spanner Man, and a three-in-one that features Fruit Machine, Torpedo and Minefield. These games will run on either the 48K or 96K machine, and each cassette costs £7.95.

Spectrum: Oh Mummy from Gem also runs on the Spectrum in 8.5K, and it is accompanied in Gem's latest catalogue by Sub Chase for the same machine. Both cost £4.95. Terminal Software (061-773 9813) has completed its third Spectrum game; called City it is a game for the financial wizard and costs £6.95.

Apple: Pete & Pam (0706 212321) has a quartet of new games freshly imported from the US. In the cerebral mould it is offering Sargon III for £33.95, which is billed as 'complete chess package' for novice or master. Besides giving you a game it will also reproduce great games from the history of chess. Gruds in Space, Plasmania and Critical Mass are in a different league — Plasmania, for example, is a micro version of the distasteful sounding film Incredible Journey in which minituarised humans were injected into somebody's bloodstream. Plasmania and Gruds in Space cost £22.95 — Critical Mass is £3 dearer.

BBC, Oric: Still in the firmament, Salamander (0273 771942) has released Lost in Space, the second of the Dan Diamond adventures, for £9.95.

Commodore 64: Hunter and Stellar Dodger are the titles of Terminal Software's latest diversions on the 64. Both cost £7.95.



Fontrix — multi-faceted graphics for the Apple.

Graphics

Sirius: Keydraw, from Tarot (01-650 2999), is designed to help you prepare chunks of text and illustrate them in the process. It offers 16 basic shapes with seven variable parameters, straightforward positioning and rotating of the shapes, various typefaces, and no restricitions on the number of styles you can use on any one page. Tarot is currently looking for dealers — meanwhile, Keydraw is available by mail order, costing £288.

Commodore 64: ISP Marketing (04868 24151) has followed up its launch of the Scope graphics language for the Spectrum by announcing the availability of a Commodore 64 version. Scope uses 31 English words to produce animated graphics and sound via a translator.

Apple: Fontrix has the appearance on paper of a quart in a pint pot. Its distributor, Pete & Pam again, claims that it's a character generator, a drawing board, a colour painting system, a typesetter, and a general graphics engine. Take your pick with an Apple II+ or IIe and at least one disk drive. The software itself costs £63.

Hewelett-Packard: BCA Industrial Publicity (0892 31812) has brought Top Draw from in-house development to commercial viability. It creates graphics from an *HP9111A* tablet or the keyboard of an HP 86 Series computer, on which it runs. It costs £350.

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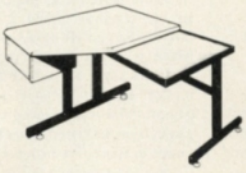

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PCN charts

Hardware Top Twenty up to £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶1	(1)	Spectrum	£99	(SI)
▶2	(2)	CBM 64	£220	(CO)
▲3	(4)	Sinclair ZX81	£45	(SI)
▼4	(3)	BBC B	£399	(AC)
▶5	(5)	Vic 20	£140	(CO)
▲6	(8)	Atari 600XL	£160	(AT)
▼7	(6)	Oric 1	£99	(OR)
▲8	(9)	Lynx 48/96	£225	(CA)
▼9	(7)	Dragon 32	£170	(DD)
▲10	(12)	TI/994A	£90	(TI)
▼11	(10)	Sharp MZ700	£240	(SH)
▲12	(13)	Atari 800	£300	(AT)
▼13	(11)	Apple IIE	£750	(AP)
▲14	(15)	Sharp MZ80A	£349	(SH)
▲15	(16)	Aquarius	£70	(MA)
▼16	(14)	Colour Genie	£168	(LO)
▲17	(18)	Epson HX20	£472	(EP)
▲18	(—)	Electron	£199	(AC)
▶19	(19)	CGLM5	£150	(SO)
▼20	(17)	Tandy Colour	£180	(TA)

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets in the two weeks up to January 14th.

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include V.A.T. Information for the top-selling micros is culled from retailers and dealers throughout the country and, like the games, is updated every alternate week.

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

Top Ten over £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
1	(2)	IBM PC	£2,390	(IBM)
2	(1)	ACT Sirius	£2,525	(ACT)
3	(6)	Apricot	£1,719	(ACT)
4	(4)	Commodore 8000 series	£1,200	(CO)
5	(4)	Apple III	£2,780	(AP)
6	(7)	Kaypro	£1,949	(CKC)
7	(10)	Televideo TS-800 series	£1,495	(MD)
8	(5)	HP86A	£1,570	(HP)
9	(9)	DEC Rainbow	£2,714	(DEC)
10	(8)	Epson QX10	£1,995	(EP)

Distributors: **AC** Acorn **ACT** ACT/Sirius **AP** Apple **AT** Atari **BW** Brainwave **CA** Camputers **CKC** CKC Computers **CO** Commodore **DD** Dragon Data **DEC** Digital Equipment **EP** Epson **HP** Hewlett-Packard **IBM** IBM **LO** Lowe Electronics **MA** Mattel **MD** Midlectron **OR** Oric **SH** Sharp **SI** Sinclair **SO** Sord **TA** Tandy **TI** Texas Instruments

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

Games Top Thirty

	GAME TITLE	PUBLISHER	MACHINE COMPATIBLE								PRICE
			SP	AC	64	V20	81	DR	OR	AT	OTHERS	
▶ 1 (1)	Atic Atac	Ultimate	★									£5.50
▶ 2 (2)	Lunar Jetman	Ultimate	★									£5.50
▲ 3 (5)	Pyramid	Fantasy	★									£5.50
▲ 4 (6)	Ant Attack	Quicksilva	★									£6.95
▲ 5 (17)	Snooker	Visions	★	★	★	★						£8.95
▼ 6 (3)	Valhalla	Legend	★									£14.95
▲ 7 (12)	Kong	Ocean	★									£5.90
▼ 8 (4)	Chequered Flag	Psion	★									£6.95
▼ 9 (7)	Splat!	Incentive	★									£5.50
▶ 10 (10)	The Hobbit	Melbourne	★	★	★				★			£14.95
▲ 11 (21)	Manic Miner	Bugbyte	★									£5.95
▲ 12 (30)	Death Chase	Micromega	★									£6.95
▲ 13 (14)	Mr Wimpy	Ocean	★									£6.90
▲ 14 (—)	The Alchemist	Imagine	★									£5.50
▲ 15 (—)	Hunchback	Ocean	★		★				★			£6.90
▲ 16 (8)	Flight Simulation	Psion	★									£7.95
▲ 17 (—)	Pool	CDS	★									£6.95
▼ 18 (13)	Arcadia	Imagine	★		★	★						£5.50
▲ 19 (24)	Penetrator	Melbourne	★									£6.95
▼ 20 (11)	Hunter Killer	Protek	★									£7.05
▲ 21 (—)	Jet Pak	Ultimate	★			★						£5.50
▼ 22 (15)	Falcon Patrol	Virgin			★							£7.00
▼ 23 (9)	Metagalactic Llamas	Llamasoft				★						£6.00
▲ 24 (—)	3D Time Trek	Anirog			★	★						£7.00
▼ 25 (18)	Moonbuggy	Anirog			★							£7.00
▲ 26 (—)	Crazy Kong	Interceptor			★	★						£7.00
▼ 27 (16)	Horace And The Spiders	Psion/Melbourne	★									£6.95
▲ 28 (—)	International Football	Commodore			★							£9.99
▼ 29 (19)	Hovver Bovver	Llamasoft			★							£7.50
▲ 30 (—)	China Miner	Interceptor			★							£7.00

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3. PICTURE PLOTTER. This program has been written so that children can create their own pictures on the television screen. It is so simple that even pre-reading children can use it, yet its sophistication makes it suitable for producing multicolour maps and diagrams.

4. NORTH AMERICAN INDIANS. This program helps to develop reading and comprehensive skills. You complete sentences using a word from the list on the screen. Correct responses are rewarded by the creation of an Indian scene which includes tipis and buffalo.

You may replace the questions in this program with your own (create a bank of up to 250 questions with a 48K Spectrum). Any subject area may be chosen.

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10. VERB PRACTICE. You have to complete the sentences using the correct tenses of the verbs. The program concentrates on those irregular verbs that often cause difficulty. An underwater landscape is created as questions are correctly answered.

11. THE STRUCTURE OF THE FLOWER. This program explains how the parts of the flower are involved in the formation of seeds. This is a three part program which makes full use of high resolution colour graphics.

12. LONG DIVISION. This detailed program takes the learner through long division sums in easy stages. Correction sequences are automatically provided when they are needed. Sums with remainders can be chosen if required.

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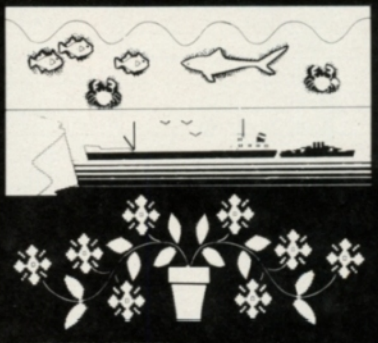
PROGRAMS 9-12



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11. THE STRUCTURE OF THE FLOWER
12. LONG DIVISION

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

Beat lunch time blues — program at home

With reference to R Pierrepont's letter (Issue 43); I own a Spectrum, and like other home computer owners in my class at school am writing my six programs on my computer, for two reasons; my Spectrum programming is better than the BBC's and I have more time to spend at home than I do programming at school.

We are allowed to submit programs in other languages too; one of mine is in Z80 machine code so I can't see it makes any difference which micro you write your programs on and my teacher agrees: as long as it is your own work it makes no difference.

I recommend R Pierrepont has a word with his teacher, as do others in the same position. Programs written at home will be far superior to those written in hassle-ridden computer rooms at dinner time.

Peter Taffs
Luton, Beds.

Pupils can use a variety of machines

I suggest all students and teachers in a similar situation to R Pierrepoint (Issue 43) check their syllabuses.

Usually, the project, which accounts for 20 per cent or so of the total mark, can be submitted in any dialect of Basic, for any machine, providing that a hard copy can be produced.

In our class, programs are being coded on Sinclairs, Acorns and Commodores, even though the school has only an Acorn BBC/ISS 45, and an assorted selection of Pets.

Schools usually have a printer, with RS232, or centronics, and someone can generally be found with a ZX Printer, so most of the popular computers can be used.

David Harrison,
Burgess Hill, Sussex.

A couple of checks on White Knight

As author of the chess program *White-Knight*, I was pleased to see it reviewed in Issue 39. There are, however, a few points I would like to clarify for your readers.

1 The VDU 19 statements are included in the loader program so the user can make permanent colour changes, rather than having to set them each time the program is run.

2 The reason *White Knight* can't solve problems like the one given by your reviewer is that it doesn't search underpromotions.

Since the program's success in the 1982 tournament, it has won the home computer section in the 1983 European Championships.

M P Bryant,
Basingstoke, Hants.

Why are we waiting — and for how long?

As one of the many thousands of Spectrum owners who bought a Sinclair computer on the basis of the promise of the Microdrive, I feel it is the duty of magazines like *PCN* to establish the true position regarding these and to publish the facts.

It is unbelievable that we continue to treat the situation as just a lovable bit of Sir Clive's eccentricity.

I have tried complaining directly to the company but all I received was a glossy handout on the Microdrives, and told I was on the waiting list. A friend, whose Spectrum is numbered 11,014 has still not received an order form after five months. At this rate it would take me about four years to acquire one.

What I want to know is are they really in production, do they work, the rate of production, and estimated take-up of orders.

Kenneth Phillips,
Milngavie, Glasgow
In PCN *last week (Issue 44) Sinclair Research answered these questions, and made the waiting time more clear. Even so, I think many people feel as you do — Ed.*

A Danish company saved my bacon

In issue 10 two readers complain about cowboys in software businesses.

I can understand the feelings of both, having been caught myself.

However, my thoughts on this subject have taken a turn for the better.

I sent off for two football programs. One, from an English firm, has not worked from the day it arrived. Despite calls to the company, I could do nothing to make this program work, and its attitude was merely that, well, it should.

The other program was from a Danish company. Not only did this program work, but the service this company gave me has been beyond all expectations.

I thought I'd found a mistake, (only to find I was at fault) and sent a letter asking for help. In reply I got not a letter, but a phone call, explaining how to work the program. To date I've had three occasions to write to them, and received another phone call.

Companies like this one restore one's confidence, but what a contrast to the response from the UK company.

D Thompson,
Norwich, Norfolk.
Perhaps you were just unlucky with the British company, though the response from Denmark seems exceptional—Ed.

Micro buyers stand up for your rights

Nicky Morris (Issue 43) and anyone who has had similar problems (not only with faulty computers) should be told that, under the Sale of Goods Act, if a shop sells them something which is not suited to the purpose for which it was sold, such as a micro which doesn't function, they have a right to a cash refund (except for goods bought on credit), even if the shop *can* offer a replacement. It is worth insisting on this, because many shop assistants don't seem to know it, though all managers should.

In law the buyer's contract is with the retailer, *not* the manufacturer (*eg* many people bought Spectrums and found they couldn't get colour with certain Japanese television sets; Sinclair refunded their mail-order customers — those who complained, at least — but anyone else had to turn to the shops which had sold them).

For goods bought on credit the matter is a little different, for under the Consumer Credit Act the contract is between the customer and the credit company, which is deemed to vouch for the quality of the goods, but a refund is still a legal right.

PCN £10 Star Letter

If problems persist, the Citizens' Advice Bureau should be able to help. I don't know, for example, where you stand if you have already accepted an offer which was less than your legal entitlement.

Martin Smith
Headington, Oxford.

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Considering on spec

Q I own a 48K Spectrum but am serious about buying a new micro at around £200-£250. The Spectravideo SV-318 seems a good machine and suits my needs perfectly. Its rubber keyboard doesn't bother me (after the Spectrum anything is an improvement).

What is bothering me is software availability. Do any of the big stores have plans to sell the SV-318 and its software?

Could you also tell me if the SV-318 is fully MSX compatible. Some reviewers say it is, and some say there is no software compatibility whatsoever.

Stephen Anderson, Balloch Alexandria, Dunbartonshire.

A On paper the SV-318 seems an excellent machine, but you're right to be concerned. There are very few Spectravideos in the country at the moment, and there are only a couple of software packages available, although these are considerably more professional than you usually get for new machines.

However, there is apparently more software already available in the US, so there should be more in the UK soon. The machine and software isn't likely to be sold in the bigger stores until adequate supplies are coming through.

As regards MSX, we can't really say anything about compatibility until we've seen some machines with which we can compare the Spectravideo. It's not likely that you'll get many instances of software running on two machines without modification, but the MSX standard should at least mean that it will be easy to convert.

Spectrum speed in question

Q Which is the faster machine: an Acorn Electron or a 48K Spectrum? After recently selling my ZX81 I am thinking of moving up to a more advanced machine.

J Plumpin, Sheffield, Yorkshire.

A The simple answer is the 48K Spectrum is faster. However, just because a micro is faster does not necessarily make it better.

When buying a new micro there are a whole host of factors to take into consideration apart from speed, and often the questions of software availability, type of keyboard, interfaces and peripherals are more important than the speed of a machine.

All we can advise you to do is to check out why you consider speed as the most important factor in buying a new micro.

Electron's peripheral vision

Q I would like a BBC B but, because of the price, I am considering an Acorn Electron. I would like to know the following:

Is there a peripheral that will convert the Electron into a BBC, in terms of Basic (Mode 7), so that all BBC software will run on the Electron?

What is the difference between 1981 and 1982 Basic on the BBC and how can you tell which a particular machine has?

Does the volume tone level on the cassette recorder cause many problems when LOADing SAVEing your own and commercial programs?

Also, I'm dissatisfied with the Basic on my Atari 800. I want a BBC/Electron for 50 per cent programming and 50 per cent games. Would one of these machines be suitable for my needs?

Simon Johnston, Boroughbridge, Yorks.

A As yet there is no peripheral available to completely transform an Electron into a BBC. There is reputed to be one that almost performs the emulation, but we've been unable to locate it.

The difference between the 1981 and 1982 Basics is that the 1982 version has several more commands. These are only documented in the Electron manual, though their names can be discovered by examining ROM. To find out which Basic you've got press BREAK, type REPORT and press the RETURN key. 1982 or 1981 will appear.

The only problem with the controls on the cassette recorder is in finding the level that your machine works best at. Programs tend to load best when the tone control, is set high and the volume control is set at about two thirds.

The best solution on your final query is to try out a BBC or Electron. You need to use one to know if you like it. Note that at present there are not many games available for the Electron, which may influence your decision.

Breaking into Apple machine code

Q Upon obtaining my weekly issue of *PCN* I always turn immediately to the three reader input sections. I am always intrigued by the little subroutine snippets suggested for enhanced computer running.

At the moment I have access to an Apple II Europlus. My knowledge of the machine is limited to the Basic and DOS manuals. Is it that nobody knows the equivalents to some of the Spectrum or BBC POKEs.

I'm sure there are many Apple geniuses who can help the average programmer like myself to discover the hidden talents of the Apple. Can you suggest any books that would help me to learn machine code programming?

Also, is it possible to disable the reset and return keys from within a Basic program?

David Lissemore, Derbyshire.

A Machine code programming is supposed to be a black art, but it's not—it's dead simple.

You'll probably learn machine code in much the same way as you learn Basic — by looking at programs, seeing how they work and trying some for yourself. Because the Apple — unlike some new machines such as the BBC and Electron — doesn't have a built-in assembler to allow you to get at the machine code, you'll need to get some form of assembler before you can properly begin machine code programming.

A good assembler and introductory machine code package is Randy Hyde's *Learning Machine Code on the Apple*. Also well worth having as good background to machine code is Rodney Zak's book, *6502 Machine Code Programming*— an excellent reference guide to the 6502 and its instruction set.

On the question of disabling keys, there are a number of different methods in machine code to accomplish this task — but you'll have to figure out for yourself which method you want to use once you've got a good background in machine code.

You can program the reset key to run a program on reset, boot disk, run a program, goto some program or point in a program or — as you've suggested — make it do nothing.

The last task can be completed by having a point in a program which does a 'warm start' when you hit reset. This would involve writing a machine code subroutine that POKEs a memory location that maintains everything in memory, but continues to run the main program when you hit reset.

You can, of course, disable the reset key in hardware with a switch underneath the keyboard — but that isn't advisable, as it means you would have to take the top off your machine every time you wanted to re-enable the break key.

Search for Spectrum Pascal

Q Having recently started a course at university which involves computer programming using Pascal, I am interested in buying a Pascal compiler for my 48K Spectrum to help with my studies. Could you tell me where I could get one?

John Peden, Greenock, Scotland.

A A good Pascal compiler for the Spectrum is Hisoft Pascal (reviewed in issue 4). It is available from Hisoft, 60 Hallam Moor, Liden, Swindon SN3 6LS. Tel (0793) 26616.

COMMODORE

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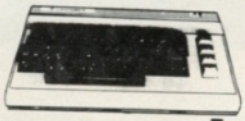

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Scrolling the Oric's screen

I have come up with this machine code program to use on the Oric-1. It will scroll the screen across from right to left one character everytime it is called. It leaves the leftmost column alone so you can insert your own colour codes there. It would be useful for such a game as Scramble or any other game (or even a word processor) that needs text scrolling past.

The subroutine works by first PEEKing an address in the text screen and then POKEing it into the next address. Locations #00 and #01 hold the current screen area being POKED. Index X holds the current loop variable for the lines. Before the main loop is entered Index X is saved in #02 because it has to be used as a modifier for the base address being POKED (#00,#01) to find the PEEKing address. At the end of the cycle the index Y is reloaded with the current loop variable.

The machine registers are stored onto the stack at the beginning of the routine and then recovered at the end. The subroutine at #423-#43F is used to increment the base address (#00,#01). To run the scroll routine CALL#400. To enter the routine into memory, use either a machine code monitor or a loader program like that given below.

```
10 FOR T=#400 TO #43F
20 READ A$
30 A=VAL("#"+A$)
40 CS=CS+A
50 POKE T,VAL("#"+A$)
60 EXT T
70 IF CS<>5953 THEN PRINT
   "SOMETHING WRONG SOME-
WHERE"
80 END
90 DATA 48,8A,48,98,48,A0,
   1B,A9,A9,85,00,A9,BB,85,01
100 DATA A2,26,84,02,A0,
   01,B1,00,A0,00,91,00,20,32,04
110 DATA CA,D0,F2,20,32,04,
   20,32,04,A4,02,88,D0,E3,68
120 DATA A8,68,AA,68,60,
   18,A5,00,69,01,85,00,A5,01,69
130 DATA 00,85,01,60
```

(NB: if the ninth byte (A9) is replaced by AA and POKE 49120 used before the CALL#400 then the colours will remain as set. Also the seventh byte (1B) is the number of lines, from the top, to be scrolled so using 10 will scroll 16 lines. Note that altering these values will change the checksum — KG).

Andrew Cain,
Cheadle,
Cheshire.

Basic breaking on the Spectrum

After reading Paul Charles' interesting Spectrum tip about breaking into Basic programs using the CAPS SHIFT, V and B keys together, I did a little experimentation to find that there are 14 other ways to break into a program. These are:

1 CAPS SHIFT + Z + SYMB SHIFT
2 CAPS SHIFT + X + M
3 CAPS SHIFT + C + N
4 CAPS SHIFT + Z + X + M
5 CAPS SHIFT + Z + X + SYMB SHIFT
6 CAPS SHIFT + X + C + M
7 CAPS SHIFT + X + C + N
8 CAPS SHIFT + C + V + N
9 CAPS SHIFT + C + V + B
10 CAPS SHIFT + X + M + SYM SHIFT
11 CAPS SHIFT + Z + M + SYM SHIFT
12 CAPS SHIFT + C + B + N
13 CAPS SHIFT + Z + X + C + V + B
14 CAPS SHIFT + X + C + N + B + Z

It's interesting to note that all are combinations of the bottom row keys. There are probably others. (BREAK pressed with any of the above combinations will break into the program).

Jonathan Williams,
Halesowen,
W Midlands.

BBC poses problems for long loads

BBC micro users who possess disk systems may have experienced problems loading long programs, such as Bees Away, *(Issues 32-33)*.

The way around this is to use a loader program that sits at the top of memory. The program loads the Basic program, as data, then switches the disk off using *TAPE. The next thing to do is to put RUN<carriage return> into the keyboard buffer and relocate the long program and change the page value. The program is:

```
10 MODE 7: IF PAGE<>&7000
   THEN PAGE =&7000
   :CHAIN"MOVE"
   20 *LOAD COLCHAR 1900
   30 *TAPE
   40 *FX138,0,82
   50 *FX138,0,85
   60 *FX138,0,78
   70 *FX138,0,13
   80 FOR T%=0 TO &2000 STEP 4
 90 T%!&E00=T%!&1900
100 NEXT
110 PAGE=&E00
120 END
```

Kieren Gordon,
Ballycotton, N. Ireland.

Playing around with POKEs

While browsing through Chapter 25 of the Spectrum's manual, I found this POKE number that changes the UDGs. When printed out in a FOR . . . NEXT loop, it looks like the credits on the end of a television program.

```
5 REM UDG POKE
6 REM
10 FOR A=0 TO 255
20 POKE 23675,a
30 REM GRAPHICS MODE ON IN
   LINE 40 BETWEEN INVERTED
   COMMAS
40 PRINT AT 0,0;
   "ABCDEFGHIJKLMNOP
   QRSTU"
50 NEXT a
60 GO TO 10
```

A Dawkins,
Port Talbot,
West Glamorgan, South Wales

Putting the brakes on the Dragon

Several of your correspondents have been interested in the problem of slowing down the fast listing of the Dragon 32. By feeding the instruction SYNCH to the CPU a delay in calling the ROM routine for inputting a character is accomplished.

Try: FOR I=&H167 TO &H169:POKE 1,19:NEXT

For an even slower listing type: FOR I=&H167 TO &H16C:POKE 1,19:NEXT

To restore normal listing speed simply POKE 57 to the above addresses.

A W Smart,
Newport on Tay,
Fife.

Colourful Dragon twice over

I was intrigued by Mr R W Stevenson's Microwave (*PCN*, issue 30), particularly when the listing shown in this item did not produce the colour black.

Here are two listings, the first of which produces horizontal bands of colour (including black) and the second reproduces Mr Stevenson's colour pattern but quicker. Readers may be interested in comparing the two methods.

A W Smart,
Newport on Tay,
Fife.

```
10 CLS
20 A=&H420:B=&H20
30 FOR I=A TO A+B
40 POKEI,128
50 NEXT I
60 C=127
70 A=A+B:C=C+16:IF C>255 THEN 110
80 FOR I=A TO A+B:POKEI,C
90 NEXT I
100 GOTO70
110 IF A<&H600 THEN 30 ELSE 120
120 PRINT@7,"DRAGON 32 COLOURS";
130 GOTO130
```

```
10 Y=127:B=&H20:C=-4
20 Y=Y+16:C=C+4:FOR I=C TO C+3
30 A=&H400+I:FOR X=A TO A+16*B STEPB
40 POKEX,Y
50 NEXT X,I
60 IF Y>=255 THEN 70 ELSE GOTO20
70 PRINT@7,"DRAGON 32 COLOURS";
80 GOTO80
```

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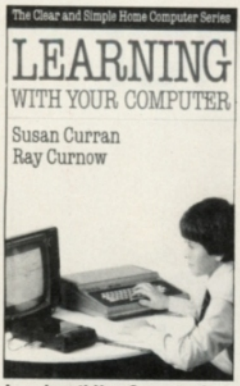


Learning wth Your Computer, by Susan Curran and Ray Curnow, published by Winward, at £4.95 (paperback 144 pages). Part of the Clear and Simple Home Computer Series.

