PERSONAL
weekly
COMPUTER
NEWS
50p April 21, 1984 No 58
BRITAIN'S BIGGEST WEEKLY

MICRODRIVING
Trouble-free tape transfer

64 EXTENDED
Choose a better Basic

SPRITELY DRAGON
A peripheral for souped-up display

SOFT OPTIONS
New products for Spectrum, BBC & Apple



HEY PRESTO! It's Rabbit's new micro!

GAMES SPECIAL: Reviews for Commodore 64, BBC and Spectrum

THE NAME IN VIDEO GAMES

Visions

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

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





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DEMOLATOR — BBC — MODEL 'B' 051-2. £8.95

(FOR A LIMITED PERIOD)

MENU

April 21, 1984 No 58



Cover photo: Howard Kingsnorth

REGULARS

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Put your tape programs onto Microdrives the easy way with Gavin Monk's routines.


```
1 REM ********************
2 REM *Cassette Tape Head*
3 REM *      Reader      *
4 REM *CoPyright  G.B.Monk*
5 REM ********************
6 CLEAR 31999: REM Lower RamTop
```

Cover story

Rabbit run 20
It looks like an IBM keyboard, claims Coleco compatibility and promises CP/M. This new micro of mixed parentage comes under the scrutiny of Kenn Garroch.

MICROPAEDIA

Pull out and keep

Games galore
Looking for a good game for your micro? In the first of a two-part Micropaedia we round up a bunch of software for the Spectrum, Commodore 64 and the BBC and pick out the ones worth your hard-earned cash.



PRO-TEST SOFTWARE

Graphical Apple 38
PCN looks at Pixit, a graphics toolkit for the Apple II that claims to take the hard work out of high-resolution.



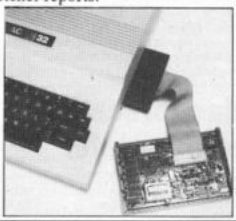
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PRO-TEST PERIPHERALS

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PROGRAMS

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C-File gives you a comprehensive database program.



Enter Amstrad



Amstrad's CPC 464 — stacking up against home micro rivals.

Look out Sinclair, Acorn and all the rest. Amstrad is coming.

Better known for its hi-fi units, this British electronics company is about to wade into the home computer scene with a micro that looks very strong on paper. Amstrad's CPC464 will appear in the shops in June. It will offer a Z80A, 64K of RAM, typewriter keyboard (including cursor cluster and numeric keypad), integral cassette drive and monochrome monitor for £229.

Opt for a colour monitor instead of a green display and the price is £329 all-in. Add on a 180K 3in microfloppy, CP/M and Digital Research's Logo language and you can have the monochrome system for £429 and the colour system for £529. The systems will be available from Dixons, Comet and Rumbelows as well as mail-order companies.

The only catch in the Amstrad deals is that it will not be offering a monochrome to colour upgrade. If you think you will eventually want a colour monitor it will be cheaper in the long run to buy the colour system at the outset. The alternative is to pay at least £200 for someone else's RGB monitor.

Three screen resolutions are available: 160 by 200 pixels and 20 column text in 16 colours from a choice of 27; 320 by 200 pixels and 40 column text in four colours; and 640 by 200 pixels and 80 columns in 2 colours.

Sound is provided by an AY-3-8912 giving three voices and seven octaves with white noise and stereo effects possible through external speakers. External connections include joystick, Centronics parallel printer and expansion port for disk drives and other devices.

Amstrad has opted for the Hitachi microfloppy format giving the benefit of low cost and the disadvantage of low capacity and the need to flip over the disks to use the second side. Another potential limitation is that only 42K memory is available under CP/M, limiting the software that will run on the CPC 464.

At the launch, Amstrad had Wordstar running adequately, if slowly. Some users may find the slow screen speed and scrolling of the 464 uneasy on the eyes.

On the software side, the micro is available with an extended version of Basic that includes unusual TIME, AFTER and EVERY commands to make use of Z80 interrupts and build elapsed time features into programmes. As an alternative to Basic, Amstrad will be offering Pascal.

The company said that by the time the machine is delivered there should be 50 games programs available together with utilities.