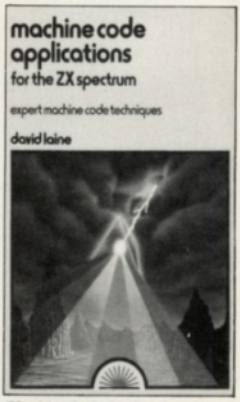
This book ranges from interesting to useful, but the whole is less than the sum of the parts.

This first section of the book is patchy. The mentions of PLATO, and two spokesmen on micros and learning, Seymour Papert and Ted Nelson, are no more than passing references — perhaps this was mere name-dropping to give messrs Curran and Curnow more authority. However, their discussion of the relative merits of CAL (computer-aided learning) and CAI (computer-aided instruction) makes some good points.

The writers' greatest authority is that they have two young children, and the acquaintance of many others who are not so small. For instance, they indicate what hardware, software and add-ons might be suitable according to age and inclination, and they point out that a disk drive system is much easier for younger children, and therefore well worth the extra cash.

The last chapter of the book assumes familiarity with Basic programming. This chapter comprises several short sample programs designed to be educational just by being used, as well as teaching, say, French vocabulary or maths tables. They include Binomial Distribution, French Fruit, Graph Plotter and File, all with a similar format: programming points, representation of screen display, line-by-line program notes and flow-chart.

For all that the chapters may be worth a glance in their own right, they have an air of all being cobbled together, rather than belonging in the same book. **HA**



'Machine Code Applications for the ZX Spectrum' by David Laine, published by Sunshine Books at £6.95 (paperback, 160 pages).

The number of introductory books to the Spectrum is legion, and introductions to Spectrum machine code are not far behind, but books on machine code techniques for the more experienced programmer are much thinner on the ground. David Laine's *Machine Code Applications for the ZX Spectrum* is intended to fill this gap in the market and presents the advanced programmer with a number of useful routines.

Though it is not for the beginner, the book kicks off by explaining how you should approach machine language, and gives some timely tips on programming techniques.

Next is a quick turn through the instruction codes, number representation and addressing, and straight into a few listings.

Once you're further into the book and the machine, Mr Laine presents routines to handle floating point numbers, output to the screen, animated graphics and Basic block delete.

Of course, there may not be much more around as yet, but by the time you've finished reading, you should really be writing it yourself, right? **JL**

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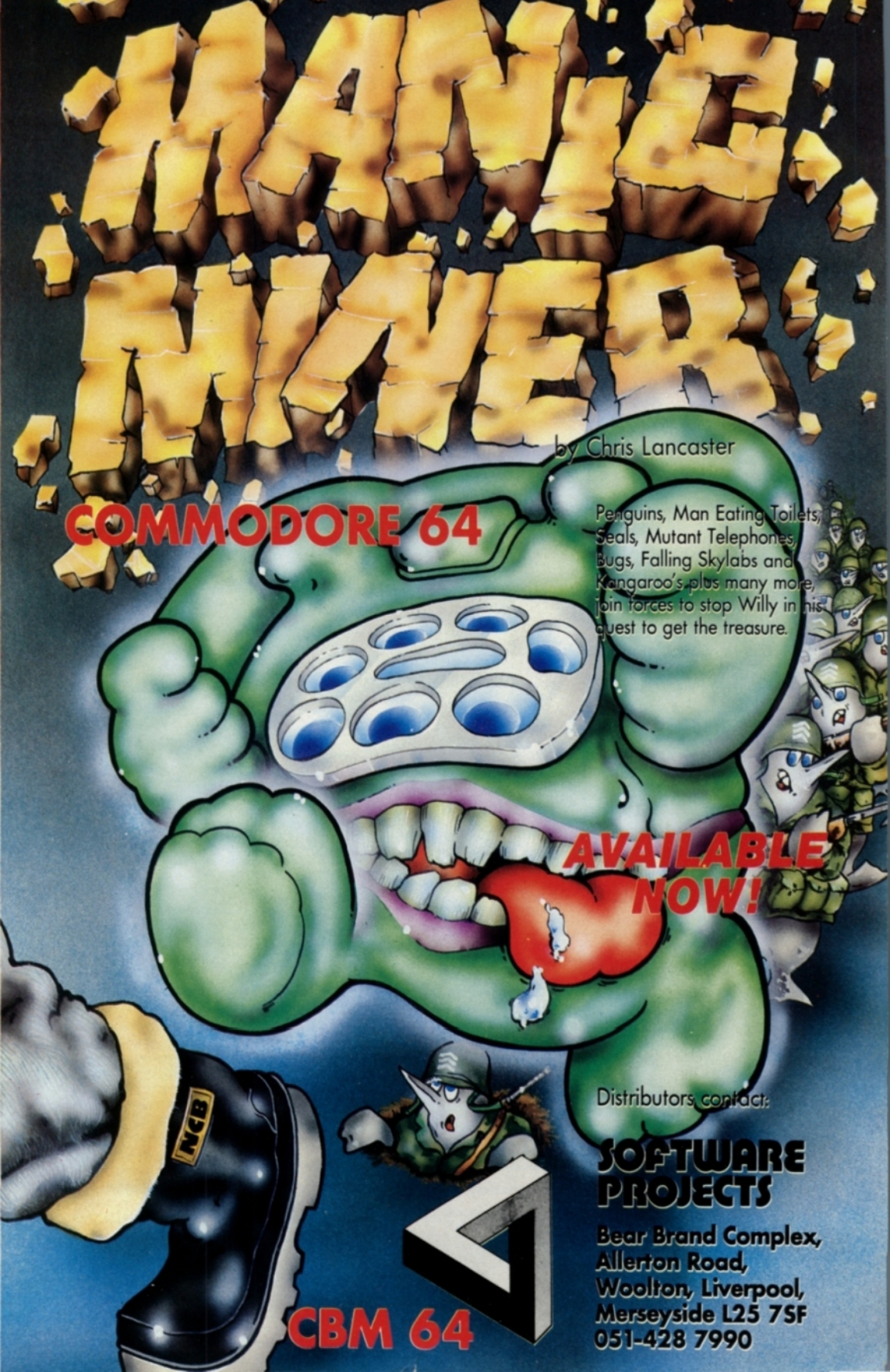
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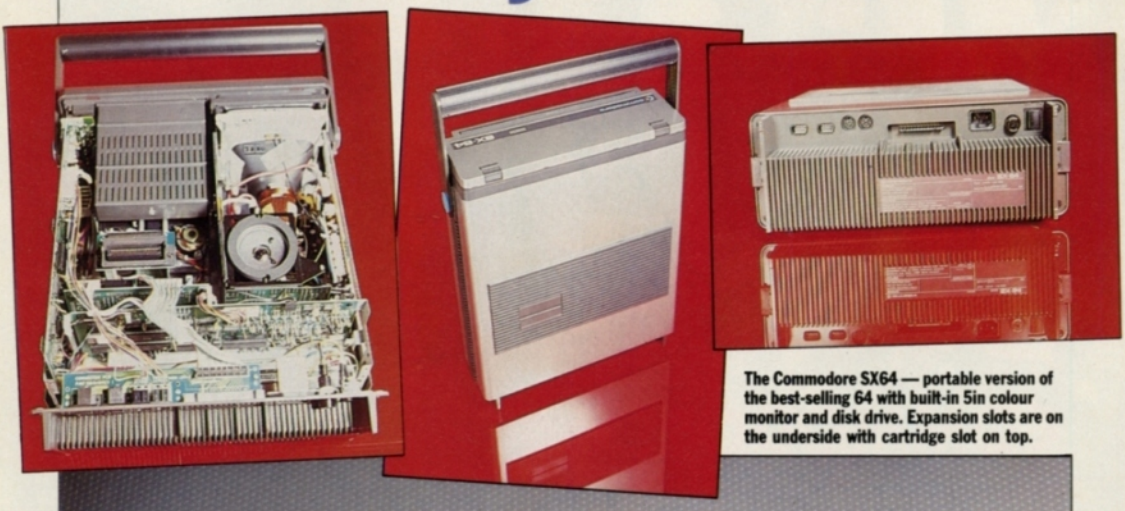
Take-away micros



The Commodore SX64 — portable version of the best-selling 64 with built-in 5in colour monitor and disk drive. Expansion slots are on the underside with cartridge slot on top.

Commodore's portable version of the 64 has been awaited with interest by Commodore enthusiasts for some months. The SX64 owes much to the trend-setting Osborne portable. More interestingly it slots into the noticeable price gap in the current micro line-up — the market region between £500 and £1000 for a working disk system. At £700 the SX should prove a popular choice for people who want a reasonably transportable computer to perform a specific set of tasks. Commodore obviously thinks that word processing will be a firm favourite — the Easywriter program is bundled in the price — as it presently is with the 64.

23▶

In this corner, the Olivetti M10, weighing in at four pounds three ounces. In the opposite corner, the SX64 at 25 pounds. An unfair fight? Like pitting Bruce Lee against Frank Bruno?

Not *really*, for both machines are likely to appeal to similar users. They simply go about providing a different set of features to meet a similar set of needs — portable word processing seems to be the target application for both systems. Unlike the luggables such as the Commodore SX, which are attempts to squeeze a conventional disk-based micro into a carriable configuration, the M10 is devoted to handheld portability. It's a convenience computer with CMOS non-volatile RAM. Instead of having to find a desk and power socket and install a disk, all you do is turn it on and you have instant access to its features. So you can use it on the train, in bed, in fact, anywhere under the sun and over the weekend.

To get a computer down to around four pounds obviously means cutting a few corners.

The most fruitful way of shedding weight and bulk is to get rid of the cathode ray tube which contributes a lot to both. The M10 uses a flat liquid crystal display instead. This feature also means that the screen is small (just eight lines by 40 characters). Another heavy component is the disk drive(s). This has been replaced by the non-volatile memory.

Say the word Olivetti and chances are you'll be thinking typewriter. However, as anyone who notices advertisements on television will tell you, Olivetti also sells a business micro called the M20 — which is faster than all the other 16-bit micros (whatever that means).

On the M20 Olivetti decided to incorporate Zilog's Z8000 processor — a 'true' 16-bit micro which can directly address up to one megabyte — instead of the industry's firm favourite, the Intel 8088.

When Olivetti extended its range of micros with the portable M10 it decided to make it yet another version of the Japanese-manufactured Kyocra system which has already appeared in *PCN* as the Tandy Model 100 (July 7 to 13) and the NEC PC-8201A (Oct 27 to Nov 2).

Olivetti's most obvious influence on the basic design is a whiff of Italian styling and a tiltable screen. The rest of the micro's features are the same as its siblings.

A minor problem with the Tandy and NEC computers is the angle you end up finding yourself looking into the screen. With the light playing over it from the wrong angle it is impossible to see what's going on — users tend to resort to cigarette packets and so on to jack the thing up. It's either that or sit it on your knee and hunch over the machine.

Olivetti has mounted the eight rows of forty characters liquid crystal display on a sprung hinge so that it can be tilted up by the user.

The machine loses points in other areas however. For instance, the keyboard layout has features designed to frustrate the average computer keyboard user. The '|' can unaccountably appear when you're trying to execute a shifted character. The Olivetti also utilises the fiddly little function keys like the Tandy's which are particularly annoying when you're attempting to send the cursor about. But these are

21 ▶

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minor quibbles. Once the idiosyncracies are mastered, the keyboard is very pleasing to use.

The rear of the machine has a row of ports — bar code reader, tape recorder socket, parallel and serial interface ports. You can also run the system off a mains power supply (this will also beef up rechargable batteries — worth the extra cost if you use the machine often).

Under various flaps there are extra sockets for RAM and ROM chips. It is possible to add an extra 32K of ROM while the CMOS RAM can be increased in 8K increments to 32K. A bus extension socket appears to promise future goodies.

Like its siblings, the M10 has a built-in word processing program, Microsoft Basic, a time scheduler and communications utilities. A version of the M10 with built-in modem will also be available.

In use

The M10 is all about instant access to whatever information you have inside. The price you pay for this is capacity. Also it will be some time before there is a great variety of applications software available.

There are two portable power sources — the RAM runs from very low charge Ni-Cd rechargeable batteries. The manual says these should last between 8 and 30 days if the computer is not used (and hence the batteries remain uncharged) and says it's advisable to use it every couple of days. The only data loss I experienced was when I inadvertently poured a cup of coffee down the keyboard. Once the system had dried out it performed faultlessly.

The four conventional penlight batteries power the eight-line screen for about 20 hours. This will also switch off it it's left without any keyboard depressions for about 5 minutes.

This means all you need do is turn the computer on, balance it on your lap and go — there is no power plug to find, no disks to manipulate and no operating systems or software to boot up.

You start with a directory of files and programs: simply position the cursor over the appropriate file or program name, depress the return key and you're off.

Judged simply as a computer using all the standard ways of benchmarking and evaluation the Olivetti M10 doesn't stand up well.

But these rules simply don't apply because the system is so totally convenient — saving time and money is what computers are all about after all.

Price	£494.50 for 8K model. £644.00 for 24K model.
Processor	80C85
RAM	8K expandable to 64K.
Screen	LCD flat display, 240 by 64 elements with 40 characters by eight lines.
Keyboard	57 full-travel keys with numeric option, 12 function keys plus four cursor control keys.
Storage	cassette tape recorder.
Distributor	Olivetti UK, 01-785 6666 available retail outlets.

Tandy Model 100

The Tandy Model 100 made its appearance in July 1983 here in the UK. The machine seems to have created something of a stir in the industry. Indeed, it seemed a winner at first glance. It consists of a full-sized typewriter keyboard on a book-sized machine with its own flat screen display, non-volatile memory and sockets and ports sprouting out all over the place.

Not only was it a nice piece of hardware, but there was a set of built-in programs in ROM to enable you to write letters, schedule yourself, run a small database — all without inserting a disk or fumbling for a power socket.

Tandy's big selling point is always sales and service, and when you're talking portable this is an even bigger advantage. On your frequent visits to the US your suddenly faulty machine need only be dropped in to a handy Radio Shack to have the relevant repairs.

Tandy is selling a lot of Model 100s, especially in the US where enthusiasm for portables is such that there are already dedicated portable computer magazines.

Like the Olivetti, the Tandy has annoyingly fiddly little cursor keys. It is expandable to only 32K of RAM. The disk drives are promised in a box together with a conventional display facility. On the plus side it does possess a good range of built-in graphics characters.

The Tandy shares with the Olivetti the disappointing duplications of the Address and Schedule programs. These enable you to create little files and search them for keywords and so on. The problem is they seem to be duplicate programs. Still, by duplicating you effectively speed up and make the functions of both more efficient since the computer would have to search through the combined files.

Price	£649 for 24K version.
Processor	80C85 running at 2.4Mhz.
RAM	8K expandable in 8K increments to a limit of 32K.
ROM	32K.
Text	40×8, 5×7 dot-matrix.
Graphics	240×64.
Keyboard	57 keys, 8 programmable function keys, 4 command keys, 4 cursor keys.
Storage	Cassette or RAM.
OS/ Language	Menu-system and Microsoft Basic.
Distributor	Tandy UK.

NEC-8201A

The NEC PC-8201A followed closely on the Tandy's heels, it was also based on the Kyocera design. Unlike Tandy, NEC seems to view its product as an 'open', multi-purpose system capable of incorporating disk drives and growing up into a 'total solution' in its own right.

The NEC scores over the Tandy in two important respects — it's cheaper and it has a 'bank switching' facility to run removable CMOS RAM cartridges. The same switching (it has 32K of ROM) enables you to expand it to 64K inside the machine.

These CMOS cartridges are wonderful things, you simply plug them into the side of the machine and use a paging command to switch banks and gain access to the files stored there. You can transfer files across the banks or swop the modules with other users. The only problem is the price tag, the cartridges cost around £200 each.

This is because the non-volatile memory used in them is still fairly expensive — when it comes down in price this sort of storage solution is bound to become very popular with a wide range of systems.

Thought and effort has been put into the keyboard which has an attractive array of cursor control keys and two of the function keys are also full-sized. The NEC does without the embedded numeric keypad.

It also doesn't support the range of built-in graphics characters. Instead it gives you the ability to redefine characters from 131 to 255 with a special character redefinition program which comes as part of the Personal Application kit.

All in all, NEC seems to have put more of its heart into its product: programs are included in ROM — the text editor and telecom communications utility. It also has a different, and some would say nicer, version of Microsoft Basic.

Price	£546 (incl. VAT).
Processor	80C85.
RAM	16K, expandable to 64K.
ROM	32K standard, 32K optional.
Text	40 characters by 8 lines.
Graphics	240×62.
Keyboard	67 keys, 5 function keys, and 4 cursor keys.
Storage	RAM cartridge or cassette.
OS/ Language	Menu system and Microsoft Basic.
Distributor	NEC, 164/166 Drummond Street, London NW1, 01-388 6100.

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Presentation

Packaging is irrelevant with this machine — it comes in the standard cardboard box, but as it's a portable you'd best get rid of the packaging in the shop. Lugging it about by the handle will be an experience in itself, but we'll come to such weighty matters later.

Construction

The SX is basically a conventional Commodore 64 (see *PCN* issues 24, 25 and 26 where the Micropaedia is devoted to the machine's features) and one of its standard 5.25 inch disk drives squeezed into a heavy-duty carrying case with a five inch colour monitor plus power supply.

How much weight the case contributes to the package is difficult to say but there's none of your thin plastic feel to this machine — it's rugged and should stand the inevitable knocks quite well.

The keyboard fits over the business end of the computer, enclosing the screen, drive and storage area. This last item is strange — it's a hole where a second disk drive should be. Though dubbed a storage area and obviously floppy disk size, the nasty magnetic field generated by the working disc drive prevents you using it as such.

The base of the SX (the bit closest to the ground when you're carrying it about) has an arrangement of cooling fins which double as a strong base for resting it, protecting the line of I/O ports which are inset far enough to be out of contact. The ports themselves consist of two joystick sockets, a video port for an external monitor, the Commodore serial port, user port and the power socket.

The top of the machine (when it's set up for work) features a cartridge port protected by a spring-loaded flap. The man-sized carry handle doubles as an adjustable foot to prop the computer up on the work surface at a right angle.

The keyboard connects via a short cable to the SX's belly. The Commodore's function keys are sensibly arranged down the right-hand side. The keyboard feels good, although some may find the mechanisms a little springy.

In use

The first thing you notice about the SX is the inadequacy of the screen. What we have here is a five inch colour monitor. At the best of times colour monitors like these are only just adequate as screen displays, when you shrink them down to five inches and squeeze 40 characters across a line you're asking for trouble. To get readable text from the system you have to limit your background/foreground to something like white against grey.

So why not have a monochrome monitor? 'Ah,' you say, 'but this is a Commodore 64 and it's designed to be a colour computer.'

And you'd be right, but then you would expect a little consistency. The machine does have a video port so Commodore obviously expects the user to want to play games or do display-oriented tasks like spreadsheet calculations on a big screen. The machine doesn't have a cassette port, so tape based software is out of the question. You can, however, use cartridges.

It might have made more sense if Commodore had opted for an on-board monochrome display which gives a steady, readable picture (if a bit boring) and left the colour for an external monitor.

Another disappointment was the disk drive. This system is supposed to be a professional tool and yet it's like watching paint dry — waiting at the screen as the drive sends data bit by bit down its serial interface to the computer.

For the Commodore enthusiast, of course, none of this matters much. They know exactly what they're getting — except for the weight.

This brings me to my favourite complaint. Unless you have legs for arms you're going to find the going tough — mind you, if you've been getting lots of sand in your face lately this could be just what the mail order ordered.

You have to take the micro out of computer when you're talking business portable. To be fair to Commodore, though, the SX is among the welter weights — although I didn't have a chance to weigh it properly it is supposed to be around 23 pounds. Some portables go up and beyond 30. Whatever it is, it's too heavy to be portable in the way that you may expect from advertisements of fresh faced executives happily boarding planes and hopping into taxis as if their arms weren't falling off.

In the course of testing the SX it made the computer commuter's journey home with me and back to the office. It's not so bad over a short distance, but walk with it any further than 200 yards and you'll be changing arms to stay the course. The SX is one of the lesser sinners in this regard, but the paying public must be warned that their idea of portable and a computer manufacturer's may be two entirely different things.

Software

Bundled with the SX is the Easywriter word processing system. Easywriter is a good package — it has all the features we've come to expect from something which purports to be full-featured. Plenty of menus, block moves, flexible formatting and so forth. But again, it was blighted by the small screen. It wasn't really a pleasure to work with.

Price	£895.00 (inc VAT)
Processor	6510
RAM	64K — 38K available to user.
ROM	20K
Screen	Text 40 column by 25 lines, 16 colours — 320 by 200 pixels.
Keyboard	62 keys plus four function keys.
Storage	one 5.25 inch single sided, single density — 170K formatted.
Distributor	Commodore Business Machines — SX available from Commodore dealers.

Final comparison

The Commodore SX 64 and the Olivetti M10 can serve as examples of two broad product trends. Both claim to offer realistic portable computing, but the philosophies of the two approaches are very different.

Although it's early days yet, it seems likely that the Kyocera-type machines (we can include the Epson HX-20 in this category as well) will attract sedentary storage systems. The idea would be that you keep the heavy disk drives and full-size monitor at home or in the office. You then use the storage facilities as a sort of 'home base' for keeping not immediately needed files and records, down-loading what you accumulate while out and about. The Olivetti is also seen as an adjunct to upmarket micros in big and medium businesses.

On the other hand there are definite advantages to the Commodore solution. The SX is an attempt to make desk-top technology moveable. This way the user has access to the full features of the desk-top micro: unlimited storage and well-tried applications packages, and usually at a good price as well.

The Osborne I was the trend-setter here — bundling a well-proved range of CP/M software with the basic price of the machine and offering a very reasonable hardware package to boot.

Commodore has taken the same route with its own system exploiting a now well-proved and supported system and making it portable. For true portability the book-sized systems are undoubtedly the way.

The luggables, on the other hand, can be moved about but hardly provide any sort of portable solution — remember that a battery pack will make them heavier still. The Commodore SX makes a nice bundled package — to buy, not to carry. PCN

Chosen which micro to buy? Then let John Lettice guide you on making that important purchase.

Hard bargain

How much should you pay for hardware? Countless articles tell you how to choose a micro, but there's a lot less information on how to buy one. In some cases this doesn't matter — prices for a Spectrum or a BBC B, for example, tend to be very stable, but in many other cases the savings can be dramatic.

Printers are particularly prone to price variation. A straw poll of a recent issue of one of Britain's biggest microcomputer magazines showed the Shinwa CP80 retailing at between £263.35 and £374, and the Epson FX80 at £400-£498. For micros like the IBM PC, savings can be in the region of £500, or considerably more if you care to look at some of the PC compatibles.

What is it that causes these vast differences in pricing? After all, in a supermarket you'd not expect the cost of a can of beans to vary by more than a few pence either way, so what is it that makes micros so different?

The short answer is that they're actually not all that different. If you've ever looked into the pricing of hi-fi equipment, you've probably run across the legend of the 'incredible little shop that sells equipment at rock bottom prices.' You'll also know all about the high street store that advertises huge savings based on a recommended retail price that everyone kissed goodbye to two months ago.

Both these shops exist — the former is still fairly legendary, but the latter can be seen every day of the week, if you care to look for it, and the thing is that nowadays both of them are selling micros on exactly the same basis. So although at the time of writing the going rate for a Commodore 64 is £199.95, you'll still find stores advertising this price as a considerable reduction. This is strictly true, but can still mislead the unwary.

There are a number of reasons for variations in price levels. Supply and demand have a considerable influence; there's no point in a shop cutting the price of something like the Electron when it can sell as many as it can get. Even with established machines a sudden Christmas rush can put paid to price cutting. The reverse side of the coin becomes most obvious in the cases of micros that are no longer being made, or whose manufacturers are in trouble.

The Acorn Atom had something of a consumer boom last year, and the TI99/4a apparently made a considerable splash as a stocking filler in the USA shortly after its official demise. Similarly, the Osborne 1 has made brief appearances in shops at prices greatly below the official level.

From the retailer's point of view, if, as is the case with the more out of the way stores, a shop is selling to an experienced public, competitive pricing is important. If the shop is well-placed it will tend to attract more drop-in trade, and if the shop is well-known to the general public as a place for buying micros, it is not actually necessary to offer the best deal in town. Bear in mind too that overheads will probably be higher, and that there's nothing criminal in selling goods at a higher price than the customer need pay.

So what can you do about it yourself? If you know what you want, it's a simple but tiresome task to plod through the advertising listing prices. Some of them will include VAT, so don't be taken in by a rock bottom price that is qualified by 'all prices subject to 15% VAT' underneath.

Be on the lookout for special offers. Some of these won't be terribly special at all, but there is the odd gem to be found. Even the more expensive stores sometimes discount particular items, so don't assume that a shop that is expensive for one thing is never worth looking at.

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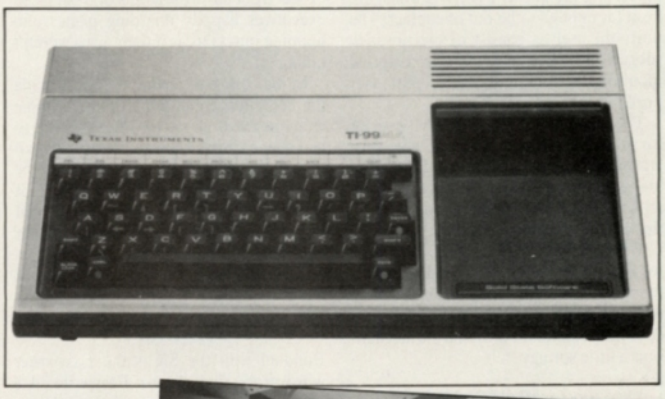

Prices can vary a lot on the Epson FX80 (top) and RX80 (bottom right). The TI99/4a (right) can be a bargain, as can the Shinwa CP80 (below).

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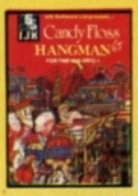

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Working through the prices, you may also notice slogans on the lines of 'best prices' and 'we will not be beaten on price.' In cases like this it's worth phoning up and saying you've seen the same item listed cheaper elsewhere, as the shop can quite often be persuaded to match the lower price. Of course, the shop is likely to want to do a bit of investigating first to make sure the offer is genuine.

In general, the bigger the system you're buying, the greater the savings — or indeed, mistakes — you can make. Take the IBM PC, for example. You'll probably pay around £2,400 for a PC, and it's unlikely that you'll get one for much less without breaking out of IBM's dealer network. But is it a PC you want, or is it just a PC-style micro?

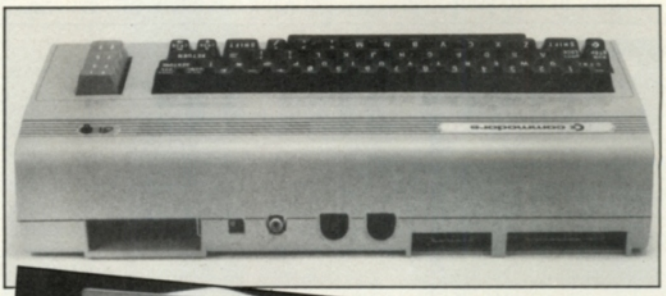
In the latter case you can look at one of the IBM compatibles that are currently being sold. Depending on your requirements, however, this course can be fraught with difficulties. Absolute compatibility should allow you to take a disk out of an IBM PC and plug it in to your own micro. You should also be able to plug in any IBM peripherals without any trouble.

But this is seldom possible, and the best you can really hope for is that a compatible will run most software and peripherals, perhaps with minor modification. So it makes sense to take a long hard look at what you want from a compatible, and at the kind of compatibility you need, before you buy one.

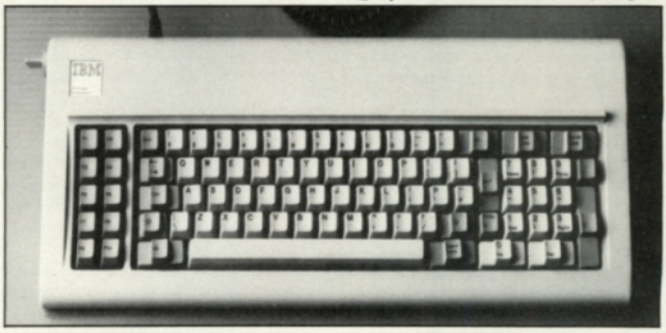
Compatibles haven't yet taken off in this country to anything like the extent they have in the States, but two new contenders, the Advance at around £1,200 for the disk version, and the Sanyo at around £900, should soon be cutting the cost of IBMing almost to home micro levels.

The other big mainstream manufacturer is of course Apple. Compatibles aren't all that thick on the ground here, as Apple takes a dim view of this particular cottage industry, but the Ram II, at £250 for a 48K machine, is one notable, even if Autoram's trading address does seem to be Jeddah. There are a few others around, but the most notable Apple compatible, the Franklin Ace, isn't nearly as common in this country as it is in the States.

Despite the dearth of compatibles in this country, it's still possible to get a fairly good deal with the Apple IIe professional home computer pack, which gives you 64K memory, one disk drive, RF modulator and various vouchers for £998. But



Osborne prices (bottom left) can vary substantially, while the 64 and Apple (top and above right) are relatively stable. But do you need an IBM (below) or an Ajile (right)?



although this isn't bad for an Apple, it's not particularly enticing when you look at some of the other machines that are available today.

One of the biggest difficulties associated with buying hardware is working out what actually is a good deal. Banners saying 'sale' don't always mean cheapest, prices that look good may often be qualified by small print saying 'all prices subject to 15 per cent VAT.' This table doesn't set out to be comprehensive, and the prices, although accurate at the time of writing, will be subject to variation. What it does try to do is to give an indication of the variations you may see, and to equip you with a target price on a few items.

NB all prices are inclusive of VAT. Note also that there will be considerable variation in the price of the more expensive hardware because of differences in specification and in the software included.

PRINTERS

Name	*Cheapest*	*Average*	*Priciest*
Shinwa CP80	£263.35	c£270	£293
Epson FX80	£375	c£380	£498
RX80	£240	c£260	£349

MICROS

CBM 64	£184.95	£199.95	£199.95
BBC B	£347	£399	£399
Sirius	£2,100	c£2,200	£2,525
Kaypro II	£1,199	c£1,400	£1,949

Cashing in with your micro — John King has a few suggestions.

Filthy lucre

Your ears are burning with desire, your fingers have an uncontrollable twitch and you're dribbling moistly into your wallet. You wan't to make money with your micro — but how?

First, you need to be the type of person who can convince yourself that it is possible and probable if not downright easy to do so. Then you need hardware and software. It should go without saying that any one is useless without the other two.

The programs needed for this exercise are usually fairly standard — word processing, database, filing and sorting packages, spreadsheets, budgeting and planning programs, as well as stock control and other items.

One side advantage, if you have already used some of these for your own benefit, is that your own personal data may be considerably more efficiently organised and available than ordinary hand-operated files. This is also good practice in meeting the requirements for both the normal accounting needs and the business habits of a newly hatched (part-time) self-employed person.

Your next move is to look at all the things you are interested in to see if there is an available program which is already tailored for use in that area. In most cases it is just as easy to design your own by a careful amalgamation of databases and word processing applications.

The best way to start is to find a method of using this type of program to enhance your hobbies with a view to making money later, or at the very least give a genuine ego-boost. Typical of this sort of technique is the use of a computer to operate and generally improve the running of a local club, playgroup or parish council. These are organisations which regularly run out of people willing or able to adequately control either the finances or the meetings; and these are two aspects which are meat and drink to a portable number-cruncher.

Another area which is a prime target for the money-maker is the use of the word processing capabilities of the machine for writing articles for sale. Basically, all you need for this is to find a subject on which you can appear to have more knowledge than the Man in the Street.

One minor point when using someone else's program as a money-spinner is that it is very easy to find that after only a short time it does not do exactly what you thought it would, let alone doing exactly what you think you need it to do. But this is the price of success.

Another factor is that for a small businessman a set of well maintained hand-written records is difficult to improve upon, and there is a lot to be said for the higher degree of personal involvement and self-organisation required in making manual records. For small businesses of all types the capital outlay involved in buying a micro is sudden and large compared with the potential benefits. Experience seems to imply that the key to success is directly proportional to the efficiency of the implementor and the involvement of the users.

There are other angles on this aim of making money. We haven't even mentioned the possibility of writing programs for sale. The greater portion of the software presently available for machines like the Apple or the Spectrum, has been written by amateurs. They have found a gap in the software library, or more often they didn't like what they found there and they have sat down and tried to do better. Insofar as it is the quality and quantity of this software that has kept an electronically aged machine like the Apple at the top of the tree for many years, then it must be true that it can be done for many more years and for many more machines yet to come.

Generally it is very easy to write a variation on another game. The real problem and the area where the big money is made is in the gaps in the market that nobody else has yet noticed. It is here that the writing and selling of programs can be most lucrative. Each aspect of the games arena will go through the 'its no good — boom — bankruptcy' roller coaster.

Once you begin to think about it and to see how many ways other people have made a bundle, all you need is the ability to say 'I can do it too,' then you're on your way to a nice little sideline.

If you begin to make a fair income from your new toy how do you go about making it into a good income? One answer is to start freelance work. All you really need as before is confidence (and maybe a lot of luck).

As a part-time occupation you will probably have specialised in only two or three areas. Freelance work is much easier to obtain when you can get suitable references from a variety of satisfied customers in these fields, and if possible get at least some of these same people to give you a degree of regular work. Once you get some bread and butter work then you can go after the jam.

You also need to get proper advice. There are a number of organisations and publications which can be helpful at this time. Typically your local bank, tax office, library and accountant will help. And if you don't have an accountant — get one.

A major pitfall is in trying to start up on the cheap. You will miss out on so many opportunities and/or waste so much time and money that it is just not worth the effort. Generally speaking it is rare to make a large profit in your first year's activity, but your accountant can help you

32 ►

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Get proper advice	Start on the cheap
Get an accountant	Try to ignore the taxman
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to offset this against other income in other years.

So unless you either have external income or a well filled back account — begin on a part-time basis. If you do this you will still be competing against full-time professionals with the full range of backup and equipment, but starting in a small way lets you spend your ordinary earnings as start-up finance while you make contacts and get ready to dive in the deep end.

You may of course find that, after you've freelanced part-time for a bit, your ideas about it have changed. Perhaps you'll find that you're quite happy just making a little money on the side, or you may even find you can't stand the aggravation working more than nine to five. But this simply strengthens the case for starting small, and not committing yourself too early. You're not burning any bridges, and you're not liable to be wasting too much money on initial investments.

Finally, the freelance worker can be an invaluable aid to the cost conscious company. In the present economic depression this occurs to business in so many fields that it should be easy to fill mutual needs.

So the opportunities for freelance workers are growing frantically. The way to get in on this is to be better than all the rest at some key topic.

Jon Riley

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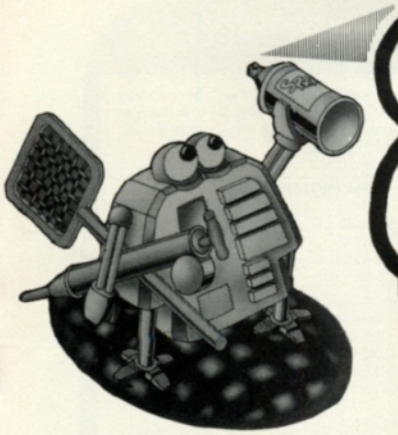


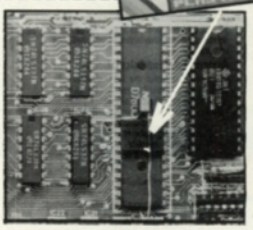
Like some free software?

Sharpen your pencils, put on your thinking caps and get out your *PCN* back issues — it's competition time. On offer is your share in £1000 of software from Ultimate Play the Game. The rules are simple — fill in the competition entry form with your correct answers to the five questions below and send it in to the address given below. If you are one of the first 20 correct entries drawn, you'll get a stake in the big software prizes.

The answers can be found in current or past issues of *PCN*. So here are the questions:

1 **Is the arrow in this picture of the inside of a Sinclair Spectrum pointing to:**

a) the Z-80 processor chip
b) the RAM chips
c) the Uncommitted Logic Array chip



2 **This man has influenced the direction of Sinclair's computer division almost as greatly as Sir Clive himself. Who is he?**

3 **What type of magnetic tape is used in Sinclair's Microdrive cartridges?**

a) ordinary audio tape
b) videotape
c) micro-cassette

4 **What is the Spectrum equivalent of the ZX-81's UNPLOT command?**

a) there isn't one
b) OVER
c) ENVELOPE

5 **In Ultimate's Jet Pac game, who is the hero of the game working for?**

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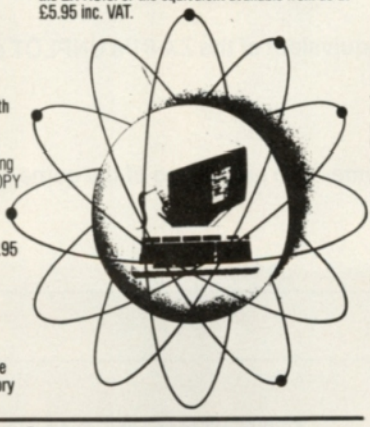

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Silence is golden but is everything that glisters gold? Colin Cohen investigates.

Acorn's Sparkjet gets in the print

The Acorn Sparkjet is small, black, sleek and, above all, virtually silent. Because it's so quiet it seems even faster than the quoted 80 cps (450 words a minute) — though the silence is occasionally shattered by piercing alarms.

First impressions

The Sparkjet's configuration was described by Drew Athol in Issue 7. It is still very much a badge-engineered Olivetti product with no attempt to match Acorn or BBC colours. If you want the Acorn logo you have to stick the loose label over the Olivetti badge.

The smoked perspex cover has to be closed while running the printer or feeding paper, which is interlocked, making the last line invisible. This is done to stop the print head having your fingers off as it goes snicker-snack across the machine.

The printer is supplied astonishingly complete — a full manual, a cable with BBC and Centronics plugs and even a plastic dust cover.

Documentation

The manual is badly printed and contains two pages of errata, including 'within the text, random tipographical (sic) errors may also be present'. Some of the photos are so bad as to be incomprehensible.

Getting started

The machine is easy to assemble, and, were it not for the dip switches, this could be done without the manual.

First you fit the tiny glass print head, for which four replacements are supplied. However, the instructions do not explain that you have to fit a print head before you start. They cost £6 for four and are said to last for 150,000 characters each, making them cheaper and easier to fit than the ribbons for an NEC dot matrix printer.

The paper is very difficult to feed as there is no hand crank, and you can really only use tractor paper up to 9in wide. Though not intended for sheet feeding, this can be done in an emergency.

In use

Dip switches select several character sets and there is good graphics capability. I don't like the standard character set, preferring that on the NEC printer, but it's hard to equate typographic quality with silence. The text mode works without difficulty from the BBC, once you realise that engaging the printer's switches needs very firm pressure.

Acorn also provides a short machine code (about 300 bytes) screen graphics dump, which loads in a few seconds. There is one version for modes two, four or five and second for mode zero. Unlike some dumps it does not seek out the mode in use, and if you try to use it in modes three, six or seven you get the screen message 'NOT GRAPHIC'. This is a problem because many programs make good use of the BBC's teletext graphics.

The program instructions say 'To dump a picture from the computer screen load and run the relevant program from cassette by typing either *RUN"G" or *RUN-"GO". When the program has finished it will return to Basic'. I thought this meant that one loaded the dump first and then ran the main program with a CALL &400 in it.

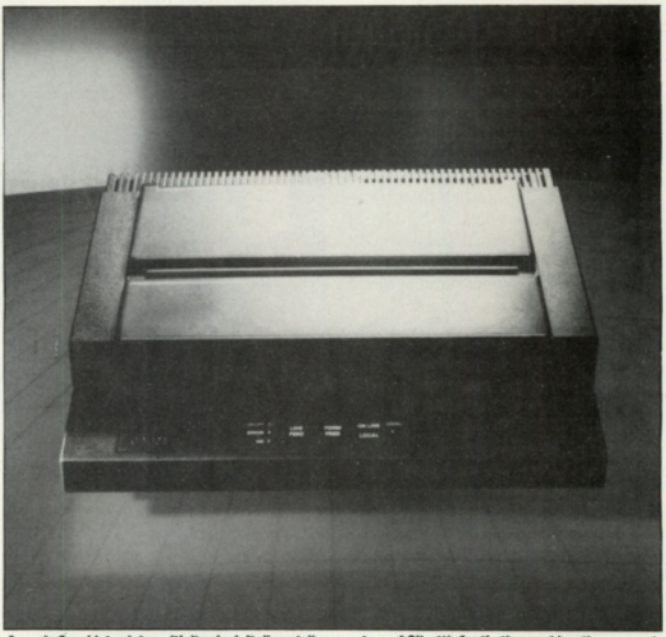
After problems with this I found it easier to add *RUN"G" or *RUN"GO" at the end of the graphics program so it would load and run the dump as soon as the screen was complete. This means you need to reload the dump for every print.

One problem is that the screen image may scroll up a couple of lines at the end so you lose the top, and you can also get searching-loading reports across your picture. This can be cured by using *OPT1,0 before you dump: don't do it too early or it will be hard to know what's going on — and rectify it later with *OPT1,1.

In graphics modes the dump takes about two minutes per image. The print area is about 6in wide.

When running there's mild interference from the printer on a TV screen. The source of the interference is presumably the 4.7kv spark from the head.

Having left the printer running all day, it did get rather hot, though not enough to be a fire hazard.



Acorn's Sparkjet printer with its sleek Italian styling courtesy of Olivetti. Aesthetic considerations seem to have precluded the incorporation of a hand crank.

Verdict

Only you can judge whether this printer would suit you. Its silence and relative speed weigh in its favour, though if you want near letter quality, it won't do.

Quality of print can be a bit patchy, and although the intensity is easily regulated, this doesn't change the uniformity.

The graphics quality is more of a problem. If you're doing graphics in colour, you will want dumps in colour too, and for £230 more you can buy the Integrex Colourjet reviewed in Issue 44.

Product Acorn Sparkjet JP101 **Manufacturer** Olivetti **Price** £345 inc VAT **Interfaces** Centronics standard, RS232 optional (£400 with serial and parallel) **Outlets** Retailers, and direct from Acorn (0233) 245200.

Piers Letcher looks at the Turbo 20 — a new and appealing daisywheel printer.

Wheels in motion

Serious competition has arrived for the Juki 6100 daisywheel printer in the form of the Turbo 20. Comparable to the Juki in speed and price, the Turbo offers serial as well as as parallel input, and compatibility with the popular Qume. It takes Qume daisywheels, of which there are nearly 100, and Qume ribbons, as well as taking the high quality and expensive Diablo daisywheels.

First impressions

The Turbo 20, like most daisywheel printers, is functional (rather than attractive), bulky (measuring 19in by 13in by 6in), and heavy (at more than 21lbs). One reason for its size is that it accommodates 13in paper, rather than the limiting 9in on most dot matrix and ink-jet printers.

Its bizarre collection of lights/touch sensitive buttons along the front flag errors, mark the printer on or off line, set the page, form feed, line feed, and self test.

The printer comes well-protected and the kit includes a mains lead, a slim manual, a ribbon cartridge and a print wheel. It seems sturdy enough for most users, but I'm not sure it would stand up to the sort of punishment it would get in an office.

Setting up

It is simple to set up, with none of the common ribbon mess problems, and no trouble fitting the daisywheel. This slips into place without fuss and the ribbon clips firmly onto the framework, held by a couple of spring clips to avoid loosening.

Most paper under 13in fits in easily and quickly, and the whole platen is visible so misfeeds are unlikely. The roller release lever allows the paper to be aligned, lessening the chance of paper jams. A proper tractor feed is soon to be available, as is a sheet feeder, but the existing system works well enough to make the extra expense questionable.

However, there were problems at first as the Error light remains on until three conditions are satisfied — paper present, ribbon correct and present, and lid on. If the latter is the case, replacing the lid does not reset the light; the printer must be switched off and then on again.

Documentation

The manual is fairly slim, but covers most of what you need to know. The diagrams are not particularly enlightening, but where they fail, the words succeed. Most of the booklet is taken up with detailed tables of codes used and accepted, ASCII, international character sets and control codes giving a thorough technical guide.

There are also detailed explanations of interfaces and dip switches, as well as handshaking protocols.

The Turbo 20 daisywheel printer — a little ungainly, but competition for the Juki 6100, at £459.

Features

The printer offers excellent print quality, and reasonable speed. The 20cps advertised seemed ambitious, but the speed matches that of the Juki.

As daisywheels go the Turbo is quiet, though obviously noisier than ink jets or the upper range of dot matrix printers.

Special features include three pitches (10, 12 and 15), proportional spacing and serial and parallel interfaces.

In use

This is certainly an appealing printer. It can print at 16 or 17cps, but tends to be slower, at about 13cps for blocks of random text. Printing characters from opposite sides of the daisywheel in succession slowed it down to 8.2cps. However, all daisywheels behave in this way, and the quoted figure is generally a maximum speed.

Connection to micros is easy. I had no problems with the IBM PC, the Torch and the BBC. The manual gives a clear description of the control codes the printer accepts and since it also has an RS232 interface, it could be used with many micros.

It comes in two slightly different cases; the biggest practical difference being the location of the dip switches. The manual caters for both positions, and possibly because of this is unclear about either. I assumed they were located inside. Six screws and a lot of wire later I found them nestling behind an easily accessible cover at the back.

But once found, they were easily changed, and it's an advantage to be able to get 180 characters across a line at 15 pitch.

Judging by the inside of the printer it looks like some maintenance would be quite difficult. However most problems are likely to occur in the platen area, and this is easy to get at.

Verdict

The Turbo 20 is good value for money. Its only serious rival at the moment is the Juki 6100, which can come slightly cheaper, though their recommended prices are the same.

The Turbo has small advantages over the Juki, particularly its Qume compatibility, which means cheap daisywheels (popular ones start at about £5), and easily available ribbon cartridges. It also takes Diablo metal daisywheels which are more expensive, but last much longer than plastic ones.

This is the first printer that OEM Peripherals has brought in direct, rather than simply distributed, but its links with Micro Maintenance, which will do any necessary repairs, should dispel any fears that the printer won't be serviceable. OEM is bringing out another printer soon called the Turbo Junior, which should compete at the top end of the dot matrix market.

For very high quality print at an affordable price the Turbo has to be considered.

It is guaranteed for six months, and is available in shops now.

Product Turbo 20 daisywheel printer **Distributor** OEM Peripherals, 1 Lochaline Street, London W6 01-748 8404 **Price** £459 inc VAT **Interfaces** Centronics, parallel and RS232 Serial **Outlets** Retail.

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Vol 15 Part 3

PULL OUT AND KEEP

Looking at the

ELECTRON

- Electron on tape
- Keywords concluded
- Acorn bookshelf

ELECTRON ON TAPE

Choosing the right storage device for your Electron is perhaps the most important decision you have to make about it. And until any kind of disk system is made available for the Electron, the only storage choice at the moment is the cassette recorder.

So it's worth knowing a good deal about the Electron's cassette filing system and the ways in which it can be used to its best advantage.

Which cassette recorder?

This question is best answered by deciding what you want the cassette recorder to do. The primary things you're likely to expect from it are:

SAVEing and LOADing of programs
CATaloguing programs
Keeping track of where programs are on a cassette
Standard plugs for Ear, Remote and Microphone
Some form of reliable volume control to adjust the intensity of the signal being sent to the Electron
A fairly consistent tape speed

Most cassette recorders will provide most of these features, but in order to get the best from your machine you should really find one that has all of them.

But because tape recorders have only serial access (*ie* unless you know where the program is on the tape you have to run through the tape from the beginning to find your program), it's going to take you an awfully long time to find anything if you don't.

It might also seem unnecessary to have a remote control facility on the recorder, but co-ordination between when the RECORD button on your tape recorder is pressed and when the program signal is sent from the Electron is essential. You can, of course, approximate this manually — but you stand the chance of losing the 'head' of the program even if your timing is only slightly off beam. Acorn do offer a data recorder to use with the Electron, but any recorder which meets these requirements should do (providing that the imponderables — like recording quality — are sufficiently met within the specifications of the recorder).

You needn't get a recorder specifically designed for use with a computer, as they are often no different from standard audio tape recorders, except that the price is jacked up once they put the word 'computer' on the front of them.

There are some good computer-specific recorders, which aren't over-priced *eg* like Tandy's CCR-81 Computer Cassette recorder with tape counter and cue-review facility.

A home quality home stereo cassette recorder may even be 'too good' to use with your Electron because it would pick up not only the loud, 'raw' computer program signal from the machine — but whatever background 'noise' is given off by the recording cable.

Micro-cassette recorders (the kind often seen in use by business people doing their dictating) can also be used with the Electron. They often have the three plug-ins needed by the Electron and a tape counter and are much smaller than the conventional cassette recorder. The disadvantage to using a micro-cassette is that there is no commercial software available in the micro-cassette format. You would have to have an ordinary cassette recorder available in addition to the micro-cassette to use standard cassette software.

Following those basic guidelines, you should be able to kit yourself out with a recorder that's going to do the computer interfacing job reliably and consistently.

Cassette File Handling

There are a number of important rules to observe when handling both program and data files on cassette with the Electron. Here are eight cassette file handling commands (most will also apply to other types of file handling):

I Make back-up copies of *all* your files *all* the time.

II Write down the start and finish numbers of your files using the tape counter on your recorder — making sure 0000 is always the start of the tape on each side.

III Keep a written (or printed out) list of your files with the cassette it's on. Always leave spaces between the files on cassette by recording a little 'silence' after each file. In this way you'll be sure of never recording one file over another.

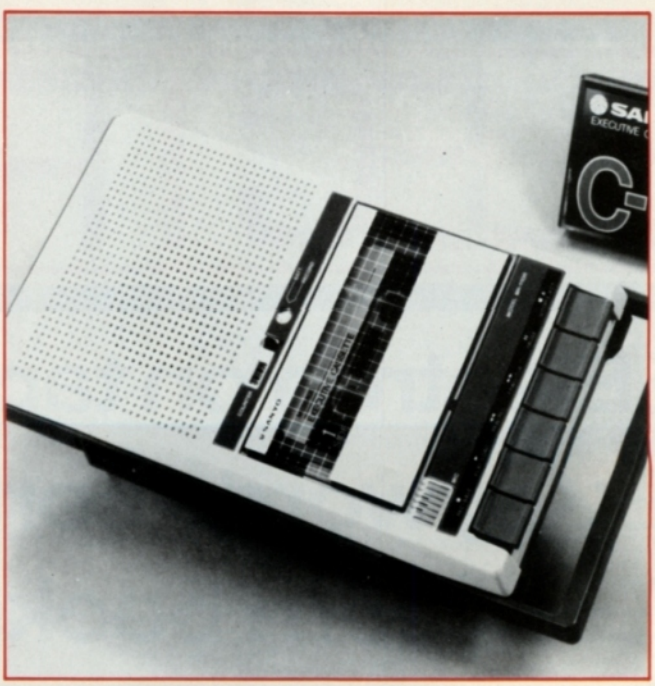
IV Never use long cassette tapes. Although it may seem better value to buy two hour tapes than 15 minute or half hour tapes, the tape is thinner and more liable to break on a longer tape — and it's also tedious to try and find files on a very long file.