Something old, something new

One new style of game emerged last week but another is going to be late.

Psytron is for the Spectrum and could be dominating the charts in short order. The game combines the styles of arcade and strategy games. The publisher, Beyond, is offering a QL to anyone who can last an hour at level six.

A novel feature of the game is that, as you play and improve, you save your 'Service Record' on to tape, which can be used to prove your progress. By clever windowing, each level includes games at previous levels.

Lords of Midnight was to have been released at the same time, but final coding is still being done.

Oric disk here

Oric's long awaited Microdisc (Issue 57) has finally been released in the UK. The drive, which costs £270, matches the Atmos, but is claimed to be Oric-compatible too.

A red plastic triangular stand comes with it, giving the whole thing the appearance of a doodlebug launcher, although this can be detached.

Oric also provides a master disk (containing the DOS), a separate power supply unit and a manual with the drive. Like Oric's computers it is guaranteed for one year.

Rumbelows was expecting deliveries of the Microdisc as *PCN* went to press, although WH Smith, Dixons and Laskys were not sure when (or if) they would be getting the drives in stock.

■ *PCN* will be testing the Microdisc in a forthcoming issue.

Mac forecasts brighter later

Apple has delayed the first deliveries of its new Macintosh computer until the beginning of June.

The company had originally planned to start delivering UK specification machines to dealers in April, but now says that it's had problems getting hold of 220 volt UK power supplies. An Apple spokesman said the problem has been compounded by US demand.

'They're selling as many as they can make in the States,' said an Apple spokesman.

The Mac shortage may appear less dire than it actually is because Apple UK has imported large numbers of US machines and stuck external power supply converters on them in order to use them in Apple showrooms. But UK dealers can only show, not sell, the US specification machines.

The Apple spokesman said, however, that the delay in delivering UK specification Macintoshes will give UK software houses time to convert their packages for the Mac.

Print quartet

Epson has added four new printers to its range — two thermal portables, a four-pen printer/plotter, and a colour dot-matrix printer.

The portables are the P-40 and the P-80, using 4.5 and 9in paper respectively. Both use thermal transfer ribbon, enabling you to use normal paper (rather than the glossy thermal variety), and will run with rechargeable batteries. The P-80 uses a very fine print head, giving near letter quality, and will cost about £160.

The P-40 is expected to cost £95, and should be available shortly — the P-80 will not be available until September.

The HI-80 printer/plotter will cost about £400, has four pens and will take almost any kind of paper, including transparencies. It should be available by the summer. The colour dot-matrix printer (JX-80) is similar in concept to Seikosha's GP700A and uses a multicoloured ribbon to give you seven colours. It costs £560.

Chip shortage hits BBC

BBC users wanting to upgrade to disk systems could find their choice restricted by the dearth of the 8271 disk controller.

Intel, manufacturer of the 8271, said that it was selling all the chips it could make, and that most of these were going to Acorn. Acorn refused to comment on the situation.

Independent manufacturers of disk operating systems for the BBC have had trouble getting the 8271 for over a year, but the situation has deteriorated over the last few months. A spokesman for Pace, supplier of the Amcom system, said that the price it was having to pay had more than doubled, and that Amcom was now getting the chips from wherever it could find them. He went on to say that if the situation continued price increases would be inevitable.

Watford Electronics is also having problems getting the chip, and is currently only supplying the disk operating system to people buying a system complete with attached disk drives.

Intel has kept the price of the 8271 constant for the last three months at £39.50 each for lots of 100 and £25 each for lots of 10,000, but the price is expected to rise in the near future.

Apple takeaway



BITER BIT? — Is Apple Computer, the scourge of imitators around the world, about to launch an Excalibur-compatible micro? The Excalibur, pictured above, is a portable Apple built (with Apple's encouragement and permission) by a UK systems house.

Apple Corp, loath to let go of what could be the most successful micro of all time in the Apple II, is about to produce a portable CMOS version.

The Apple II is still a viable product even at this late stage because of all the software available.