V Always do a *CAT of a file after you've recorded it to make sure it's there.

VI Make sure you know which baud rate you're recording at. *TAPE3 slows the recording rate to 30 characters per second, while *TAPE returns it to the default baud rate of 1200 cps.

VII Using OSBYTE and *MOTOR control you can vary the Electron's cassette motor control to run more than one tape recorder (see Page 237 of the User Guide for details).

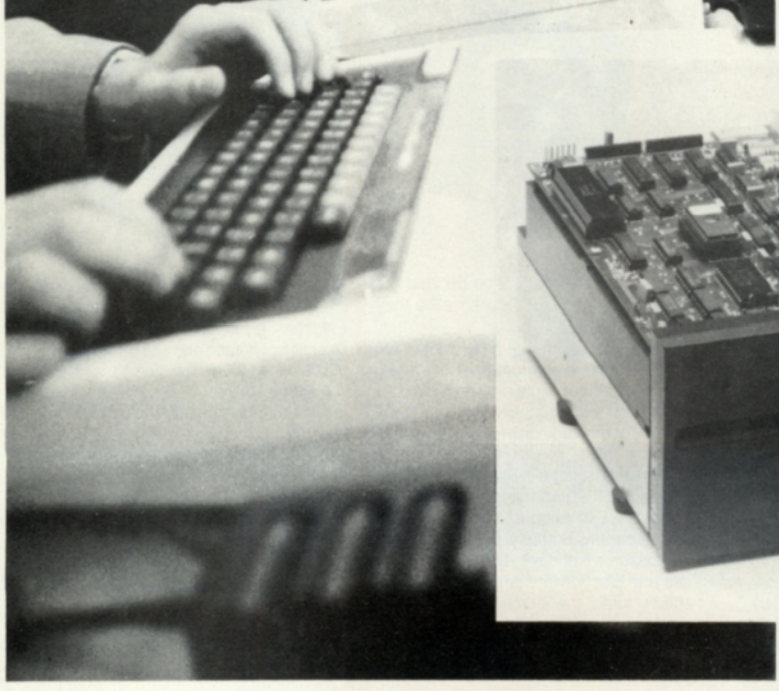
VIII Know your *OPT commands to control error detection (see Page 197 of the User Guide).

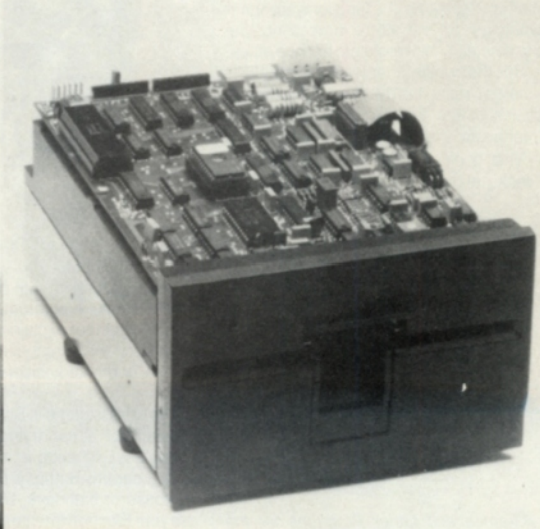


Unlike the BBC (pictured in the throng below), the Electron does not yet have the capacity to run disk drives (pictured at the bottom of this page) as an alternative to cassette storage. But Acorn has said it plans to produce disk interfaces for the machine eventually. The disk filing system will have to fit outside the Electron, however, as the machine doesn't have the BBC's ROM.

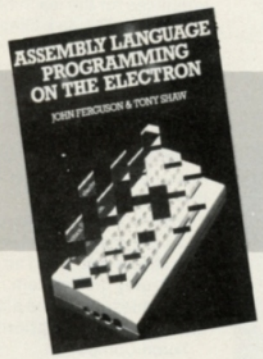
The Electron also doesn't have a disk drive plug in, so that even with a disk interface it may have to run an Acorn-only proprietary operating system and an Acorn-only disk system. Acorn doesn't see the disk drive as a pressing priority.

Torch Computers, however, hopes to develop an Electron version of their popular Torchpack CP/M look-alike operating system and disk drives for the Electron — giving access to standard CP/M programs. The only problem is likely to be the cost — between £400 and £500 (although that includes at least one disk drive, 64K RAM and a Z-80 second processor).





ELECTRON BOOKCASE



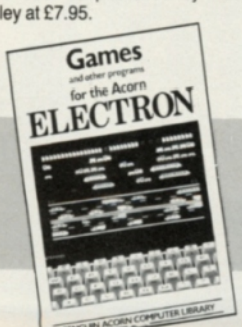
Some Electron books are very similar to already published BBC micro books. This is not necessarily a problem since it means that Electron owners are benefitting from research completed on the BBC.

This is the approach of John Ferguson and Tony Shaw's *Assembly Language Programming on the Electron*. Although many of the chapter headings are the same as those in *Assembly Language Programming on the BBC Micro*, the authors have examined Electron-specific problems.

The first part closely resembles their BBC Book, including sections on Bits, Bytes, hex, ASCII code, examination of memory locations, the functions and inner workings of the 6502 processor, the assembler, use of registers and the stack.

But the twelfth chapter is substantially different, reflecting the more limited capabilities of the Electron. The section on interfacing is left out.

The book is published by Addison-Wesley at £7.95.



Games and Other Programs for the Acorn Electron was compiled by Lee Calcraft with the user group Beebug.

The book contains 20 programs divided into four categories. *Action Games* comprises five arcade-style listings — Munchman (a Pac-Man lookalike), Robot Attack (you are chased by robots), Mars Lander (a version of Lunar Lander), Hedgehog (Frogger played with hedgehogs) and Invasion (enhanced Space Invaders type). Black and white 'screen shots' show what the finished game looks like.

The second category, Thought games, is a collection of puzzles including the classic Life simulation, a Yahtzee-style card game called five-dice and an Anagram analyser.

Visual display is dealt with in the third section, which includes a Union Jack, ellipse and a rotated three-dimensional figure.

The final section is more useful than simply fun. It contains utilities for editing sound envelopes, rescuing bad programs, listing bad programs, producing double eight characters and three-dimensional characters. The book costs £3.95 from most Penguin booksellers.

Audrey and Owen Bishop decided the Electron and BBC are so alike they could share a book.

The book begins with a short introduction to Basic programming on the two machines before explaining and listing 11 programs, which comprise the usual mix of games, demonstration programs and utilities.

The arcade game is Stunt Car, in which you control a car trying to jump over pot-holes. Exchange is a simple conversion program, Birthday Book is a small database of birthdays, Limerick lets you use your Electron to write verse, and Music Maker turns the machine into a little electric piano.

Take off with the BBC Micro and the Electron is published by Granada at £5.95.

One of a series of books for both the Electron and the BBC Micro is *The Companion to the Electron* by Jeremiah Jones and Geof Wheelwright, from the Pan/Personal Computer News Computer Library.

The Companion is a step-by-step introduction to the Electron including a comprehensive look at the machine's BBC Basic, the applications for the Electron, machine code, the operating system and advanced programming in assembly language.

There are also extensive appendices at the back providing sample programs for word-processing, character-defining and string-matching.

Portions of this Micropaedia are taken from the Companion, which is due to be published in February at £4.95.

Another in the PAN/PCN series, Jean Frost's *Instant Arcade Games for the Electron*, gives you not only a wide selection of arcade and adventure games, but also the tools to build and design your own game easily.

Instant Arcade Games tries to teach you how the building blocks you need to develop game programs can be put together, so the book is not just a collection of listings.

The promise is that 'with little or no knowledge of Basic, you can still take a suite of 'skeleton' programs and create your own arsenal of dynamic and totally unique arcade games.'

The book is available from all bookshops and newsagants that stock PAN books, at £3.95.

Ian Watt's *Creating Adventure Programs on the BBC Micro* is another of the BBC books that could prove helpful.

The book spends a good deal of time discussing the standard methods of creating adventure games and the components common to them. There are three extensive adventure listings as well as discussions of how to develop the character of an adventurer.

Most of the games seem to use the BBC's Teletext Mode 7 — which is not supported on the Electron, so you will have to convert some of the PRINT statements which attempt to use the Beeb's Teletext mode double-height facility. But this shouldn't prove difficult as adventure programs tend to be text-based and it shouldn't really matter which screen mode you're in when you write them — though screen Mode 4 is a suggested replacement for the Teletext mode.

The book is published by Addison Wesley at £6.95.

Another book that plays both sides of the Acorn field is *Brainteasers for the BBC and Electron computers* which concentrates on puzzles-type programs.

Among those puzzles are traditional conundrums such as Hexagon puzzles, Spot the Difference, Pattern Pairs, Bar Charts, and Profit and Loss. The book also includes a few games — such as the Francis Drake adventure game, the Western adventure game and a Whodunnit adventure.

Author Genevieve Ludinski has largely avoided arcade-type games and concentrated consistently on puzzles — so if you're looking for souped-up versions of Space Invaders, this isn't the place to look.

The book is published by Phoenix Publishing at £5.95.

Since much of the material written about the BBC Micro is relevant to the Electron, BBC books not yet 'converted' for the Electron can still be useful to Electron users.

Self-instruct Basic: a practical guide, is a Pitman book from the father and son writing team of Anthony and James Clark; it contains programs for the BBC Micro and the Sinclair Spectrum — and a number of the BBC programs and explanations would apply just as well to the Electron as the BBC.

The book comes in a 'flip-over' ring binder so it can be easily stood up while you're working. It is published by Pitman at £4.50.

Third in the PAN/PCN series of Electron books is *Sixty Programs for the Electron*, an Electron version of the massively successful *Sixty Programs* books already produced for the BBC Micro, the Vic-20, the Commodore 64, the Oric and the Sinclair Spectrum.

This book claims to be 'a massive software library for the price of a single cassette . . . explosive games, dynamic graphics and invaluable utilities, this specially commissioned collection takes Basic to the limits and beyond'.

It is in the same format as the *Sixty Programs* books, with as much space as possible devoted to program listings, and a minimum of discussion and instruction to pack in as many programs as possible. Four people authorised this tome — Robert Erskine, Humphrey Walwyn, Paul Stanley and Michael Bews.

It is imminently available from all shops stocking PAN books, at £4.95.

Oddly enough probably one of the best books for the Electron is the *BBC Micro's User Guide*, which has a wealth of technical and background information on BBC Basic and on the BBC Micro operating system.

There are some chapters that don't apply, of course. The chapter about Teletext mode graphics has no relation to the Electron because the Electron has no Teletext mode 7 and much of the detailed discussions on mixing SOUND channels are not relevant because the Electron has only one SOUND channel. But the keywords section, the character set tables, the list of *FX calls, the VDU calls and the book as a whole are all excellent.

The User Guide is available from most Acorn dealers.

Besides the Electron- and BBC-specific books, there are general computing books which can be helpful in reaching an understanding of your micro.

The McGraw-Hill Computer handbook is just one such book. It is — if nothing else — a beautiful 'coffee-table' style book that lends itself to the occasional read both for reference and interest. It's tremendouslıy expensive ($79.95 in the US), but has an introduction by the redoubtable Adam Osborne (of the luggable computer) and thorough sections on Computer History and Concepts, Computer Structures, Boolean Algebra and Logic. There are also discussions of hardware development and many high-level languages.

Among the languages covered are Basic, COBOL, FORTAN, Pascal and PL/I. The future is not ignored, with some attention given to voice recognition, robotic interfacing and artificial intelligence.

The book features a largely American cast of contributors.

AN ELECTRON LEXICOGRAPHER

ENVELOPE — is used in conjunction with sound to control pitch. ENVELOPE is followed by parameters defined using the syntax:

ENVELOPE n (envelope number), s (auto-repeat/on-off switch), PI1 (change in pitch per step in section 1), PI2 (change in pitch per step in section 2), PI3 (change in pitch per step in section 3), PR1 (number of steps in action 1), PR2 (number of steps in action 2) and PR3 (number of steps in action 3).

Figure 1 is an example which generates a 'police siren' noise:

Note that there are actually 14 parameters listed after the ENVELOPE statement in the example above — only the first eight relate to the parameters as explained above, the rest are just zeros which fill out the requirements of the command as it was originally devised for the BBC Micro.

But since SOUND is one of the things in which the two machines are not entirely compatible, the Electron has to have some 'placebo' values to fill in where it doesn't have the capabilities of the BBC.

The program will be looked at in detail in our discussion of FOR as the FOR . . . NEXT construction plays a major part in making the police siren noise work properly. ENVELOPE is used in conjunction with the associated SOUND command (which is detailed in the Electron User Guide).

EVAL — lets you enter numeric variables and operators as character strings and still evaluate them as variables. Look at the example program below which converts a weight measured in stones into pounds.

```
10 PRINT "Input your name, then a comma,
   and the conversion formula for your
   weight in stones (whole numbers of
   decimal values only please)"
20 INPUT A$,B$
30 Y=EVAL (B$)
40 PRINT "Your name is ";A$;" and you
   weigh ";Y;" pounds"
```

The program PRINTS the question, then uses the INPUT statement to get the strings A$ and B$ (the former represents the user's name, the latter the formula for conversion of the user's weight in stones), then at — Line 30 — the EVAL command carries out the operations specified in B$.

Line 40 prints the values calculated by EVAL.

FALSE — allows a conditional test to produce a number (0) when that condition is found to be false. If the Electron decides a certain condition is false it will represent as a 0 — and will act accordingly.

FOR — is used in conjunction with the keywords NEXT and STEP to define a series of repeated actions. In the 'police siren' example we have to show you how ENVELOPE works, the FOR . . . NEXT and STEP words were used to vary the pitch variable in the SOUNDSXS STATEMENT. By MODIFYING THE FOR . . . NEXT values and the values for STEP in figure 2 you should see how those words affect the program.

You'll see that by changing the values of X in the FOR . . . NEXT loop so that it now runs from 70 to 92 in the 'rising' part of the siren and 92 to 70 in the 'falling' part of the siren, we have effectively changed both the pitch of the siren using FOR (by cutting the values of STEP down to 1 and −1 respectively). REPEAT . . . UNTIL performs much the same kind of function as FOR . . . NEXT except that instead of using FOR X= . . . TO . . . and NEXT, REPEAT . . . UNTIL uses REPEAT . . . UNTIL X= . . .

FN — see the discussion of functions and procedures in the following chapter.

GOSUB & GOTO — these words are, in most home computers, both the root and the introduction to structured programming. They allow you to break out of simple 'linear' program where one line happens after the next with no great variety or elements of structuring the 'blocks' that make up your program.

GOTO is the simplest instruction of the two and means exactly what is says: the word GOTO, followed by a line number, means go to that line number and do whatever the program is tell you to do at that point. The little example below demonstrates the power of GOTO. Try typing Figure 3.

It's not great poetry, but once you've typed the program in and RUN it, you'll get the idea of what GOTO does. Although the lines to our 'poem' are not in sequence in the program, they appear in sequence when the program is RUN because the GOTO statements have sent them hither and thither throughout the program.

GOSUB accomplishes much the same task, except that it contains a RETURN instruction with the program executes after it goes to the SUBROUTINE mentioned in the GOSUB statement. If we let GOSUB run the Electron literary circle, it might re-arrange the above poem so that the program to produce it looked like this:

```
1 MODE 4
10 GOSUB 500
20 GOSUB 600
30 GOSUB 800
40 GOSUB 700
50 END
500 PRINT "There were once two little
GOTOS"
510 RETURN
600 PRINT "who couldn't believe their good
fortune"
610 RETURN
700 PRINT "within a program at times that
were not importune"
710 RETURN
800 PRINT "in finding that they could move
about"
710 RETURN
```

The program is now not only GOING TO a line number, but GOING TO a whole SUBROUTINE — or block — of the program. When it carries out the instruction in that block and encounters the word RETURN, it moves back up to the line following the one containing the original GOSUB instruction. You'll learn more about GOSUB in the next chapter.

IF—is known as a conditional statement. It tests to see whether a certain condition holds true and, if it does, takes whatever action you specify in the THEN portion of an IF . . . THEN statement. Like the FOR . . . NEXT, no IF . . . is complete without its associated THEN.

Let's take the words of a famous song; IF a picture paints a thousand words THEN why can't I paint you?

If a picture didn't paint a thousand words, then the phrase 'why can't I paint you' would no longer be applicable and then next alternative choice would have to be taken. Try our version of IF below:

```
10 PRINT "Does a picture paint a thousand
   words (Answer Y of N)";
20 INPUT A$
30 IF A$="Y" or A$="y" THEN PRINT "Then
   why can't I paint you" ELSE PRINT "Then
   why did I give up writing in favour of
   photography?"
40 END
```

We have used ELSE—a third part of the IF . . . THEN conditional structure—in Line 30 to produce an alternative, just in case you don't think a picture paints a thousand words.

INKEY & INKEY$—both these functions are to do with getting input from the Electron's keyboard. Looking at the demonstration program used (Figure 4) in discussing ABS, you can see what INKEY is up to:

The variable Q in Line 5 is assigned a value when you press a key in response to the INKEY instruction. The number in brackets after INKEY specifies in one-hundredths of a second how long the program will wait for you to input a value to satisfy the INKEY command before it gives up. Once you press a key, INKEY expresses the value of

that key according to it's ASCII value (explained in the ASC definition given earlier).

INKEY$ does much the same thing, but instead of expressing your response as a number, it expresses it as a letterr. So, if you press the "A" key in response to an A$=INKEY$(100), A$ will now be set equal to A. Typing PRINT A$ after this should have the letter "A" appearing on screen.

**INKEY$**, meanwhile, can serve as the heart of a small word-processor. By dimensioning an array—each of whose elements is defined by a character inputted using INKEY$—you have the beginnings of what can later be developed into a creditable word-manipulating device.

See Figure 5.

The Electron will need to be hooked up to a tape recorder with the power on, a clean tape in the machine and the play and record buttons pressed down to use this mini-word-processor. To work a string array of size Q is set aside by the keyword DIM, and then filled using a FOR . . . NEXT loop and the INKEY$ instruction. The number 32767 after the INKEY$ statement means that the Electron will wait 32767 hundredths of a second—or slightly under an hour—before it gives up on you entering a character to be word-processed.

The tape recorder comes in with the *SPOOL instruction, which asks the Electron to open a file on tape called FILE and read into that file the information you've just written and then close the file. If you want to call the file anything other than file just change the word "FILE" after *SPOOL at Line 80 to whatever file name you want.

The files created this way are simple ASCII text files and should be readable into any conventional word-processor you could get for the Electron. And, using a printer interface, you should be able to quite easily send such files to a printer. GET and GET$ are the associated keywords to INKEY and INKEY$.

LISTO—is a useful command for printing out listings. LISTO can be used to insert spaces in program lists, to show indentations after line numbers, during FOR . . . NEXT loops and during REPEAT . . . UNTIL loops. The fourth option—LISTO is LISTO followed by a numeric constant, where LISTO1 will indent after line numbers, LISTO2 during FOR . . . NEXT loops and LISTO4 during REPEAT . . . UNTILs. If you can easily see where your loops are, then it's less of a chore to check where you've jumped out of them, or tried to break in where you shouldn't.

LISTO also allows you to add your options together, so that LISTO6 would give you indentations on both FOR . . . NEXT loops and REPEAT . . . UNTIL constructions. LIST is an associated keyword.

OLD—the Electron shares with the BBC this unique operating system feature. Lots of computers have a NEW command, but not many will use this corresponding OLD statement. OLD will recover most programs from a 'soft' break—caused either by typing 'NEW' or by accidentally hitting the BREAK key—because the programs are not actually lost from the Electron's Random Access Memory (RAM) until you unplug it.

RENUMBER—is a utility built into the Electron which you often have write yourself on other machines. It allows the

Figures 1-5

```
5 FOR X=20 TO 65 STEP 2
10 SOUND 1,-10,X,1
20 ENVELOPE 2,45,0,-15,15,-15,10,10,0,0,0,0,0,0,0
30 NEXT X
40 FOR X=65 TO 20 STEP -2
50 SOUND 1,-10,X,1
60 ENVELOPE 2,45,0,-15,15,-15,10,10,0,0,0,0,0,0,0
70 NEXT X
80 GOTO 5
```

```
5 FOR X=70 TO 92 STEP 1
10 SOUND 1,-10,X,1
20 ENVELOPE 2,45,0,-15,15,-15,10,10,0,0,0,0,0,0,0
30 NEXT X
40 FOR X=92 TO 70 STEP -1
50 SOUND 1,-10,X,1
60 ENVELOPE 2,45,0,-15,15,-15,10,10,0,0,0,0,0,0,0
70 NEXT X
80 GOTO 5
```

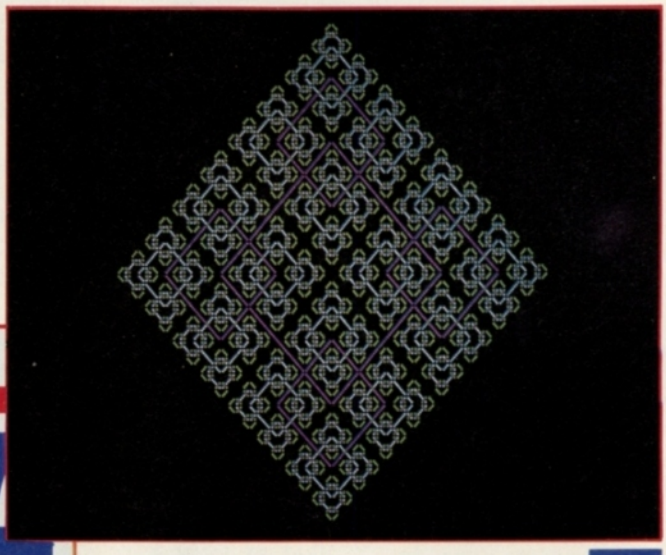
```
1 MODE 4
5 PRINT "There were once two little GOTOs"
10 GOTO 100
20 PRINT "in finding that they could move about"
30 GOTO 120
100 PRINT "who couldn't believe their good
    fortune"
110 GOTO 20
120 PRINT "within a program at times that were
    not importune"
130 END
```

```
5  Q=INKEY(32767)
10 IF Q>355 OR Q<-155 THEN GOTO 5
20 X=Q-100
30 SOUND 1,-15,ABS(X),5
40 GOTO 5
```

```
10  PRINT  "How many characters will be in the
    file you  want  to
create":INPUT Q
20  CLS
30  DIM A$(Q)
40  FOR X=1 TO Q
50  A$(X)=INKEY$(32767)
60  PRINT A$(X);
70  NEXT X
80  *SPOOL FILE
90  FOR X=1 TO Q:PRINT A$(X);:NEXT X
100 *SPOOL
```

The digital clock program listed below shouldn't ever give a time where the minutes go beyond 59—much less 84 as it has in the illustration below. But many have suggested that 1984 will be the Electron's big year.

The machine will be in desperate need of both peripherals and software as people will quickly feel the need for a printer (the Electron has no printer interface), a disk drive (there is not yet a disk interface ready for the Electron) and joysticks (there also isn't a joystick interface . . .)



1984

Despite its lack of expansion interfacing, the Electron still possesses much of the BBC Micro's outstanding graphics capability. The Electron can produce high-quality colour graphics like the ones generated by the BBC Micro in the picture above from the Acorn's Creative Graphics book (see last week's look at Electron software for more details on that and other Acornsoft packages).

'lazy' programmer to do foolish things like numbering one statement as 11, another as 12 and then realising you need a statement between them.

Using RENUMBER, you just type in the RENUMBER command (or its abbreviation REN. or Function key 8), hit RETURN and you listing will by renumbered automatically — with all the relevant changes to GOSUBS and GOTOS (although if you use procedures—as outlined in the next chapter, you won't have to worry about that part of the old renumbering game).

You can RENUMBER only certain sections of the program; start the RENUMBER from numbers other than 10 and RENUMBER in increments as little as 1 (although that particular increment is not recommended).

It can be given either as a stand-alone command or with one or two numbers after it: the first number is where the renumbering is to start and the second is the size of the increment by which the line numbering is to increase. RENUMBER with only one number following starts renumbering the program at that line number in increments of 10—the default value.

TIME—is a simple way of accessing the Electron's on-board clock. The clock is simply an integer variable incremented every hundredth of a second. For an example of the clock at work, type and RUN this little test program above.

The example program will ask you for the time you want the clock to start—inputting the hours, *then a comma, and* then the minutes (the starting seconds are always set to zero).

```
5  PRINT "INPUT START TIME":INPUT H,M
10 TIME=0
15 X=INT(TIME/100)
17 IF X>59 THEN TIME=0:M=M+1
18 IF M>59 THEN M=0:H=H+1
19 IF H>23 THEN H=0
20 PRINT H;" ";M;" ";X
25 CLS
30 GOTO 15
```

It then defines a variable × which represents seconds and sets out a series of IF . . . THEN statements which defines the relationship between the seconds and minutes.

The program then prints the time, clears the screen and cycles back the definition of seconds. If you want a game that uses real-time—so that you can cause it to end after a certain time—this kind of Basic clock using the TIME command can be helpful.

You could also use the "counter" built into this subroutine to write a program that produces an ordinary analog clock with a proper clock face and second, minute and hour hands.

To write such a program you would use the variables H, M and X to help determine the screen position of the clock at all times. Different colours could also be included in the clock, with perhaps a blue "face" and white "hands".

Design: Nigel Wingrove
Micropaedia Editor: Geof Wheelwright

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We present a special one-part look at modems and communication with a concentration on how modems work and what modems are available for popular micros.

We'll also examine the growing popularity of telephone-based databases, mailboxes and noticeboards. Keep hanging on the line until next week . . .

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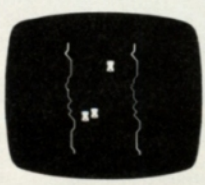

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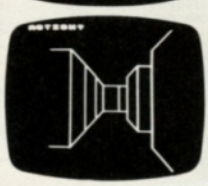

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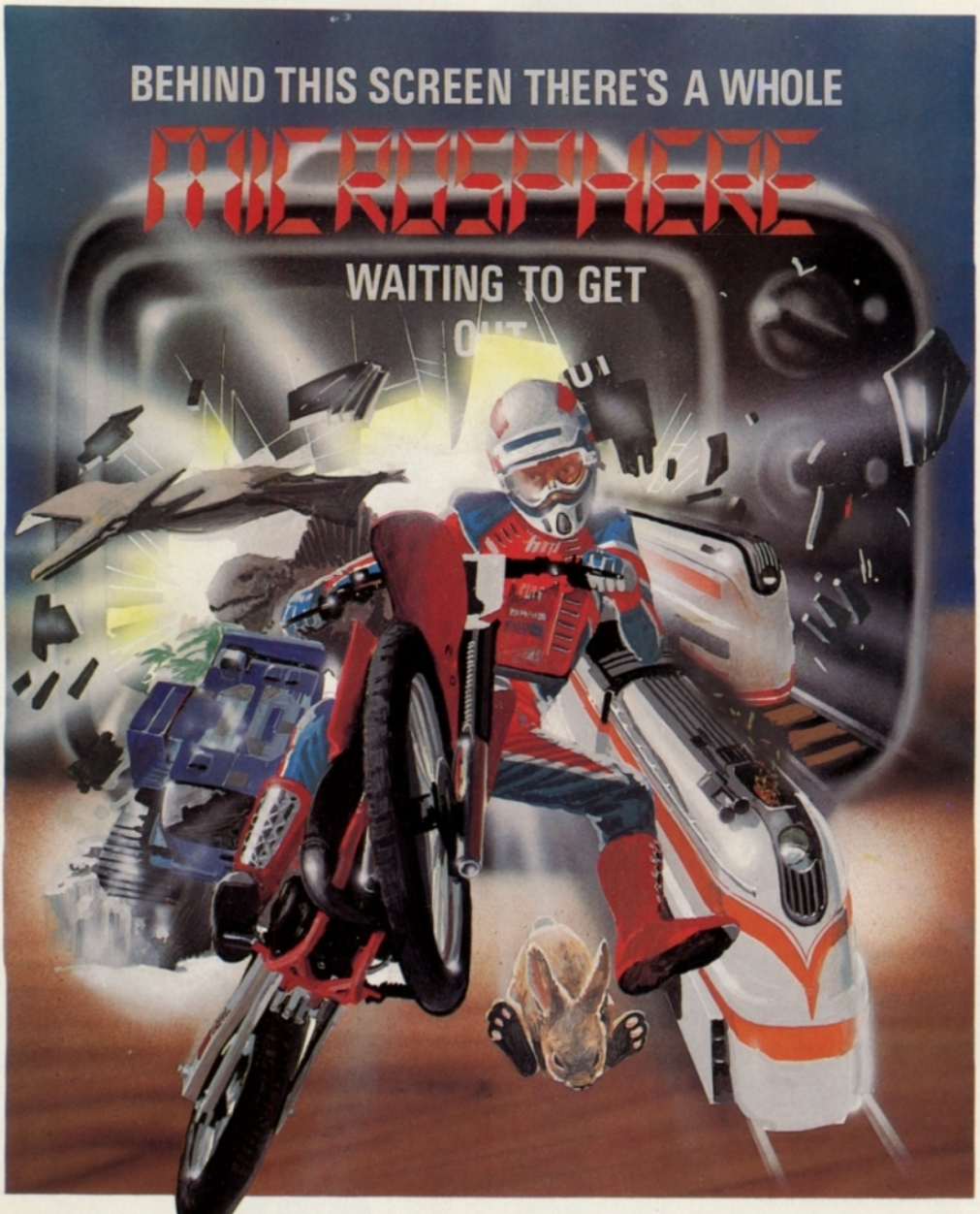

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Budding chemical engineers should experiment with these packages, says Bill Quentin.

Cleverchemist

Cloud 9 Software has produced Titre and Masterchem as two separate programs for chemists at secondary school.

Masterchem has been written as a mastermind style quiz game with the specialist subject being 'symbols of elements in the periodic table'. There are three levels of difficulty and answers must be typed in against the clock.

Titre is a tutorial-style program for A-level chemists. It covers the subject of titrations, *ie* adding acid to alkaline (or vice versa) in order to make a neutral solution (pH = 7). Teacher says: if the initial strength of the acid is known, then the strength of the alkaline can be calculated from the volumes required to make a neutral solution. The subject is made much more interesting by the introduction of technicoloured indicator chemicals which show the solution's relative acidity. If the correct indicator is chosen then just one drop of acid (or alkaline) will cause the whole solution to change colour as it goes to neutral.

Titre has four parts, three of which are academically oriented. The fourth is for armchair chemists. It puts you in charge of a burrette during a simulated titration experiment. The object is to open and close the burrette and allow just enough solution to flow from it to make a neutral solution in the flask below. The apparatus, volumes and pH are displayed on the screen with machine code graphics.

The other parts to Titre are Indicator data, A-level worksheet and pH Curves. Indicator data is information on nine common indicators while the worksheet comprises a set of instructions for an A-level 'stinks' practical. The most educational part of the package is the final module, pH Curves, which plots the acid-alkaline transition for any specified acid and alkaline.

Presentation

The instruction manual for Titre is a slip of badly photocopied paper. It doesn't give details on the theory of titration but takes almost a quarter of its length to describe the loading procedure.

The instructions assume a working knowledge of performing titrations for A-level chemistry. It is possible that without this background a software-jockey could get into the program, but its use is more likely to confuse than to educate.

The machine code graphics are effective although most of the screen is filled with characters generated from within the Basic program. Titration Simulation is the most exciting part of the program and shows an actual experiment being performed.

Masterchem's instructions are even briefer; dedicating much of its text to warning about the dangers of authorised copying, absolving itself from any mental damage caused by its use, and other nonsense.

The graphics to Masterchem are limited, consisting entirely of an oversized character set. This is especially disappointing as they have been machine coded.

Scope of programs

Titre could be a useful inclusion to an A-level course on titrations and indicators. It's also an interesting program in its own right. The greatest potential of Titre is to draw together what has been learnt, in a tutorial environment, after the practicals. The program's capability to plot pH Curves for any acid or alkaline (of known pH) makes it an excellent teaching aid.

Titration simulation is the most entertaining part of the package, but not of much academic value, and the novelty of titrating exactly the right amount of reagent soon wears thin.

Masterchem is designed to simulate a Mastermind tournament. In practice it isn't much of an advance on a pack of cards, with symbols on one side and the associated name on the other.

Ease of operation

Both packages are largely self-explanatory, which is just as well considering the brevity of their instructions. Titre is menu-driven so that at each stage you are given a series of options as to what the program should do next. Unfortunately, once a particular option is selected it is difficult to return to the menu without following the option to its conclusion.

Limitations

Common concentration values, from 2M to 0.00001M, for concentrated hydrochloric acid (strong) and ammonium hydroxide (strong alkaline) can be entered into Titre. The limitations on these values lie with practical difficulties of calculating the titrations of such extreme concentrations rather than any shortcoming in the software. Another limitation is that it's not possible to titrate different concentrations of acid and alkaline.

Masterchem quizzes you widely on the table of elements. Californium and a few other heavy elements are missing.

Reliability

I encountered problems in operating the pH Curves part of Titre. There is an intermittent bug occurring during keyboard entry which causes the program to ignore your selection of the various chemicals. On occasions it's necessary to retype the selection several times before the program accepts it. The program worked well, apart from this minor hiccup.

Masterchem is advertised as a quiz game against the clock. Unfortunately, my clock seemed to have stopped. Otherwise the program flew along reasonably well and no errors were reported.

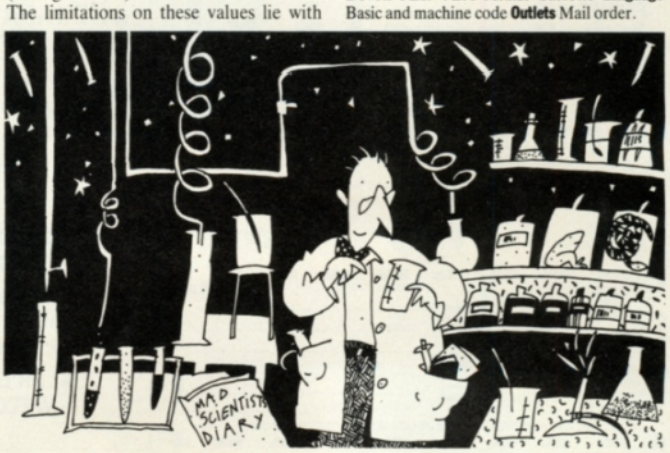
Verdict

Titre is a useful piece of educational software which is also entertaining. It has been produced for A-level chemists and would be of little value to someone whose chemistry isn't of this standard. The whole package is let down by its manual, though, which could be significantly improved.

Masterchem doesn't approach the high standards of Titre. It has little use beyond the rote-teaching of chemical symbols.

RATING	Titre	Masterchem
Features	■■■■	■
Documentation	■	■
Performance	■■	■
Usability	■■■	■■■
Reliability	■	■
Overall value	■■■	■

Names Titre and Masterchem **Application** Educational software — Chemistry **System** Titre: Spectrum (48K) Masterchem: Spectrum (16K) **Price** Titre: £8.50 Masterchem: £4.50 **Publisher** Cloud 9 Software, 4 Dolvin Road, Tavistock, Devon PL19 9EA **Format** Cassette **Language** Basic and machine code **Outlets** Mail order.



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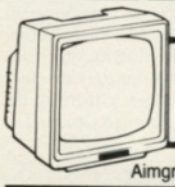

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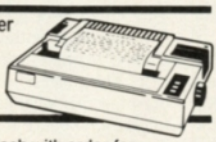

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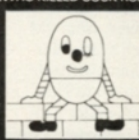

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Garry Marsh enters a new dimension in computer graphics made easy with another BBC ROM chip.

Concept Graphics

Computer Concepts have added yet another piece of firmware to their already impressive list of ROM based programs for the BBC micro. The latest addition is a Graphics Extension ROM, providing 29 new commands, allowing access to Sprites, Turtle Graphics, as well as many general purpose graphics routines, including a new MODE 8, giving all 16 colours, but on 80 × 256 graphics screen, *ie* half the normal mode 2, and therefore uses only 10k of memory.

Features

The ROM, the book, and the *help menu, are all clearly defined. Each section has a detailed explanation under the relevant main title, with each command separately indexed, and explained, with short, good demonstration listings.

After the introductory pages, a note on the help menu, a list of the abbreviations used, and a list of all the new error codes, which may be produced through using this ROM, you come to the first main group of routines, which cover sprites.

In use

Sprites are essentially multicoloured, large scale user-defined graphics, up to three by three graphics units. This would give a block 24 × 24 units in all modes, which will give a Sprite size of 192 × 96 in Mode 2, while in mode 0, the maximum size of a Sprite is 48 × 96.

Above are examples of the kind of thing you can do with text.

The creation of Sprites, is not easy at first, but after a couple of tries, it becomes so; the manual helps by providing examples to key in.

To start using Sprites you first need to allocate a chunk of memory to store them in (between &2000-&2FFF is recommended). Then you go on to the design of the Sprite, by using the DESIGN command; if you want to alter it you use the *ALTER command, if you want to save them on tape, or disk, use the *PUT command, and to load them back in again use the *GET command . . . easy isn't it?

A sample of what can be achieved with a surprisingly simple program.

Having created them you will now want to show them. A really good feature of this section is the ability to create a 'film' of a number of Sprites tagged together in sequence; effective animation may be produced with comparative ease. Having never used Sprites before I found them very easy to get used to, although Computer Concepts stresses that because of the way they are Exclusive-Ored onto the screen, odd effects may be experienced: I found this feature a positive advantage. I wrote a simple game, and used this feature to create different coloured Sprites, for different screens of play, just by changing the background colour.

The second set of commands covers Turtle Graphics, normally associated with the LOGO language. This has become increasingly popular in schools, because the computer controls a mechanical 'Turtle' which can be made to draw patterns onto paper. Although this version of Turtle Graphics does not support the mechanical peripheral, it does represent this 'turtle' as a triangle on the screen, and uses the same basic commands as LOGO does to control it.

The distance, or angle of rotation, is controlled by command variables, *eg* *FORWARD 500 will move the turtle 500 graphics units forward. The size and colour and hence the trail the turtle leaves, are all definable by *commands. Although a very simple system, it can produce spectacular results, all in full colour.

The third and final section of the ROM is devoted to system commands that produce graphic effects in one word commands. It would have taken many Basic program lines to produce similar results. With these extensions it is possible to produce effective 3-dimensional graphics, pixels of any size, alphanumerical characters with any size, at any angle, in any colour, including patterned, anywhere on a graphics screen.

These facilities create designs, such as those shown, with very little programming. *SCALE enables the user to alter the X and Y co-ordinates to suit, thus enabling large scale magnification of a small screen area for instance. The *ROTATE command will place all graphics printed to screen at that specified angle. When used in conjunction with either the *PIXEL, which plots any sizes of pixel, or with the *PRINT command, colourful title page designs can be produced in Modes 0, 1, or 2.

The package includes numerous commands that can be used to draw shapes easily, such as circles, arcs, and patterns, each having its own direct command, giving greater flexibility to the BBC's existing graphic functions. One of the best things on this ROM is the 3D graphics option. To use it a *PLOT command is issued — to all intents and purposes the same as the standard BASIC PLOT command, except that an extra variable is required; thus you can plot a dot at the centre of the screen by keying :- *PLOT 69,640,512,Z The z at the end is the relative 'depth' into the screen. If a cube were drawn, by moving it around the screen the viewer's perspective of the cube changes depending on the position, both in the X and Y axis, and in the Z axis, so by moving the cube *into* the screen the cube will appear to become smaller, or, in 3D further away.

Create your own title pages, print them out or save them to disk.

Verdict

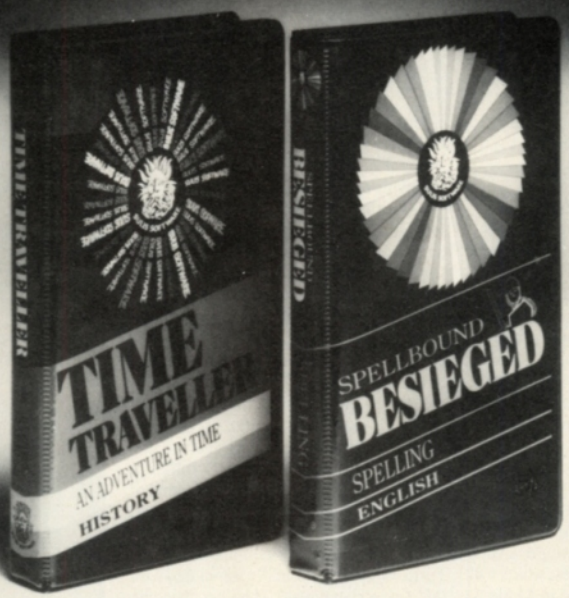
The benefits obtained using this package are vast, although only for yourself. You cannot use these commands in programs you intend to share with others, but the time saved could be used as titles or pictures in disk-based adventure games. The manual supplied is a well-written guide, although a little skimpy in parts on information. Apparently, the book has been re-written in parts and presentation has been altered slightly. PCN

RATING

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

Product Graphics ROM **System** BBC Price £33.35 **Publisher** Computer Concepts, 16 Wayside, Chipperfield, Herts (40-69727) **Format** ROM **Outlets** Mail order/some retailers.

Two exciting games from Sulis that teach you more than how to destroy aliens.



From the Computer Age to the Bronze Age! That's how far back in time you start when Sulis teach you History *their* way.

And when it comes to mastering the quirks of English spelling you'll find yourself right in the middle of the Crusades!

In fact, whenever you're learning a subject with Sulis you'll be aware of another major difference — you're enjoying yourself.

Time Traveller £9.95 inc VAT

An adventure in time that tests your overall knowledge of British history.

The program contains five exciting chase games in one: a Bronze Age forest with wolves, a Roman fort with legionaries, a Norman cathedral with priests and prelates, a 16th-century ducal palace and a Victorian sewer with rats and germs.

At each stage of the game you have to get your historical facts right before you can slip through the time warp into the next Age.

Besieged £9.95 inc VAT

An utterly compulsive word game for anyone who thinks they know which word means what and how it is spelt.

The scene is set in the age of the Crusades, with gallant knights attempting to relieve a beleaguered city from the grasp of infidels.

Every word you spell correctly helps one of your knights in their struggle. Spell a word wrong and the infidels will have the advantage.

Available for use on the **ZX Spectrum** and other popular micros, these games can be obtained from larger branches of W.H. Smith and Boots and all good bookshops/computer stores.

Sulis Software

Sulis Software is marketed by John Wiley & Sons Ltd, Baffins Lane, Chichester, West Sussex PO19 1UD, England

DRAGON 32

Decisive Viking

Name Viking **System** Dragon 32 **Price** £7.95 **Publisher** Dragon Data, Kenfig Industrial Estate, Margam, Port Talbot, West Glamorgan SA13 2PE **Format** Cassette **Language** Basic, some machine code **Other versions** None **Outlets** Retail, mail order

Viking doesn't ask you to go out looting and pillaging, but it is a simulation game putting you in charge of running a Viking settlement in the year 750 AD.

Objectives

You start as a Holder, whatever that is, and if things go right you can work your way up to becoming king or queen after several years of decision making.

In play

Viking has nine skill levels, and from one to four people can play. At the start you're curiously asked "Who lives in Oslo?" with no indication that you're meant to respond by typing you name, so I spent the first game being referred to as 'The King?'

Once you've sorted that out, you're told the year is 750 and you're straight into the first bit of information, which is your storekeeper telling you that Norway rats ate 35% of your grain and you need more ferrets. From then on it's decisions, decisions.

You have to keep an eye on your population, who will insist on being born and dying, and you have to feed them too, including the thralls, who apparently are farm labour. Depending on the skill level chosen you will start off with various assets that may earn you money, like fishing boats, and a number of guards who have to be paid. The important news is the harvest, which varies according to the weather, and depending on the yield and your population you can elect to buy or sell grain.

With the cash in your treasury you can then invest in various items, like more guards, another fishing boat, or more land. You must also set the level of your taxes, and state whether your courts are going to be lenient, firm or cruel. Cruel presumably brings in more fines, but won't do much for your public image.

Apart from bad harvests you might also have to put up with plagues, revolts, raids or bankruptcy, though the last of those seems merely to wipe out your debt and let you start afresh, which is a little unfair on the rest of the players.

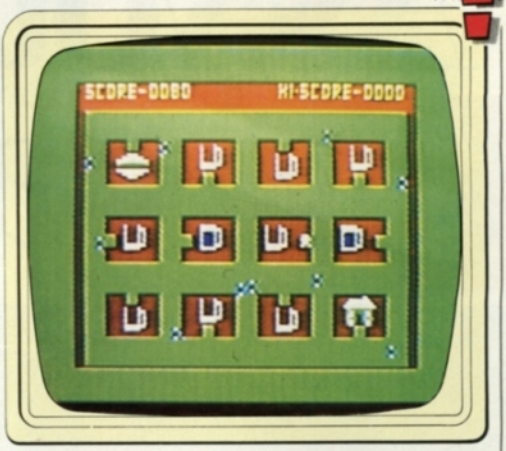
Verdict

Although the game worked quickly and well, and absorbed me for one or two plays, it lacked the humour, complexity or other features that some simulations have. Life in a Viking settlement could soon become boring.

Mike Gerrard

RATING

Lasting appeal	
Playability	
Use of the mach	
Overall value	



Hangover avoided

Name Pub Crawl **System** Dragon 32 **Price** £6.95 **Publisher** B&H Software, 208 King Street, Cottingham, Hull **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order, some dealers

When you have defeated the evil wizard Tharg in the distant kingdom of Ulrick, and you've rescued your rocket marooned on the planet Syron, you sit back and think: Why don't programmers write about down-to-earth things like — well, like how to down ten pints and a hamburger and still get home in one piece. Now someone has, and it's called Pub Crawl.

Objectives

The aim is to do just that, visit ten of the pubs on the high-res map, manoeuvre your little self into the hamburger joint, and then get back home safely.

In play

The map is simply 12 squares in a 3 × 4 grid, with streets going inbetween and all around them. Your house is the square at bottom right, and there you are in the doorway about to set out for a night on the town. The hamburger joint is the square at top left, suitably indicated with a Big Mac, while the other squares all sport a drawing of a foaming pint. Movement is by the arrow keys, and when you first set off there is traffic flowing both ways. Initially it's easy enough to dodge between the lanes of traffic and get to the pub doorways. But then strange things start to happen. After downing a few drinks your feet start to stutter and there's a distinct tendency to slide past the next pub and have to take another run at it.

You can eat the hamburger at any time, and when you do the result is amazing, your feet become your own again, and the traffic miraculously slows down. Of course, that doesn't last long as you insist on having a few more pints, and by the time you reach home to sleep it off you're as legless as ever you were. But no hangover!

The next night things are worse. The police have heard about you and are out patrolling, thankfully they don't appear till your penultimate pint. It's the third time round that things get rather out of control, as the police are out in force.

After a few drinks, when the arrow keys are no longer controlling you as perfectly as you might wish, the game gets very tricky with you having to watch out for both cars and police as you try to nip round corners and into the awkwardly placed pub doorways.

Verdict

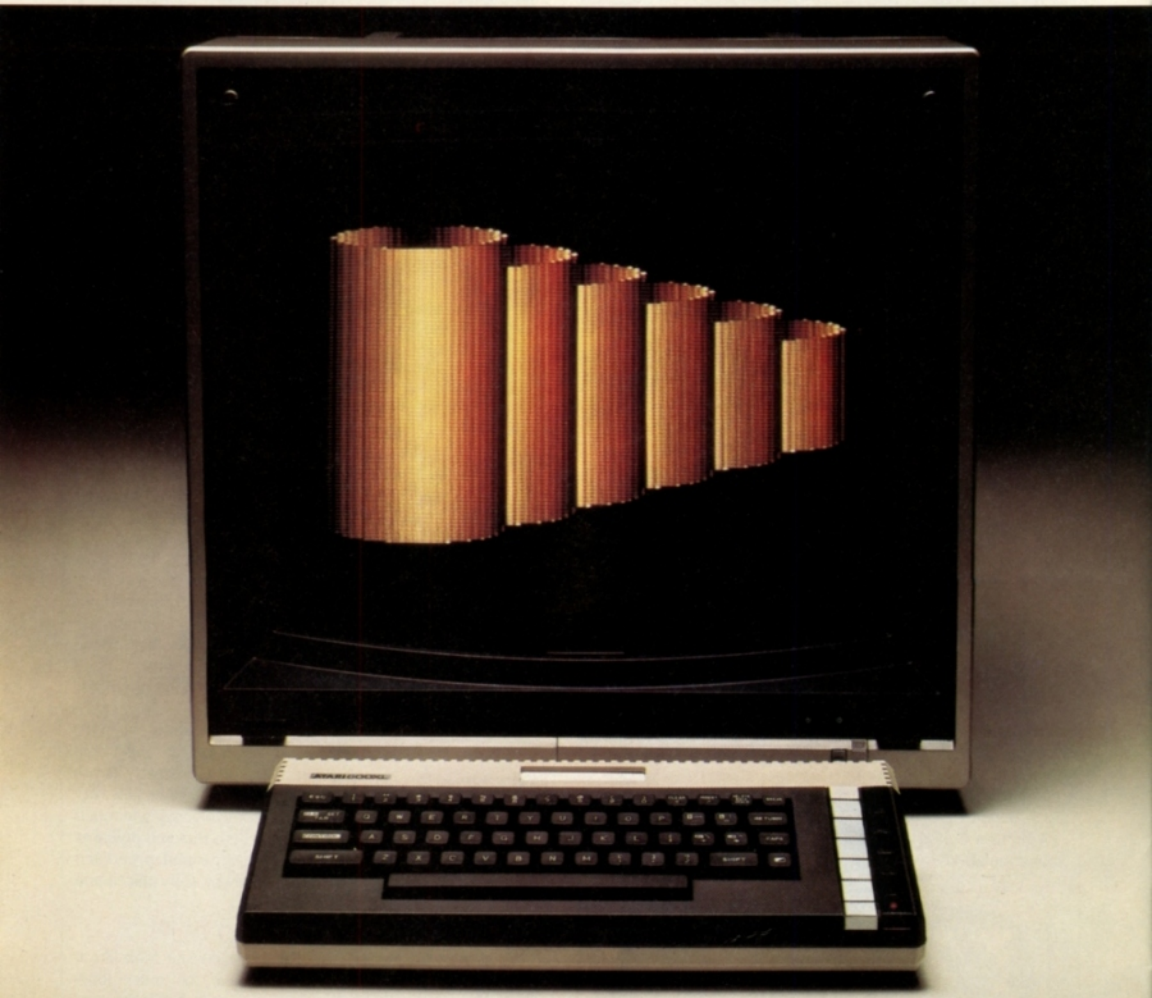
The game doesn't look like it would have too much long-lasting appeal, but in keeping with the events it portrays it's good fun while it lasts. Don't attempt to down a real pint each time you visit one of the pubs: we don't want readers drunk in charge of their Dragons.