Being based around the creaky old 6502 and an architecture requiring lots of chips, it's now just beginning to become a problem producing Apples at the right price. Although the II did remarkably well during the last sales boom before Christmas, there is no guarantee that this privileged position will last forever. The new version, called the Apple IIC, apparently gets around the problem by using much more circuitry on less silicon but does the same thing the Apple II does — it runs Apple DOS, but runs it and its programs faster, in a much smaller package.

Apple is being mysterious about the product but is holding a press conference in the UK on April 24 — putting II and II together probably makes C. Watch this space.

CBM task force

Ralph Bancroft reports from the Hannover Fair

Three home micros, three business machines, two printers and software were among the new products announced by Commodore at the Hannover Fair.

Heading the list was the expected 264 home micro with 64K memory and Magic Desk software. Not so expected was a 16K machine in this series called the 116 and a functionally similar machine in a Commodore 64-styled box called the C16.

There was also an early showing of the IBM-compatible Commodore PC looking just like the Bytec Hyperion — not surprising since that is just what it is.

Some of the games playing features of the 64 have been omitted from the 264. For example, there is no sprite facility and the sound capability is limited to two voices and a noise generator.

Plus points are 128 colours on screen (actually 16 colours at eight levels of intensity) and 60K of RAM available for Basic programs. The Basic included in the 32K system ROM is a new version, Basic 3.5.

The application being demonstrated at the show was the Magic Desk. This is a catch-all program for typing, filing, giving the time and making calculations.

The computer emulation of a typewriter even goes to the extraordinary extent of giving typewriter-like sound effects.

The C16 and 116 are intended to be the new babies of the Commodore family — at a baby price. The only difference between them is the styling of the housing.

Inside is 32K of system ROM and 16K of RAM. The screen display is as for the 264 but sound is limited to a one voice/one noise generator. Basic 3.5 is the supplied language.

The 116 could sell for under £100 and provide strong competition for the 16K Spectrum.

In the business field, Commodore is also going for a highly competitive profile.

The most remarkable of the product announcements is the Commodore PC. It's the first time Commodore has stepped outside the company for a new product and new chip. The design has been licensed from Bytec and Commodore is buying in the all-important 8088 chip from Intel.

A Commodore-compatible machine is the 8296. Designed as a big brother to the 8032/8096 it comes with 128K of RAM and Basic 4.0.

A new member of the 700 series also made an appearance on the Commodore stand. The 720D is a dual disk version that adds 2Mb of online storage to 256K of main memory of this now-you-see-it, now-you-don't machine.

Undoubtedly, the daddy of the Commodore family is the newly announced Z8000. Running on the Z8000 16-bit chip it comes with 256K of user RAM, 128K of screen RAM, monochrome 1024 by 1024 resolution display and a Unix 7-derived operating system called COHOS.

The standard version can support two users.

Dual 1Mb disk drives come as standard with a 10Mb hard disk available as an option.

The two new printers are an 18 cps daisywheel and a 50 cps seven-colour dot matrix.

Compatibility browned off

The most depressing feature of the show was the proliferation of so-called IBM PC compatibles. No matter where you turned a manufacturer had felt obliged to turn out a micro to nibble at the heels of IBM.

One company that took a refreshingly different approach to compatibility was Micro Craft. Squatting on the edge of the Shugart stand it demonstrated a machine not only compatible with the IBM PC but also the Apple II, TRS-80 and virtually any CP/M machine you could care to mention.

Not for Micro Craft the boring 8088/128K concoction that the others offered. The Dimension is based on a 68000 processor, capable of addressing the full 16Mb of RAM and comes with six expansion slots inside its box. To emulate, say, an Apple II, you plug in an expansion board containing a 6502, 64K of RAM and one or two other bits of circuitry and away you go.

Unfortunately, it will be some time before the Dimension appears in the UK. Micro Craft has yet to sign any distributor agreements.

Epson on the second lap

Epson, first in the field with the HX-20, is set to up the stakes in the battle of the lap-held micros.

Pride of place on the Epson stand at the Fair was taken by the PX-8 portable which features an 80 by eight character screen, 64K of RAM, optional 60K and 120K battery-backed-up RAM packs, optional battery-powered microfloppies and the ability to run CP/M software.

There can be no doubt that it beats rival machines such as the NEC 8201A and Tandy Model 100.