Mike Gerrard

RATING

Lasting appeal:	
Playability:	
Use of the machine	
Overall value:	

As your expe
so can your



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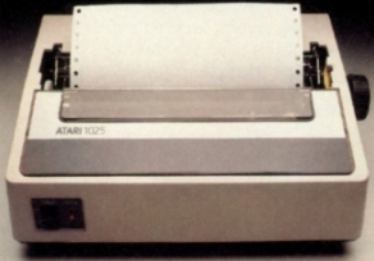

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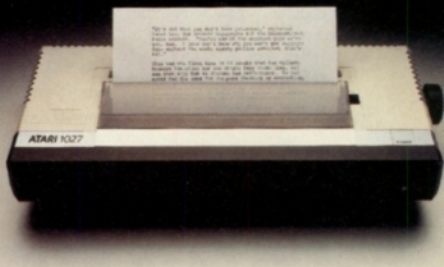

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SPECTRUM 48K

Square dance

Name Traxx **System** Spectrum 48K **Price** £6.95 **Publisher** Quicksilva, PO Box 6, Wimbourne, Dorset DH21 7PY. **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Retail/Mail order

It seems that most computer games these days go out of their way to give you a glorious role to play as well as the game, whether you're Captain Sprog of the UK Boobyprise wading your way through a galaxy, or a white knight rescuing damsels.

Traxx has a really rather refreshing attitude, here's a game, you know what to do, now do it. There's nothing written on the cassette inlay card at all that tries to sell you this game, only a pretty picture. Even the on-screen instructions are only three lines long. These simply inform you that what you control is supposed to represent a spaceship, what you're trying to avoid are bugs, and in colouring in a square, you are actually capturing it. Fine.

Objectives

This is a game for one or two players that involves you quite literally zapping around a grid trying to 'capture' squares. This is done by outlining them with your spaceship. Things aren't so easy because there can be as many as nine bugs chasing you, and physical contact with them is, predictably, fatal.

You can use either a joystick (if it's an AGF one) or the keyboard to control your spaceship. Both these methods will take some getting used to as your spaceship's acceleration is rapid.

In play

It must take a lot of skill to be able to function effectivly with nine bugs haring after you at full throttle. I found life extremely difficult with only two slow ones. This is the only real progression that the game makes. There are no new, exciting, colourful screens to work up to, same old screen, same old bugs, just once you've filled in the entire grid, it clears and you get an extra bug to annoy or destroy you.

This is the source of my only criticism. The game only ever gets harder, nothing else changes. From this point of view it's very dated. This is a shame because everything else about it is good, the graphics are very nice, smooth (albeit super-fast) movement across the screen, the odd sound effect, all this is great, but why no actual game!

Verdict

I already have a large collection of similar games they sit on a shelf, they never get played.

Roger Howorth

RATING

Lasting appeal	
Playability	
Use of the machine	
Overall value	

Prickly problems

Name Wild West Hero **System** Spectrum 48K **Price** £5.90 **Publisher** Timescape Software, 1 Virginia Gardens, Fairways, Milngavie, Glasgow G62 6LG **Format** Cassette **Language** Machine code **Other Versions** None **Outlets** Mail order

What more natural setting for a shoot 'em up game than the Wild West, even if it has been used before?

Objectives

The aim is to avoid the glowing cactus, to stay alive, and to shoot all the baddies. I thought at first the cassette's instructions had omitted to mention which key you fire with, but they've saved you the bother of pressing any key as your Colt 45 rapid fires automatically in whichever direction you're facing.

In play

The game can be played with a Kempston joystick, or any programmable joystick interface, while keyboard users will be firing on all four cylinders: Q, A, SYMBOL SHIFT and SPACE for up, down, left and right. There are both one and two player games, with three lives at your disposal, and those quick on the draw will earn an extra life at 20,000 points.

The program has certainly been written with style, and there's hardly a moment when the screen isn't changing colour. But all that glitters isn't gold, so what of the game inside all the razzamatazz? Well you find yourself in the centre of the screen which fills with a number of bandits and cacti. Your task is to simply blast your way out by shooting both.

Your character moves with as much speed and zip as I've seen in any game. The bandits start to move towards you, though they looked a little like Al Capone, in their suits with padded shoulders. They'll try and force you into a corner, which is usually fatal as it's very difficult to shoot your way out with the bandits being so numerous on some waves. As you slide across the screen at such a speed it's quite difficult to avoid brushing the occasional cactus. These plants have an unusual defense system, the slightest contact with one results in instant and spectacular disintegration.

You don't need to clear the screen of cacti, but as soon as you've wiped out the last gunslinger there's an explosion of graphics and you're on to the next screen.

Apart from all the zap-pow surrounding the game, I wasn't too impressed with the graphics, particularly the Wild West Hero himself who looks more like a deep-sea diver than Billy the Kid. The sound is never-ending and adds to the feel of the game, but I have my doubts about whether I'd return to it again and again as it's very repetitive once you've had your bit of fun with it.

Verdict

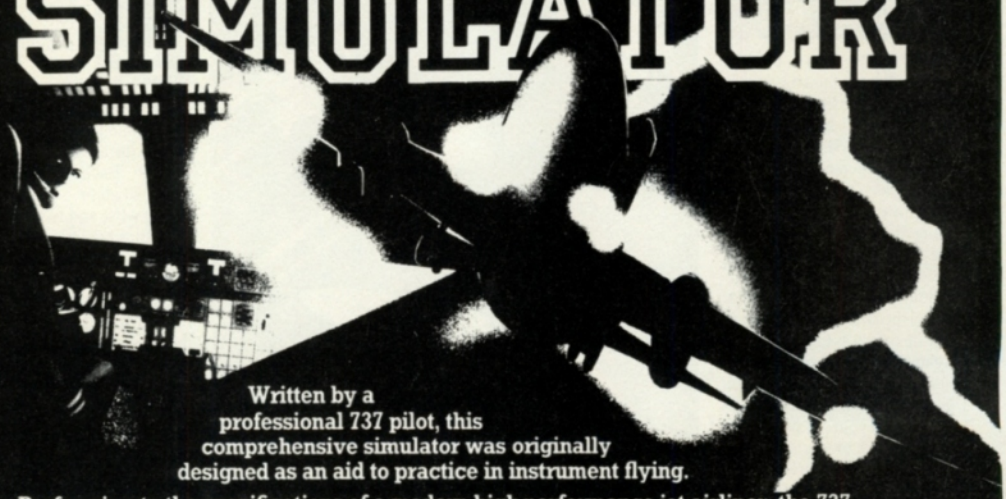
Worth seeing for its speed and presentation, but low on long term appeal.

Mike Gerrard

RATING

Lasting appeal	
Playability	
Use of the machine	
Overall value	

737 FLIGHT SIMULATOR



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Bob Chappell gets to grips with a handful of Commodore 64 games — some are simply addictive

Commodore collection

What some of these Commodore 64 games lack in sophistication is made up for in other ways

CROSSFIRE

Best of the bunch is the simple but maddeningly addictive Crossfire. On screen are six rows of seven boxes, but the action is in the lanes between the boxes. Ranged around the perimeter are snoozing aliens with your craft somewhere more central.

Some of the aliens waken to patrol the lanes, merrily firing a missile or two as they go. This is a game of shoot or get shot for it is apparent they are intent on ganging up on you. You outmanoeuvre your pursuers using your joystick or keyboard (the latter can be configured to your own taste), and trying desperately not to get caught in crossfire. Shoot one of them with your limited supply of 35 missiles and, like as not, the injured party will undergo a metamorphosis into something unpleasant.

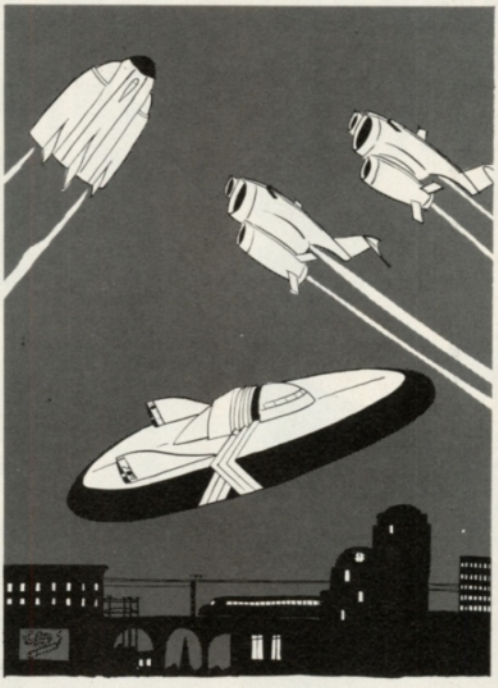
When your ammunition is down to under 11, you must reach a reloading station pronto. There are two speeds of play and several levels, each offering fewer defence missiles than the one before. The game has good sound effects and mood music which can be turned off.

A simple concept which, at first sight, appears to be a doddle. Take my word, it's not as easy as it looks and it keeps you coming back for more.

BONKA

Bonka is an aptly titled version of the Panic variety where, instead of bashing the enemy, you bash the ground.

A series of platforms are linked by ladders. The hero starts at the bottom of the screen and must first get hold of a hammer. At the top of the screen is a solitary meanie, a rotund alien equipped with built-in *deely boppers*. No prizes for guessing on what platform the hammer is.



Ed Briant

Once the hammer has been captured, a quick press on the joystick fire button digs a large hole — obviously this hero has never seen a shovel. The meanie turns out to be short-sighted and will fall into any hole, to be left dangling by its antennae.

A quick wallop over the spot with the hammer and the meanie plunges down the screen — the further the drop, the more points for you. Each screen supplies more meanies to harrass you. Again, simple but insomnia-inducing.

EVEREST ASCENT

The Spectrum version was reviewed in a previous issue of *PCN* (13) so let's be brief.

This game lets you make an assault on that most romantic of mountains, Mt Everest. There are no graphics (except for a scenic backdrop), and progress up the mountain is a matter of selecting options and giving orders from menus.

A successful ascent involves careful control and planning of movement and supplies, making sure you have enough Sherpas, oxygen, food and such like.

This is an enjoyable exercise in logistics with a yeti thrown in for good measure though it's not a true adventure.

ROAD TOAD

You got it in one — our old web-footed friend is still trying to cross the road. Here he has to contend with lorries, racing cars and a shrieking ambulance which goes twice as fast as the rest of the traffic and drives down the road's centre. If Toad makes it, he then has the usual logs, crocs and turtles to contend with.

Road Toad is one of the best amphibians I've seen, which gives a deep 'Ribbit, ribbit' croak as it hops. A very competent version of a classic, though some colours are not so hot and don't show some objects to best advantage.

CATACLYSM

Using your cross-sight, you defend your city against waves of horizontally mobile alien saucers which dump bombs on their way to the local galactic supermarket. Each wave contains about 70 ships, so you need a strong wrist and trigger finger. The ships come in a variety of shapes, sizes and colours.

As the ships move across at different heights, they sometimes pause before resuming their journey. That's about it really — you get them before they wipe out the city.

Attractive graphics and zippy space sounds, but not much variety. Joystick only.

LASER STRIKE

This limited version of Scramble offers only two types of screen. The first has you dodging asteroids and solar pods to bomb bases, with a mystery ship shooting up from below. In the second screen you travel through ice caves avoiding walls while destroying more bases.

The game has a bug which locks it up. If you crash your ship into the ground on take-off (unlikely but possible), the program stops and only powering off and on restores it.

This game does what it does reasonably well but there's not much to it. And the disk version is more than double the price of the £9 cassette.

Crossfire (disk version £21.95) Sierra On-Line, USA. Home Computers, Blackpool FY1 3PX Tel (0253) 22340
Bonka (£6.95) J Morrison (Micros), Leeds LS9 9JJ Tel (0532) 480987
Everest Ascent (£5.50) Richard Shepherd Software, Slough Tel (06286) 63531
Road Toad, Cataclysm (£7.95 each) Audiogenic, PO Box 88, Reading Tel (0734) 586334
Laser Strike (cass £9 disk £19.95) Isis Hathor, USA. A Barrow, Royden, Perklane, Prestwood, Gt Missenden Bucks HP16 0JD.

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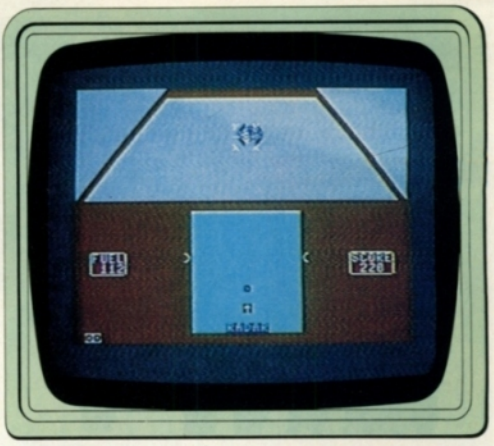

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Kenn Garroch, Personal Computer News, 62 Oxford St, London, W1A 2HG.

All disks and cassettes will be returned as soon as possible after evaluation of publication, at our expense.

At last a game for the Commodore 64, and a zap zap zoom one at that. If, as an expert computer user, you have ever wanted to learn how to fly a star fighter, this simulator, from Gary and Brian Rushby of Great Sutton in South Wirral, is what you have been looking for.

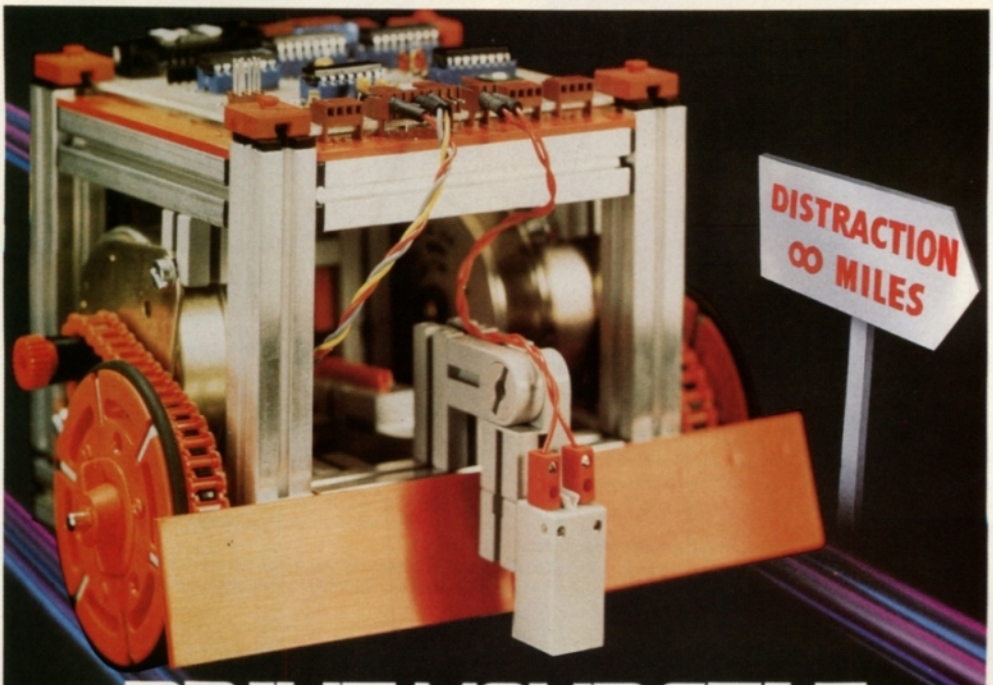
The game uses joystick port two to control the fighter, but can easily be converted to run from the keyboard (see the accompanying notes). Notice that you are controlling your fighter and not the alien's. So, if the alien is above you, pull the stick back, if the alien is to your right then push the stick to the right to line yourself up so you can 'blast the alien outta the sky'.

The program makes good use of the 64's sprite facilities, to define the alien space craft that you're after. You have to hit the alien five times to kill it and it needs to be in the centre of your sights to hit it at all.

MAIN PROGRAM NOTES

10-19	Copyright message
20	Set the screen and border colours then go to title page.
50	Set the sound register base at 54272.
60	Dimension the arrays used in the high score table.
100-105	Set sprite registers and define text as priority.
120-135	Declare all variables.
140-150	If G=0 then load the sprite data. If G=1 then no need to do it again.
160-171	Instructions option of first game. Subsequent games ignore this instructions option.
175	G=1, therefore preliminaries not needed again. Set the screen and border colours.
190	Gosub to screen print routine, then go to general initialisation and main routine loop.
200-20	Move left routine, includes part of the main sound routine at line 201.
203-204	Move the sprite left and test if the coordinates are allowed.

```
10 REM ***********************************
12 REM
13 REM         BATTLESTAR FIGHTER
14 REM
15 REM WRITTEN BY BRIAN AND GARY RUSHBY
16 REM
17 REM           DECEMBER 1983
18 REM
19 REM ***********************************
20 POKE53280,12:POKE53281,12:GOSUB2500
50 REM ** SOUND REGISTER ***************
51 SD=54272
60 DIMSC$(5),SC(5),SH(5):FORJ=1TO5:SC$(J)="**********":SC(J)=0:SH(J)=0:NEXTJ
100 REM** SET SPRITE REGISTERS ********
101 V=53248:POKEV+40,6:POKEV+44,6:POKEV+45,6:POKEV+46,2:POKE53275,255
105 POKE2045,244:POKE2046,245:POKE2047,246
120 REM ** DECLARATION OF VARIABLES ***
125 G=0:HI=0
130 SC=0:X=0:Y=0:I=0:SI=0:XP=0:XE=0:XR=0:XD=0:N=0:JY=0:M=0:O=0:S=0:TI$="000000"
135 YR=0:CL=0:F=500:R=0:SH=0
140 IF G=1 THEN GOTO 190
150 IFG=0 THEN GOSUB 5000
160 REM **INSTRUCTIONS OPTION**********
161 IFG=0 THENPRINT"■■■■■■■■■■■■■■■■■■■■■■■■■ DO YOU REQUIRE INSTRUCTIONS(Y/N)"
167 GETA$:IFA$=""THEN 167
169 IFA$<>"Y" AND A$<>"N" THEN 167
171 IFA$="Y"THEN GOSUB 3000
175 G=1:POKE53280,11:POKE53281,12
190 GOSUB 1000:GOTO 700
200 REM ** MOVE LEFT ******************
201 POKESD+4,19
203 X=X-6:IFX<0 AND SI=2 THEN X=X+255:POKEV+16,0:POKEV+2,X:SI=0
204 IFX<0 AND SI=0 THEN X=0
205 IFXP<0 THEN XP=0
207 POKEXD+(YR-1)*40,160:POKEXD+54272+(YR-1)*40,5
211 XE=XP:XP=XP-6:IFXP<0 THEN XP=0
212 XR=1558+INT(XE*12/347)
218 POKEXR+YR*40,160:POKEXR+54272+YR*40,5
220 XD=1558+INT(XP*12/347)
225 POKEXD+YR*40,87:POKEXD+54272+YR*40,6
230 RETURN
240 REM ** MOVE RIGHT *****************
241 POKESD+4,19
243 X=X+6:IFX>256 AND SI=0 THEN X=X-256:POKEV+16,2:POKEV+2,X:SI=2
244 IFX>90 AND SI=2 THEN X=90
248 POKEXD+(YR-1)*40,160:POKEXD+54272+(YR-1)*40,5
250 XE=XP:XP=XP+6:IF XP>347 THEN XP=347
252 XR=1558+INT(XE*12/347)
```



DRIVE YOURSELF TO DISTRACTION

WITH A *BBC* BUGGY

Trying to determine the limitations of the BBC Buggy is a task which will drive you to distraction. So sit back and accept the fact that your BBC Micro computer (Model B) controlled Robot will provide you with hours and hours of stimulating entertainment.

This rugged little vehicle which has been designed in conjunction with the BBC Computer Literary Programme and featured in the television series 'Making the most of the Micro' is built from an easy to assemble fischertechnik construction kit, complete with all necessary cables, software and instructions.

The Buggy's software which is based on the 'building block' principle consists of 12 robust application programs and one familiarisation program all of which feature full graphics.

Take a trip into the future without ever leaving your key-board – drive a BBC Buggy.

PROGRAMS
Test and familiarisation.
Switch – direct computer control.
Memory Switch – demonstrating computer memory.
Routeplanner – advanced version of Snail.
Recorder – route display.
Snail – screen route planning.
Explore for wall – mapping of boundaries.
Explore for object – seeks objects, defines shapes, returns home.
Bar Code Routeplanner – non-keyboard information input.
Tin Pan Alley – composing music by bar codes.
Man vs Buggy – 'Flying blind'.
Sunseeker – seeking a light and negotiating obstructions.
Line Follower – black or white line following.

The BBC Buggy is available from Acorn/BBC dealers and other major outlets.

ECONOMATICS

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BATTLESTAR FIGHTER

205-230 Deletes old radar image.

240-242 Move right routine. Includes part of the main sound routine at line 241.

243-244 Move the sprite right and test if the coordinates are allowed.

248-260 Delete the old radar image — POKE new radar image.

270-276 Move up routine. Includes part of the main sound routine in line 271.

280-290 Move down routine. Includes part of the main sound routine at line 281.

295-315 Tests if alien is within fire range, if so then calculate the new score and the number of times the alien has been hit. Print the new score.

320-335 Calculates and prints the amount of fuel left. Also includes part of the main sound routine at line 325.

340-400 Explode the alien routine: sequentially explodes alien with four explode sprites plus final sprite

```
254 POKEXR+VR*40,160:POKEXR+54272+VR*40,5
255 XD=1558+INT(XP*12/347)
258 POKEXD+VR*40,87:POKEXD+54272+VR*40,6
260 RETURN
270 REM ** MOVE UP ********************
271 POKESD+4,19
275 Y=Y-6:IFY<0 THEN Y=0
276 RETURN
280 REM ** MOVE DOWN ******************
281 POKESD+4,19
285 Y=Y+6:IFY>150 THEN Y=150
290 RETURN
295 REM** SCORE ROUTINE ***************
300 IF VR>2 THEN SC=SC+10:A=A+1
305 IF A=5 THEN SC=SC+100
310 PRINT"■■■
```

BATTLESTAR FIGHTER

expanded. Includes the sound routine for the explosion. Also deletes the radar image.

500-699 Laser routine, prints the laser beams onto the screen and then deletes them. A sound routine is included between the prints and deletes. Line 665 detects if the alien sprite is within the limits of the sights.

700-900 Main routine loop, 775 prints the position of the alien on screen. The size of ther alien (distance away) is defined by N. 776 tuns sprites 0 (sights) and 1 (alien) and also tells the sprite which side of the screen to appear.

780-805 Joystick routines. If the keyboard is to be used then include the following lines:

780 GETA$

785 IF A$="U" THEN GOSUB 270

```
855 ON M GOSUB 200,240,270,280
900 GOTO 770
1000 REM ** SCREEN PRINT **************
1005 PRINT"■
1010 PRINT"
1020 PRINT"
1030 PRINT"
1040 PRINT"
1050 PRINT"
1060 PRINT"
1070 PRINT"
1080 PRINT"
1090 PRINT"
1100 PRINT"■
1110 PRINT"■
1120 PRINT"■
1130 PRINT"■
1140 PRINT"■
1150 PRINT"■
1160 PRINT"■  ■FUEL■      >■■          ■C    ■SCORE■  ";
1170 PRINT"■  ■ 500■        ■■          ■    ■ 0   ■  ";
1180 PRINT"■
1190 PRINT"■
1200 PRINT"■
1210 PRINT"■
1220 PRINT"■
1230 PRINT"■
1240 PRINT"■
1250 POKE2023,160:POKE56295,9
1260 POKE2040,240:POKEV+39,1:POKEV,176:POKEV+1,79:POKEV+21,1
1300 RETURN
1500 REM** END OF GAME ****************
1505 POKEV+21,0:FORL=0 TO 24:POKESD+L,0:NEXT
1510 POKESD+14,5:POKESD+18,16:POKESD+3,1:POKESD+24,143:POKESD+6,240:POKESD+4,65
1515 FR=5389
1520 FORI=0TO70 : POKE53265,PEEK(53265)AND239
1525 FQ=FR+PEEK(SD+27)*3.5 : HF=INT(FQ/256):LF=FQ-HF*256
1530 POKESD,LF:POKESD+1,HF
1535 POKE53265,PEEK(53265)OR16
1540 NEXTI
1545 POKESD+24,0
2000 PRINT"■"
2002 PRINT"■YOU SCORED ";SC "POINTS"
2003 PRINT:PRINT"YOU DESTROYED ";SH "ALIEN SHIPS"
2025 IF HI<SC THEN HI=SC:PRINT"■■■            A NEW HI-SCORE              ";
2030 PRINT"■■■■■■■HI-SCORE=■ ■";HI
2100 FORX=0TO20:GETA$:NEXTX : Z=0:FORX=1TO5:IFSC>SC(X)THENZ=X:X=11
2105 NEXTX:IFZ=0THEN2140
2110 PRINT"■■■■■■■ENTER YOUR NAME:"
2115 INPUT A$:IF LEN(A$)>10THENA$=LEFT$(A$,10)
2120 IF Z=5 THEN2130
2125 FORX=4TOZ STEP-1:SC(X+1)=SC(X):SC$(X+1)=SC$(X):SH(X+1)=SH(X):NEXTX
2130 SC(Z)=SC:SC$(Z)=A$:SH(Z)=SH
2140 PRINT"■■■■■■■■■■■■■■HIGH SCORE TABLE"
2150 PRINT"■■■■■■■■■■■■■■
```

LOADING

Type LOAD"" to load program.
Wait 5 minutes for program to load.
Program will run automatically.

INTRODUCTION

The object of the game is to collect treasure from a maze without losing lives and thus to achieve the highest score possible. Each item of treasure is worth a number of points, the more treasure collected, the higher the score.

There are a number of hazards within the maze, pitfalls, trapdoors, portcullis and wandering **SKULLS**. The **SKULLS** will attempt to guard the treasure by catching you, but you may find within the maze a green cross which will give you a period of safety during which you may attack the **SKULLS**.

Other features of the game are:-
- Top ten highest score table.
- Game in progress save/load.
- Merge highest scores with table on tape.
- Halt or pause game.
- Print screen on printer.
- Display a short term plan of the maze.
- Lock or unlock a portcullis with a key.
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- Lucky charm bracelet to show proximity of skulls.
- Inventory of collected treasure.
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SKULL

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Author: I. C. Docherty

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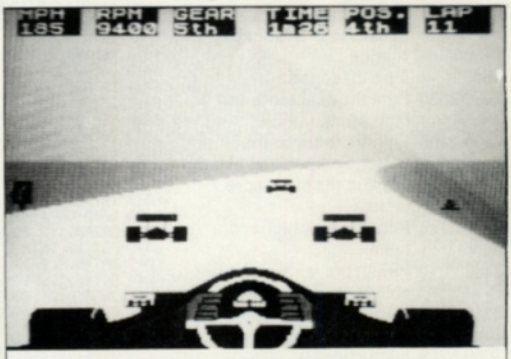

FORMULA ONE AND STEERING WHEEL

For Sinclair ZX Spectrum 16K & 48K

THE GAME

Based on current formula one levels of acceleration, braking and roadholding, with 10 circuits to choose from (one on 16K version) including Silverstone, the world's fastest grand prix circuit, this program has been developed for the ultimate in realism with the help of The Jim Russell International Racing Drivers' School at Silverstone. It has four stages – Instruction, Practice, Qualifying and Race – with eight cars racing against you in wet or dry conditions. Incredible sound effects and smooth 3D action graphics give you all the speed and excitement of motor racing. 100% machine code.

THE STEERING WHEEL

Naturally you cannot steer a racing car effectively by pushing buttons or wiggling a joystick so we have developed a steering wheel that fits to the Spectrum. With one hand on the wheel (the other free for braking and accelerating) it gives the level of precision needed to steer the car on the fastest line through the corners and correct a skid when you overdo it. The wheel is strongly made and thanks to a brilliantly simple design we have been able to keep the cost down to a minimum. It will be used for many games in the future but is now only available with FORMULA ONE.

To order FORMULA ONE and Steering Wheel send cheque or p.o. for £8.95 to

SPIRIT SOFTWARE, Dept N1, 1½ Pembroke Mews, London W8

BATTLESTAR FIGHTER

790 IF A$="D" THEN GOSUB 280
795 IF A$="R" THEN GOSUB 240
800 IF A$="L" THEN GOSUB 200
805 IF A$="F" THEN GOSUB 500
The keys UDRLF can be any convenient control keys.
810 Detects if 5 hits an alien.
811 Main sound routine.
815 Value of CL depends on the clock (CL is used to determine how far away the alien is and also how much fuel is left).
820 Determines the size of the alien and also the distance away for the radar image.
830 Allows only 4 sizes of alien (0-3).
835 Detects if the alien has gone past.
840 Turns off alien and radar image.
845 Delay loop and initialisation for next alien.
850-855 Random movement of alien.
1000-1250 Print the cockpit.
1260 Print sprite for sights.
1500-1540 End of game sequence. Turns off all sprites and initialises siren sound routine.
1545 Turn off sound.
2000-2030 Print the final score and high score.
2100-2105 Empty the keyboard buffer, find position of last score in the high score table.
2110-2155 Print the new high score table.
2160 PRE(0) prevents garbage collection.
2240-2280 Another game option.
2500-2999 Title page.
3000-3999 Instructions.
4999-5007 Enter sprite data into memory.
6000-7000 Sprite data.

```
3034 PRINT"    THE PRESENCE AND POSITION OF AN"
3035 PRINT" ALIEN SHIP CAN BE DETECTED ON YOUR"
3040 PRINT" ONBOARD RADAR SCREEN.THIS WILL ALSO"
3045 PRINT" SHOW WHEN THE ALIEN SHIP IS WITHIN"
3050 PRINT" RANGE OF YOUR FIRE-POWER."
3052 PRINT
3055 PRINT"    YOU GAIN POINTS FOR EACH DIRECT HIT"
3060 PRINT" BUT TO DESTROY THE ALIEN YOU MUST HIT"
3065 PRINT" IT 5 TIMES.THIS GIVES BONUS POINTS AND";
3070 PRINT"  CONFIRMATION OF DESTRUCTION IS SHOWN"
3075 PRINT" ON YOUR CONTROL PANEL."
3078 PRINT
3080 PRINT"■■PRESS ANY KEY TO CONTINUE■"
3082 GETA$:IFA$=""  THEN 3082
3085 PRINT"■■■
```

COMPUTER MAGAZINE

ON CASSETTE

In May 1984 Available on Commodore 64 and Oric 1

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The Electron and Carto

Pack up your paintbox, throw away your paintbrushes and move into the electronic age of art with our amazing new PIXSTIK™

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You just plug in and all the materials you need are listed on the screen. You'll have access to up to 16 exciting colours and 16 separate commands. Simply give your instructions by pointing PIXSTIK™ at the appropriate colour or command.

PIXSTIK™ couldn't be easier to operate. Whether you're eight or eighty, you'll find it fascinating, especially when you discover the range of pictures you can produce.

Wherever your imagination goes, PIXSTIK™ will follow. It gives

ic Paint Box on Set

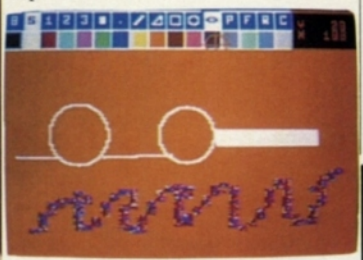
There is no limit to the wonderful artistic creations you can produce with a PIXSTIK™ and special PAINTBOX Software – here are just a few examples of its infinite possibilities.

you freehand freedom or creates straight lines, triangles, rectangles, circles and ellipses with geometrical precision.

Choose whether to fill your shapes with solid colour or leave them blank. And if, after that, you still favour a paintbrush effect, simply move PIXSTIK™ into paintbrush mode and it will do the rest.

What makes PIXSTIK™ even more special is that it doesn't simply stop with a completed picture. Because it incorporates the special ABC feature, you can use individual designs as part of animated sequences and cartoons.

At the "animate" command, pictures stored in memory will reappear in turn. On the "bounce" instruction, your pictures will move forwards and backwards and when "cartoon" is called up, they will reappear continuously in sequence with just the effect of a professional cartoon clip.



Pictures can be drawn using fine lines, blocked lines or paintbrush effects for extra variety.

PIXSTIK™ can bring all your pictures to life. Use it to show the sun moving across the sky, smoke curling from a chimney and an arrow hitting its target.

The only limit on PIXSTIK™ designs is your own inventiveness. There are even three different stick modes to ensure different colours can be drawn across each other without merging.

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DATABASICS

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

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

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

APPLICATION Each software package is listed alphabetically by its application.
PRICE includes VAT.
MACHINE/OPERATING SYSTEM on which the best selling packages runs.
OTHER VERSIONS indicates whether or not the package runs on a different machine or operating system.
MEDIA SUPPLIED indicates in what format the package comes — either cassette, disk, or cartridge.

MAIL ORDER AVAILABLE tells you whether or not the package is available by mail order.
HARDWARE REQUIRED shows the need for special hardware, such as disk drive, joystick or printer.
PUBLISHER/DISTRIBUTOR This code refers to the distributor code table at the end of the listings, which will give the name and telephone number of the publisher/distributor.
COMMENTS — any other points of interest.

SOFTWARE

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
Business Graphics	£471.50	16-bit machines		Micro-Graphpower	128		●		●	●		●	I2	Needs plotter. Business graphics which plots business data.
	£120.75	Apple III	●	Business Graphics	48K		●			●			P6	Also on Apple II (£125.35). Supports range of plotters & pie-charts, etc.
	£149.50	IBM PC	●	Graph Magic	96K		●		●	●			F1	Also on Apple II, III. Displays files graphically. Reviewed 18.3.83.
Business Management	£569.25	Commodore 8000		The Administrator	96K		●		●	●			S11	Complete applications generator. No programming required.
	£4,140	CP/M		Peachtree Business Management System	48K		●		●	●			P1	Also on MP/M & Unix. Available on hard disk (£6,900). Six modules for single user.
	£684.25	IBM PC	●	Tomorrow's Office	128K		●		●	●			S11	Also on Sirius, Victor & MSDOS. Complete applications generator.
Financial Planning	£44.85	Commodore Pet		Busicalc	16K	●			●				S5	Also on Hytec & ICL PC. 96K version available. Helps decide on financial strategy.
	£188.60	Apple II	●	VisiCalc	48K		●		●	●		●	R1	Also on Apple III, Commodore & IBM PC, etc. The classic spreadsheet.
	£345.00	CP/M		Bottom-Line Strategist	48K		●		●	●			P4	A business/project forecasting program. Allows user to test business assumptions.
	£281.75	CP/M	●	Master Planner	64K		●		●	●			C5	Also on MS-DOS & CP/M 86. Needs 80 column printer. Upgrade of a spreadsheet.
	£396.75	CP/M	●	Micro Plan	64K		●		●	●			B1	Also on MP/M. Spreadsheet financial planner.
	£343.85	CP/M		Minimodel Financial Modelling	48K		●		●	●		●	M5	Needs 80 column screen. Model consolidation facility, colour option.
	£182.85	CP/M	●	Multi-Plan	48K		●		●	●			P4	Also on PC-DOS, Cromix, Fortune, Corvus & Sirius. Second generation spreadsheet.
	£44.85	CP/M		Plannercalc	64K		●		●	●		●	C5	Needs 80 column screen. Entry level system for spreadsheet planning.
	£218.50	CP/M		SP2020	48K		●		●	●			G2	Forecast effects of proposed actions. Aid to management decision-making.
	£172.50	CP/M		Supercalc	128K		●			●			A1	Electronic worksheet, representing a large flexible accounting work pad.
	£212.75	CP/M		Super Calculator	48K		●		●	●			E1	Spreadsheet calculator.
	£178.25	CP/M		T-Maker	48K		●		●	●			X1	Utility for analysis & presentation of numerical data & test material.
	£224.25	MS-DOS		Pulsar Business System	128K		●			●			A1	Consists of eight integrated packages & provides commercial accounting functions.
	£339.25	Osborne	●	PADA/C	64K		●		●	●			P2	Also on CP/M. Two systems. Incomplete records accounting, time/cost recording.
	£632.50	UCSD-P System		Microfinesse	128K		●		●	●			P5	Financial modelling program for businessmen.
	£741.75	UCSD-P System	●	Micro-Modeller	48K		●			●		●	I2	Also on CP/M & MS-DOS. Designed for large corporations.
Integrated Software	£569.25	IBM PC		Context MBA	256K		●			●			B2	Integrated spreadsheet modelling, graphics, WP, database & communications.
	£908.50	MS-DOS	●	Silicon Office	256K		●			●			F1	Also on Sirius & Victor. Comprises word processor database management system.
Payroll	£431.25	Apple II		Payroll	48K	●		●	●				C1	Supports weekly, monthly & per monthly. Up to 350 employees per disk.
	£287.50	Apple II	●	Tabs Payroll	48K		●		●	●			T3	Also on CP/M & MS-DOS (64K). Up to 2000 employees, nine pay schemes.
	£80.50	Apple II		Statutory Sick Pay (SSP)	48K		●		●	●			H1	Also on Spectrum. Does all SSP calculations.
	£977.50	CP/M	●	Powerday	48K		●			●			O2	Also on MP/M and MS-DOS. Integrates with Omicrons nominal ledger. Handles SSP.
Project Management	£747.00	IBM PC	●	Micronet	48K		●			●			T2	Also on ICL PC, Sirius, Superbrain, Apple II, & others. Critical path analysis.
Project Planning	£1,150.00	Commodore 8000		Hornet	32K		●			●			C3	Has eight optional variants (all eight £4,025). Network logic & variety of screen display.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
Sales Ledger	£287.50	Apple II	●	Tabs Sales Ledger	48K		●		●	●			T3	Also on CP/M & MS-DOS. Part of integrated system. 300 analysis codes.
	£805.00	CP/M	●	Powersales	48K		●			●			O2	Also on MP/M & MS-DOS. Multi-user system based on mainframe software.
	£339.25	Apple II		Sales Ledger	48K		●		●	●			H1	Supports 700 & accounts. Direct posting, credit control & 100 analyses.
	£325	DEC Rainbow 100	●	Sales Ledger System	64K		●		●	●			D2	Also on DEC Mate II. Invoicing & monthly statement generating system.
	£287.50	CP/M	●	Sales Ledger	64K		●		●	●			S2	Also on CP/M 86 and MS DOS. Flexible ledger system.
WORD PROCESSING														
	£92.00	Apple II		Piewriter	48K		●		●	●		●	M5	Needs 80 column card. Allows entry, editing & print formatting of any text type.
	£17.25	BBC Model B		Wordsworth	32K	●	●		●	●			I7	Disk version £19.50; cheap word processing package.
	£152.95	Apple III	●	Apple Writer 2	48K		●			●			P6	Also Apple II. Has word wrap, glossary & word processing language.
	£28.50	BBC Model B		Alphabeta	32K	●			●				H3	Also available on disk. Suitable for home & business.
	£10.50	BBC Model B		Word Pro	32K	●			●				I4	Includes DELETE, INSERT, SAVE, Date etc.
	£90.85	Commodore 64		Infomast	64K		●		●	●			R2	Combined programmable word processor, Database and calculator.
	£89.00	Commodore 64	●	Paperclip	64K		●		●	●			K5	Also Commodore 8000. Compatible with WordPro & SpellPro.
	£51.75	Commodore Pet	●	Papermate +	16K	●			●				S5	Also on Commodore 64, 3, 4, & 8000. Available on floppy (£53.49).
	£145.00	CP/M	●	Mail Merge	64K		●			●			X1	Also on CP/M 86 and PC-DOS. An optional MERGE, PRINT, extra for Wordstar.
	£295.00	CP/M	●	WordStar 3.3	56K		●			●			M10	Also on IBM PC, MS-DOS. Integrates with CalcStar, InfoStar, Mail Merge, SpellStar.
	£316.25	CP/M	●	Spellbinder	48K		●		●	●			E1	Also on Oasis. Word processing & office management system.
	£225.00	IBM PC		Easywriter II	64K		●			●			X1	Bold face & underscoring on screen. 80,000 word spell checker extra (£43.15).
	£340.40	IBM PC		VisiWord	64K		●			●		●	R6	Mail merge facility with Visi file.
	£40.25	Newbrain		Word Processor 40/12	32K	●			●				E2	Automatic word wrap, editing, saving paragraphs, deleting.
	£45.42	Sharp MZ804	●	Wordpro	48K	●			●				K1	Also on MZ80B+K. Available on disk (£91.94). One of few WP packages for Sharp.
	£40.25	Memotech		Propen 32 (4)	30K	●			●			●	E2	Also for New brain — word processor.
	£49.95	Tandy TRS 80 I	●	AJ Edit	32K		●		●	●		●	M6	Also on Genie I & II. Needs printer.
EDUCATION														
Basic Course	£13.95	Texas Instruments 99/4A		Teach Yourself Extended Basic	16K	●			●				T5	Needs extended Basic module.
Business Game	£9.95	BBC Model A	●	Business Game	16K	●			●				W1	Also on Model B. Two games for economics, business & general studies, teaching.
	£5.95	BBC Model B	●	Inkosi	32K	●			●				C9	Also on Vic-20. Rule for ten years, overcoming obstacles, e.g. famines.
Chemistry	£14.38	Research Machine 380Z	●	Symbols To Moles	31K		●		●	●			H4	Also on Apple II. Practise using chemical symbols, writing & mole concept.
Children	£37.89	Apple II		Bumble Plot	48K		●		●	●			P4	A set of five programs for developing graphics and maths skills. For children 8 to 13.
	£29.84	Apple II	●	Face Hanger	48K		●		●	●			P4	Also on IBM PC. Designed for children to learn computer keyboard by building up face.
	£37.89	Apple II		Gertrude's Secret	48K		●		●	●			P4	An educational game to teach logical thinking & planning. For children aged 6-9.
	£9.80	Atari 400	●	Jigsaw Puzzles	16K	●							T4	Also on Atari 800. Has 16 puzzles and optional difficulty.
	£9.95	BBC Model B		Letters	32K	●			●				C9	Designed for children aged 4-6 & for dyslexic & remedial children.
	£9.95	BBC Model B	●	Metrics	32K	●			●				C9	Also on Vic-20+ Spectrum. Structure of metric system, for children aged 10-15.
	£5.95	BBC Model B	●	Pascal	32K	●			●				C9	Also on Vic-20. Shows construction of Pascal Triangle and tests on it.
	£5.95	BBC Model B	●	Sequences	32K	●			●				C9	Also on Vic-20. Demonstrates number patterns.
	£6.50	BBC Model B		The Early Stages	32K	●			●				H3	Reading aid. Plays nursery rhymes. Available on disk.
	£4.50	BBC Model B		Super Hangman	32K	●			●				I4	Version of famous game. High resolution graphics. 800 words or enter own choice.
	£9.95	BBC Model B		Tree of Knowledge	32K	●			●				A9	Interactive program teaching categorisation. Simplified information retrieval.
	£4.95	Sharp MZ80A	●	Giant Maths	32K	●			●				S8	Also on MZ80K. Big screen figures & humorous error messages. 5 to 11 years.
	£4.95	Sharp MZ80A	●	Rocket	3K	●			●				S8	Also on MZ80A. Four difficulty levels. For five to 11 year olds.
	£9.20	Sharp MZ80A	●	Teach Tables	48K	●			●				K3	Also on MZ80K. Plays like game but motivates children to improve their ability.
	£4.95	Sharp MZ80K	●	Master Builder	48K	●			●				S8	Also on MZ80A. Repair a wall using random blocks. Teaches spacing.
	£5.25	Spectrum		Alphabet	48K	●			●				W2	'Picture for each letter of the alphabet. Option for lower case.' Aimed at ages 2-6.
	£5.25	Spectrum		Adding and Subtracting	16K	●			●				W2	For children aged 3-7. Three animated programs with full graphics.
Classroom Monitor	£322.00	UCSD-P	●	Classroom Monitor	64K		●		●	●			K4	Also on Apple II. Provides demonstration facilities & monitors student's progress.
Economics	£28.75	Sharp MZ80K	●	Broadwater Economics Simulation	16K	●			●				W1	Also on Commodore Pet & BBC. Simulates micro & macro economics.
French	£14.38	Research Machine 380Z	●	Repondez	31K		●		●	●			H4	Also on Apple II. Practising French verb formation (present tense).
	£9.20	Sharp MZ80A	●	French Conjugate	48K	●			●				K1	Also on MZ80K. Automatically conjugates regular verbs into tenses.

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	£9.20	Sharp MZ80A	●	French Verbs	48K	●			●				K1	Also on MZ80K. Allows user to impart up to 20 verbs & eight tenses at a time.
Graphics	£8.00	BBC Model B	●	Painter	32K	●			●				A5	Also on Spectrum (£5.75), Atom (£6.90) & on disk.
	£9.95	BBC Model B		Creative Graphics	16K	●			●				A9	Book available (£7.50). Designed to illustrate BBC graphics.
History	£20.13	Sharp MZ80A	●	Kings & Queens	48K	●			●				K1	Also on MZ80K. Facts & figures on English monarchs since 1066.
Languages	£7.95	Sharp MZ80A	●	Multilinguist	3K	●			●				S8	Also on MZ80K. A language tutor to suit all European languages.
Mathematics	£8.95	BBC Model B		Angle	32K	●			●				C9	Also on Spectrum. Includes four programes designed to teach simple geometry.
	£9.95	BBC Model A	●	Algerbraic Manipulations	16K	●			●				W1	Also on Model B. Includes four programs designed for use in maths teaching.
	£82.80	IBM PC		Fact Track	64K		●			●			I3	Learning basic arithmetic. Presents simple two-line sums in random order.
	£9.20	Sharp MZ80A		Directed Numbers	48K	●			●				K3	Also on MZ80K. Teaches difficult mathematical functions.
	£9.20	Sharp MZ80A	●	Divisor Advisor	48K	●			●				K3	Also on MZ80K. Teaches division at a variety of skill levels.
	£27.60	Sharp MZ80A	●	Numerical Integration	48K	●			●				K3	Also on MZ80K & B. Teaches Simpson's Rule.
	£5.25	Spectrum		Counting	16K	●			●				W2	Graded programs. 'Good as a first introduction to numbers.' Aimed at ages 3-6.
Meteorology	£23.00	Research Machines 380Z	●	Weather	31K		●		●	●			H4	Also on Apple II. Gives synoptic charts. Teaches elementary meteorology.
Morse Code	£9.20	Sharp MZ80A	●	Morse Tutor	48K	●			●				K3	Also on MZ80K. Used to teach morse code by sight and sound. At seven levels.
Physics	£14.38	Research Machines 380Z	●	Lenses	31K		●		●	●			H4	Also on Apple II. Illustrates formation of images by lenses using ray diagrams.
	£3.00	Sharp MZ80A	●	Physics 1 and 2	20K	●			●				D6	Also MZ80K. O' level electricity and motion.
Typing	£28.75	CP/M	●	Touch'n'Go	48K		●		●	●			C6	Also on MS-DOS. Typing tutor for mastering numeric pad & Qwerty keyboard.
	£31.05	IBM PC		Typing Tutor	64K		●			●			I3	Presents exercises for learning touch typing or for improving existing skills.
GAMES														
Adventure	£7.95	BBC Model B		3D Deep Space	32K	●			●				P10	You're in a starship defending the stargate to your galaxy.
	£6.95	Dragon 32		Death Cruise	32K	●	●		●	●			V1	'Adventure game set on the high seas'.
	£7.50	Atari 400		Intruder Alert	16K	●					●		A11	Locate your ship and escape with Dreadstar's plans.
	£7.50	Atari 400		The Rings of the Empire	16K	●					●		A11	Involves battle stations protected by rings of energy.
	£7.50	Atari 400		Crazitack	16K	●					●		A11	The Crazies are attacking you. Also on Atari 600 and 800.
	£7.95	BBC Model B		Hunchback	32K	●	●		●	●			S15	Little man runs along walls avoiding obstacles.
	£9.95	BBC Model B		Sphinx	16K	●			●				W1	'A classic adventure, moving through caves avoiding hazards to collect treasure'.
	£24.99	Commodore Vic-20		River Rescue	8K			●			●		T4	Needs joystick. 'Captain boat through treacherous rivers to rescue explorers'.
	£7.50	Commodore 64	●	Gridrunner	64K	●			●		●		L2	Also on Atari and Vic 20.
	£7.50	Commodore 64		Hovver Bovver	16K	●			●		●		L2	Man mowing the lawn is chased by his neighbour.
	£5.95	Commodore 64	●	Horace & the Spiders	68K	●			●				M8	Also on Spectrum and Dragon 32.
	£8.00	Dragon 32		Mansion Adventure	32K	●			●				M12	'Wind your way through an old mansion picking up clues to find the diamond',
	£7.95	Dragon 32		Wizard War	32K	●			●		●		S7	Needs joystick. 'Magical combat for two to nine players; interactive duel'.
	£35.00	IBM PC		Adventure in Serema	64K		●					●	I3	Needs colour graphics adaptor and direct drive colour monitor for use.
	£6.90	Oric	●	Zodiac	16K	●			●				A5	Also runs on Atom. 'A thinking persons adventure game'.
	£12.07	Sharp MZ80A	●	Adventure	48K	●			●				K1	Also runs on Sharp MZ80B and MZ80K. 'An interactive adventure game'.
	£7.95	Sharp MZ80K	●	Nightmare Park	48K	●			●				S8	Also runs on MZ80A. 'Cross Nightmare Park. Every few steps play game or task'.
	£6.95	Spectrum		Luna Crabs	16K	●							M14	'Convincing 3-D graphics (PCN issue 33)'.
	£4.00	Spectrum		The Last Jedi	48K	●			●				A10	Textual adventure with over 500 rooms.
	£4.00	Spectrum		Dragon	48K	●			●				A10	Mission to recover Sword of Roac.
	£4.00	Spectrum		Kane	48K	●			●				A10	Mission to kill the great Dragon Smang.
	£14.95	Spectrum		Valhalla	48K	●			●				L1	PCN issue 35.
	£5.95	Spectrum		Manic Miner	18K	●			●				B3	Guide miner Willie through 20 crazy caverns.
	£5.50	Spectrum		Lunar Jet Man	48K	●			●				U1	Sequel to Jetpac — enhanced version.
	£5.95	Spectrum	●	Jetpac	16K	●			●				U1	Spaceman collecting pods and rockets.
	£5.95	Spectrum		Kong	48K	●			●				O3	Kong's got the girl — you go to her rescue.
	£6.95	Spectrum		3D Ant Attack	48K	●			●				Q1	Girls rescue boys (or vice versa) in a maze filled with aggressive ants.
	£5.50	Spectrum		Heathrow ATC	16K	●			●				H7	Air Traffic Control game.
	£5.50	Spectrum		Chunkie Egg	48K	●			●				A5	Also on BBC B. Try walking on the eggs.
	£6.95	Spectrum		Penetrator	48K	●			●				M8	Joystick optional.
	£5.50	Spectrum		Zoom	48K	●			●				I6	3-D fighter game with plane flying close to the ground.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge	Mail order avail.	Disk drive	Joystick	Other		
	£5.50	Spectrum		Zip Zap	48K	●			●				I6	Concerns a non-stop robot which avoids aliens.
	£7.50	Spectrum		Halls of the Thing	48K	●			●				C11	Pretty straight forward — you avoid and kill monsters.
	£7.95	Spectrum	●	Flight	48K	●			●		●		P9	Also available on ZX81.
	£15.95	Spectrum		Scrabble	48K	●			●				P9	Expensive but popular.
	£14.95	Spectrum		The Hobbit	48K	●			●				M8	'Object is to get treasure. For one player. Also for Commodore 64.
	£5.00	Spectrum	●	Orb	16K	●			●				I5	Also runs on Dragon 32 and Commodore Vic-20. 'Explore labyrinth and destroy Orb'.
	£10.00	Spectrum	●	Pimania	48K	●			●				A7	Also runs on Sinclair ZX81, BBC 13, Dragon 32. Reviewed 18.3.83.
	£5.00	Spectrum	●	The Quest	48K	●			●				I5	Also runs on Dragon 32. 'Fighting adventure game'.
	£5.00	Spectrum	●	Star Trek	48K	●			●	●			I5	Also runs on Dragon 32 and Commodore Vic-20. 'Hunt down the Klingon in space'.
	£10.06	Tandy TRS-80 I	●	Mysterious Adventurer	16K	●			●				M6	Also runs on Tandy TRS-80 III, Genie I, II, Colour Genie and BBC B.
	£7.50	BBC Model B		Atlantis	32K	●			●				I4	'Guide submarine through caverns & destroy enemy'.
Arcade type	£9.99	Commodore Vic-20		Night Crawler	5K	●			●				R2	'A Centipede style game. Fast action, graphics and sound effects'.
	£5.50	Spectrum	●	Arcadia	16K	●			●				I6	Also on Commodore Vic-20. '12 levels of aliens attacking in different ways'.
	£4.00	Spectrum		Fozbee & the Hunny Suckers	48K	●			●				A10	Arcade game in 100% machine code.
	£5.95	Oric 1		Killer Caverns	16K	●			●				V1	'Involves running off with pieces of a ladder, hidden in the caverns'.
	£7.95	BBC Model B		Microbe	32K	●			●				V1	'Fast action game written in machine code'.
	£5.95	Spectrum		Quetzalcoatl	48K	●			●				V1	'Fast action game of strategy an skill involving small plane'.
	£6.95	Commodore 64		Falcon Patrol	48K	●			●		●		V1	'3-D maze game set on the high seas'.
Ballooning	£14.95	Atari 400	●	Up Up Away	16K	●			●				S13	Reviewed in *PCN* week ending April 29. Also on Atari 800. Available on disk.
Defender type	£9.99	Commodore Vic-20		Annihilator	3K	●			●		●		R2	'Based on Defender'.
	£6.95	Spectrum		Penetrator	48K	●			●				M8	'Two levels of difficulty difficulty'.
	£21.95	TI 99/4A		Parsec	16K			●	●				T5	'Increasingly difficult. After four onslaughts pass through to next stage'.
Flight Simulator	£22.80	Atari 400	●	Jumbo Jet Pilot	16K	●					●		T4	Also Atari 800. 'Ten difficulty levels. View through cockpit with flight instrumentation'.
	£7.95	Spectrum	●	Flight Simulation	48K	●			●				S10	Also on ZX81 (£5.95). 'Shows control panel & control view'.
	£17.20	Tandy TRS-80	●	Jumbo	16K	●			●				M6	Also on Genie I, II & BBC Model B. 'Simulation of piloting a Jumbo'.
Frogger type	£5.50	Commodore Vic-20		Wacky Waiters	3.5K	●			●				I6	'Waiter serving drinks in hotel. Has to hop from lift to lift'.
	£9.99	Commodore Vic-20		Hopper	3K	●			●		●		R2	'A version of Frogger'.
	£5.95	Spectrum		Horace Goes Ski-ing	16K	●			●				S10	'Sequel to Hungry Horace. He must cross busy road, fetch skis & ski down slope'.
Sport	£33.35	IBM PC		Decathlon	64K		●			●		●	I3	Needs colour graphics adaptor & direct colour monitor. 'For up to six players'.
	£29.99	Atari 400	●	Kick Back	8K			●			●		T4	Also available on Atari 800. Needs joystick to run. 'Beat the high score'.
	£19.55	Atari 400	●	Soccer	8K			●					T4	Also on Atari 800. 'Aerial view of field.' Reviewed 11.3.83.
	£7.50	Atari 400		Giant Slalom	16K	●						●	A11	Guide the skier down a giant slalom course via gates'.
	£7.95	Dragon 32		Golf	32K	●			●				S7	'For one or two players. Full handicapping system'.
	£3.75	Sinclair ZX81		Golf	16K	●			●		●		R3	'Similar to other golf games, in black and white'.
	£8.50	BBC Model B		Billiards	32K	●			●				H3	Available on disk. 'A game for all ages'.
	£5.99	Commodore 64		Hustler	48K	●			●				B6	Simulation of mini-pool game (PCN issue 33).
	£7.95	Dragon 32		Grand Prix	32K	●			●		●		S7	'For one or two players, features eight Grand Prix tracks & 10 levels of difficulty'.
Helicopter	£24.95	Commodore Vic-20	●	Chop Lifter	8K			●	●		●		A3	Also on Commodore 64. Needs joystick to run. 'Vic version of USA's best-seller'.
Jigsaw	£14.99	Atari 400	●	British Heritage Jigsaw Puzzle	8K	●							T4	Also on Atari 800. 'Educational game with selective difficulty'.
Science Fiction	£19.95	Apple II		Lunar Leeper	16K		●			●			S12	Reviewed in *PCN* week ending April 22.
	£5.95	BBC Model B	●	Invisible Man	32K	●			●				C9	Also on Commodore Vic-20. 'Aim is to shoot man who keeps disappearing'.
Space	£9.95	Dragon 32		Dragon Trek	32K	●			●		●		S7	'A version of Star Trek with ten levels of difficulty'.
	£5.95	Spectrum		Android Run	16K	●			●		●		A6	'Control android to shoot walls, kill mutants & reach central complex'.
	£7.50	Atari 400		Space Attack	16K	●					●		A11	'Consists of a battle in a black hole'.
	£5.50	Spectrum		Schizoids	16K	●			●				I6	'Space bull-dozer nudges shapes into black hole'.
	£5.95	Spectrum		Starship Enterprise	48K	●			●				S9	'Based on the classic Star Trek. Includes arcade action'.
	£4.95	Spectrum	●	Star Trek	48K	●			●				R3	Also on ZX81 (£3.95). 'One player, sound & full colour graphics strategy game'.
	£7.99	BBC Model B		Swoop	32K	●			●				M7	'Written in machine code with full colour & high resolution graphics'.
	£7.50	BBC Model B		Model B Invaders	32K	●			●				I4	'A Space Invaders game with high resolution & colour graphics'.
Strategy	£7.95	Dragon 32		Wizard War	32K	●			●				S7	Reviewed in *PCN* week ending April 8.
	£4.00	Spectrum		Advance to Mayfair	48K	●			●				A10	Play against your Spectrum. Supports printer.

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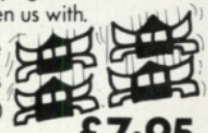

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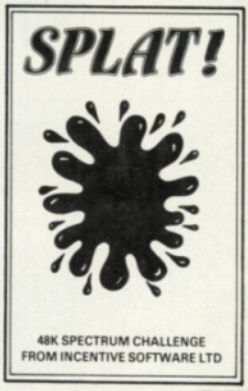

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UTILITIES

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
Basic Upgrader	74.75	Commodore 64	●	VicTree	64K	●			●				S5	Also Commodore Vic-20. Also on floppy (£92.00). Adds 50 commands to Basic.
Card Index System	£215.05	Apple II	●	VisiDex	48K		●			●		●	R1	Also on IBM PC. Needs printer. One record/screen designed for cross-referencing.
	£178.25	CP/M	●	Cardbox	48K		●		●	●		●	C6	Also on MS-DOS. Needs 24×80 VDU & 100K disk storage.
Communications	£102.35	Apple II		ASCII Express — The Professional	48K		●		●	●		●	P4	Needs RS232. Asynchronous serial communications package.
	£149.50	Apple II	●	Terminal Utilities	48K		●		●	●			C1	Also on Apple IIE. Converts Apple II to intelligent terminal. Speeds of up to 9600 BPS.
	£57.50	CP/M		Xcopy 1.0	64K		●		●	●			X1	Disk copy utility for Cromemco machines. Copies 8" or 5¼" single/double sided.
	£575	CP/M	●	Bisync AC-3780	64K		●		●	●			E1	Also on MP/M & CP/M86. Micro to mainframe comms through IBM terminal emulation.
	£117.30	IBM PC		IBM 3101 Emulation Program	64K		●			●			I3	Makes PC act as 3101 terminal provides 3270 emulations when connected to host.
	£22.43	Sharp MZ80A	●	Zen	48K	●			●				K1	Also MZ80K & B. Full Z80 editor/assembler.
	£115.00	IBM PC	●	Interlink	48K		●			●			T2	Also on Sirius, Apple II, Xerox, Osborne etc. Connects processors for downloading.
Database	£132.25	Apple II		DB Master	48K		●		●	●			M5	Available on hard disk. Allows 1K records over 100 fields. Report generation, etc.
	£29.32	Newbrain		Database 40/5	30K	●			●				E2	Also on the Memotech.
	£99.95	Commodore 64		Magpie	64K			●	●	●		●	A3	User-programmable database manager.
	£39.95	Commodore 64	●	Home Filewriter	64K		●			●			D7	Also for Atari. Database design system.
	£9.95	Spectrum		Data Genie	48K	●			●				A3	User programmable home database.
	£96.60	Apple III	●	PFS: File	48K		●			●			P6	Also for Apple II (£135.70). Used in tandem with PFS (£96.60).
	£217.35	Apple IIE		VisiTrend + VisiPlot	64K		●		●	●			R6	Also for CP/M. Graphic representation of data. Compatible with VisiCalc.
	£10.30	BBC Model B		Filer	16K	●			●				M7	Allows searching, sorting, saving & recovery of data.
	£295.00	CP/M	●	InfoStar	48K		●			●			M10	Also on IBM PC, MS-DOS. Integrates with WordStar and Calcstar.
	£499.74	CP/M		dBase II	48K		●		●	●			E1	Micro DBMS. Can be used for high level programming for a range of applications.
	£557.50	CP/M		Superfile	56K		●		●	●			S4	Multi-file database giving application package information.
	£1,840	CP/M	●	MDBS II	64K		●						T2	Also on CP/M-86, MS-DOS, Turbo DOS, Unix and Xenix. Mainframe-like facilities.
	£569.25	Commodore 8000		The Administrator	32K		●		●	●			S11	Applications generator. No programming involved.
	£68.42	Newbrain		Invoice & Credit Program	32K	●			●				E2	The invoice program allows you to put in your own information and design invoice.
	£29.32	Newbrain		Database 40/S	32K	●			●				E2	Information gatherer, stores large quantity of information & can be interrogated at will.
	£684.25	Sirius, IBM PC, MS DOS	●	Tomorrow's Office	128K		●		●	●			S11	Complete applications generator.
Debugger	£258.75	CP/M	●	Animator	64K		●		●	●			M11	Also on Unix & MS100S, interactive source level debugging tool for CIS-Cobol.
File Transfer	£132.25	CP/M		BSTAM	16K		●		●	●		●	X1	Needs common interface ports or modem access. Utility for transfering CP/M files.
Graphics	£34.50	Apple II	●	Graphic Utilities	48K		●		●	●			C1	Also for Apple IIe. Parameter driven machine code programs' high res graphics.
	£24.95	Atari		Constructor	48K		●		●	●	●		C8	Less experienced & new programmers can design animated sequences.
	£9.95	BBC Model A	●	Creative Graphics	16K	●			●				W1	Also for BBC model B.30 programs on cassette produce range of pictures & patterns.
	£24.95	BBC Model B		EDG Graphics Package	32K	●			●				S7	Computer aided design package. Reviewed 11.3.83.
	£50.60	CP/M		CP/M Graphics	64K		●			●			D4	Range goes up to £421.70 & conforms to GKS Graphics Standard.
Home Expenses	£28.75	Newbrain		Home Expenses 40/6	30K	●			●				E2	Also on the Memotech.
Language	£488.75	CP/M	●	CIS Cobol	64K		●		●	●			M11	Also on Unix. Compact, interactive ANSI 74 standard implementation of Cobol.
	£1,109.75	CP/M	●	Level II Cobol	96K		●		●	●			M11	Also on Unix & MS-DOS. High level ANSI 74. Compiler, mainframe-compat code.
	£396.00	CP/M		Fortran 80	48K		●			●			T2	Useful for scientific applications, where Pascal is inefficient.
	£285.20	CP/M	●	Pascal — MT+	64K		●			●			X1	ANSI standard Pascal for Z80 processors. Also on CP/M 86 (£484-90).
	£210	CP/M	●	Supersoft C Compiler	48K		●		●	●			M4	Also on CP/M-86, MS/DOS, PC. DOS. Fast implementation of C.
	£114.43	Commodore 64	●	DTL-Basic Compiler	32K		●		●				D1	Also on Commodore 8000, 4000 & 3000. Also tape version on CBM 64 (£39.96).
	£253.00	CP/M	●	ProPascal	56K		●		●	●			E1	Also on CDOS. Needs two disk drives. Native code Pascal.
	£40.19	Sharp MZ80A	●	Forth	48K	●			●				K1	Also on MZ80K & Osborne. Allows implementation of Forth.
	£25	Spectrum		Hisoft Pascal	48K	●							H5	Reviewed in *PCN* week ending April 8. Pascal compiler and screen editor.
	£421.70	Any 8 or 16 bit machine		PL/1	48K		●			●			D4	A compact implementation based on ANSI standard general purpose subset of PL/1.
	£172.50	UCSD p-System		UCSD Pascal	48K		●		●	●			D4	Portable Pascal for systems development or commercial applications.
	£201.25	CP/M		Basic 80	48K		●		●	●			X1	Industry standard Basic.
	£235.70	CP/M		Basic Compiler	48K		●		●	●			X1	Companion to Basic 80. Allows programs to run faster.
	£121.90	CP/M	●	C Basic	64K		●			●			X1	Commercial Basic. Also on CP/M86 (£265.65).
	£213.00	Any Z80		X-Basic	48K		●			●			X1	Built-in matrix functions. Supports MP/M record locking. Graphics option.

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	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Hardware Required: Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
Operations	£59.80	CP/M		Operating Guide	48K		●		●	●			E1	Works by putting CP/M to sleep & replacing it with operating environment.
Operating system	£22.94	Apple II		Fasdos	48K	●			●				P4	Disk operating system for Apples which speeds up location of binary & Applesoft files.
	£277	8086 micro		Concurrent CP/M-86	48K		●			●			T2	Enables four separate tasks to run in a single user station.
	£126.50	8080 and Z80 micros		CP/M 2.2	64K		●			●			D4	O/S for 8-bit micros with over 1.5 million users.
	£379.50	8080 and Z80 micros		MP/M	64K		●			●			D4	Multiuser, multitasking. Features record & file locking, date & time stamping etc.
	£210.80	8086 and 8088 micros		CP/M-86	64K		●			●			D4	Manages up to one megabyte of RAM & allows up to 128 megabytes of on-line storage.
	£548.20	8086 and 8088 micros		MP/M-86	64K		●			●			D4	Multi-user. Multi-tasking. Multi-user capability with multi-programming for each user.
	£168.70	8080, Z80, 8086 and 8088 micros		CP/Net	64K		●			●			D4	A CP/M compatible O/S designed to access local & networked resources.
	£295.20	Motorola MC68000		CP/M 68K	64K		●			●			D4	Extends CP/M to Motorola MC6800 microprocessors. Single user, single tasking.
Program Generator	£228.85	Apple II	●	Quickcode	64K		●		●	●			P4	Also on IBM PC. Program generator for dBase II.
	£126.50	CP/M	●	Forms-2	64K		●		●	●			M11	Also for Unix & MS-DOS. Programming tool, for generating Cobol code.
	£379.50	CP/M	●	Last One	64K		●		●	●			S3	Also on MS-DOS and Apple DOS.
Programming Tool	£2,500	Apple II	●	Pascal Isam/Pascal Form	48K		●		●	●			A4	Also on IBM PC & Corvus Concept. Needs Corvus hard disk. Pascal prog tool.
	£18	Apple DOS		MUM	48K		●		●	●			H8	Macro Utilities Master is a business programming aid.
	£287.50	CP/M	●	Fileshare	48K		●		●	●			M11	Also on MP/M. Bank-switched memory or CP/M network.
	£7.95	Dragon 32		Dragon Selection 2	32K	●							D3	Four utility programs which can be listed to see how the program works.
	£4.00	Sharp MZ80A	●	Tape Copier	48K	●			●				D6	Back-up copier for BASIC and machine code.
Telex	£2,113.70	Superbrain	●	Micro Telex	64K		●		●	●			E1	Also on Televideo 802. Enables automatic sending-receiving or telex by micro.
Testing Tool	£95.82	CP/M 80	●	Diagnostics II	32K		●		●	●			M4	Also on CP/M-86 and MS/DOS. Tests systems.
Time Recording	£862.50	Commodore 8000	●	Minuteman	32K		●			●			C4	Also on Commodore 4000. Time recording system. Can produce range or reports.
	£402.50	CP/M-86	●	Time Recording System	64K		●		●	●			D2	Also on CP/M 80. Control over man/hour expenditure by job or account number.
HOME														
Clubs and Sports	£78.00	Sharp MZ80A		Clubman	48K	●			●				S8	Golf handicapping and competition results system complying with 1983 regulations.
	£575.00	Apple II	●	Tabs Golf Package	48K		●		●	●			T3	Alsom on MS/DOS (64K). Maintains members handicaps including 1983 regulations.
	£28.18	Epson HX20	●	Horse Race Forecast	48K	●			●				K1	Also on Newbrain and Sharp. A punters aid to betting.
	£28.69	Sharp MZ80A	●	Navex	48K	●			●				K1	Also on MZ80K. Simulations of navigating a yacht on the English Channel.
Diary	£9.95	BBC Model A	●	Desk Diary	16K	●			●				W1	Also on BBC Model B. Consists of address book & diary planner (plus instructions).
Home budget	£19.99	Atari 400	●	Home Financial Management	8K	●						●	T4	Also on Atari 800. Needs Atari Basic cartridge. Aids money management.
	£19.95	Epson HX20	●	Home Budget	16K	●			●				K1	Also on Sharp, MZ80 & Osborne. Keeps records of home finances with graphics.
	£14.95	Sharp MZ80A	●	Sam Analysis	3K	●			●				S8	Designed for balancing home debits & credits.
Music composition	£24.99	Commodore Vic-20		Vic Music Composer	8K			●					T4	Aids to aspiring composer. Also for entertainment and education.
	£5.75	Spectrum		Music Maker	48K	●			●				B5	Teaches musical notation, aids composition.
Various	£4.95	Spectrum		ZX Text	16K	●			●				S14	900-page colour teletext simulation with 24-hour clock etc.
	£12.95	Commodore Vic-20		Home Office	5K	●			●				A3	Comprises VicPro (word processor) & VicData (A database program).

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K1 Kuma Computers, 07357 4335, **K2** Kansas City Systems, Chesterfield 850357 **K3** Knights, Aberdeen 630526 **K4** Keen Computers, Nottingham 412777 **K5** Kobra Micro Marketing, Henley-on-Thames 2512
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T2 Tamsys, Windsor 56747 **T3** Tabs, Andover 5893 **T4** Thorn EMI, 01-836 2444 **T5** Texas Instruments, Bedford 63211
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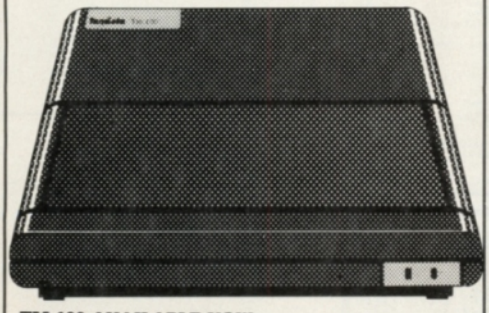

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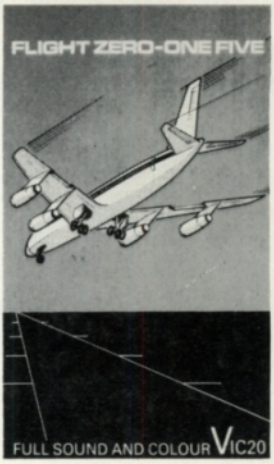

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On the dot

Graphics seem to get more advanced with every passing month. As the prices fall the levels of sophistication rise.

The Dyad Chroma 1 system is pretty expensive by micro standards, but a recent upgrade is worth noting. Among other improvements you can now have 16 million, yes, 16 million, colours on screen using 24 bits per pixel. This luxury sets you back £3,800 on top of the £1,395 you pay for the basic system.

But you can't have them all on screen at the same time — monitor technology, with a mere 368,640 dots, is lagging sadly behind.

SYNTAX ERRORS

Unix umbrage

Multimedia Editions, a Unix training and support specialist, has pointed out that Unix was developed on a Digital Equipment mini, not a 68000 system as we foolishly declared in Monitor, Issue 44.

Program prices

In Vol 13 Micropaedia — the Christmas Software Buyer's Guide — there were a few mix-ups.

For example, the Up, Up and Away program for the Atari is no longer distributed by Pulsar Software and no longer costs £21.95. It is now distributed by a company called Starcade and costs just £14.95.

Meanwhile, the Scramble program for the Commodore 64 got wrongly credited to Supersoft of Harrow — when it actually came from Terminal Software at £9.95.

Newbrain situation

What can we tell you — last week's Newbrain correction was very nearly right, and we reckon one more go should see us through. But before we start, we'll do it in prose. Between the up arrow and the reverse inverted comma there should be one character — an underline. So it should read:

Sr$(z)="HXYZ[\]`_'a0B5C"

Words cannot express our regret at the way this ongoing situation has been going on.

NEXT WEEK

Macintosh *Apple's new star exclusively charted in PCN.*

Memo *A guide to programming on the new Memotech systems.*

Brother *The EP44 printer from Brother.*

Modems *This week's pull-out features Modulator/Demodulators, cornerstones of networks.*

Games *Spectrum, BBC and Commodore 64.*

Copy right

The new year brings another winner in the intermittent but still Great PCN Gibberish-Spotting competition. James Woods of Leeds earns the £5 prize for noticing this gem. 'A cheap copy, perhaps?' he comments.

XEROX 81 Computer with 16K Rampack, used once only, unwanted gift. £45 o.n.o. Tel: 554748 or 733382.

PCN DATELINES

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

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

UK EVENTS

Event	Dates	Venue	Organisers
Which Computer? Show	January 17-20	NEC, Birmingham	Clapp & Poliak Europe Ltd., 01-747 3131
Northern Home Entertainment Show	January 19-22	Excelsior Hotel, Manchester Airport	Stamley Wire Advertising Ltd., 01-253 6637
Acorn Education Exhibition	January 25-27	Central Hall, Westminster	Computer Marketplace (Exhibitions) Ltd, 01-930 1612
Peripherals Suppliers	January 31-February 2	Cunard International	Reed Exhibitions, 01-643 8040
Communications & Computer Systems Fair — CABLES	February 2-4	Pontin's, Prestatyn, Wales	Pontin's Ltd., 07456 2267
London Home Computer Show	February 3-5	Royal Horticultural Society's Old Hall, Westminster, SW1	Andy Jones, 0562 751126
10th ZX Microfair	February 4	Alexandra Palace, N22	Mike Johnstone, 801 9172
The Apricot & Sirius Show	February 7-9	Kensington & Chelsea Town Hall	Dennis Jarrett, 241 2448
Taunton YMCA Computer Exhibition	February 11	Taunton YMCA, Somerset	P. Wojeik, 0823 74667
LET '84	February 13-15	Heathrow Penta Hotel	Anthony Farrar, 0923 774262
International Home Computers, Video Games & Software Exhibition	February 13-15	Heathrow Penta	Wheatland Journals Ltd., 0923 774262
Information Technology & Office Automation Exhibition and Conference	February 21-24	Barbican Centre, London EC1	B.E.D. Exhibitions Ltd., 01-647 1001
OEM Only Conference	March 7	Hilton Hotel, London W1	Tom Lewis, 01-994 6477
Computer Trade Show	March 13-15	Wembley Conference Centre, Middlesex	Reed Exhibitions, 01-643 8040

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
National Software Show (East)	February 3-5	Miami Beach, Florida, USA	Raging Bull, USA, 0101 415 459063
Personal Business Computer Show	February 29-March 3	Hong Kong	Overseas Exhibition Services Ltd., 01-486 1951
Personal Computer Show	March 14-17	Sydney, Australia	ECL Ltd, 01-486 1951
International Business Equipment & Computer Show	March 13-17	Singapore	International Business Centre Co. Ltd., 8F Hosoi Building, 15-7, 5-chome Honmachi, Higashi-ku, Osaka, Japan

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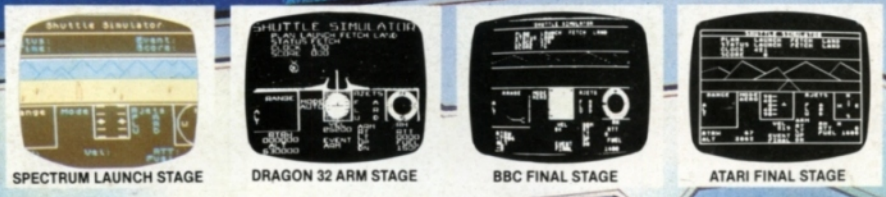

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