The micro comes in its own lightweight, A4-size case. Removing the lid at the front reveals the keyboard, and the rear lid holds the LCD above a microcassette drive.

Standard interfaces include RS232, 38.4K baud serial port for attaching disk drives, bar-code reader, analog input and 8-bit system bus.

The built-in nickel-cadmum batteries last between 10 and 20 hours dependent on use. A sleep function conserves power by switching off the screen display if a set time elapses without a key being depressed.

Memory expansion comes in two forms. Two sockets on the main board allow you to plug in EPROMs or ROMs containing applications programs. Alternatively, you can add on a RAM pack.

These packs contain their own battery power to protect data after the machine is switched off and they plug in underneath the machine. The packs tilt the keyboard to a more suitable typing angle.

The RAM packs can also be configured as RAM disks so down loading software and running the machine as a completely portable CP/M micro is possible.

To complement the PX-8, Epson was also showing a compatible printer and microdrives. The latter use the Sony 3½in format with a 360K capacity and the unique ability to run off batteries.



Epson PX-8 — a portable pioneer for number one spot again.

Unlike the other lap-helds the PX-8 does not come with bundled software.

Epson plans to release the PX-8 in June. It will cost under £1,000.

Hannover 1984

MSX makers hang fire



Hitachi's MSX-compatible ¥1 — no UK shipments before autumn?

MSX is coming, but not quite yet. That appears to be the message from Hannover.

Hitachi, among others, used the show to give a preview of its MSX offerings. But the whisper is that MSX will not arrive in Europe until the autumn.

Perhaps the only good piece of news is that the micros will appear in the UK first.

The Japanese reticence is somewhat surprising since the longer they delay the more difficult it will be to make an impact for Christmas.

It has been suggested that the MSX consortium has agreed that no one manufacturer will start shipping into Europe until they are all ready.

It certainly seemed that some kind of pact had been agreed. No matter which company you talked to at the fair the reply was roughly the same: 'No, we can't tell you when our MSX machine will be available. Possibly the autumn, even September.'

The generally held view is that, while the specifications of the MSX standard are nothing special, the superior marketing expertise of the Japanese companies will ensure that everyone else is in for a tough time.

Juki plugs gap

A healthy sprinkling of new printer products indicated a closing of the price/performance gap.

The Juki 6300 runs at an average 32 cps, offers proportional spacing, has a 3K buffer and supports Diablo protocols and printwheels. The target retail price is below $1,000 (which means below £1,000 on arrival in the UK).

The Brother HR-35 also offers proportional spacing and prints at the slightly faster 36 cps. It also scores over the Juki with a 7K buffer and the ability to print in two colours (providing they are black and red).

VIEW FROM JAPAN



MSX holds out promise of silver lining

By Serge Powell

From Japan, the US lies to the East. The western block is China. In Japan, it goes without saying, you get a different perspective.

You will have noticed the current preoccupation with MSX, an attempt to produce a standard home micro. It isn't a Japanese invention but so far most of the active interest had been generated among Japanese firms. Their products will perhaps have flitted before your eyes in the pages of this (Issue 50) and other papers; Yamaha the music specialist, secretarial Sony, Matsushita with its strange cursor control keys, and the others.

This isn't another column about MSX hardware. It's about where the home computer of the future is coming from and what you'll be able to do with it.

The current vogue for MSX, you see, runs against the microcomputing current. In the UK Sinclair, Dragon, Oric, Camputers, old uncle Tom Cobbley and all are moving towards business systems. In the US they're all so panic-stricken about IBM that they're hurtling lemming-like into IBM compatibility and hence business systems. Even Atari has a good, solid, respectable business machine, the 1450XL, in its line, and the Commodore PC is good for a hearty laugh.

In Japan, by contrast, the MSX standard has proved to be a magnetic rallying point. The irony is that MSX machines shelter the business micro's best friend, the Z80.

Let's not bother to coin new phrases when perfectly adequate ones exist already: every cloud has a sliver lining. But it was in a less than euphoric state that I wandered into my local computer superstore to see what the perpetrators of MSX Basic had come up with in the way of software.

I ought to declare an interest — or, to be strictly accurate, a lack of interest. I don't like computer games, with one major exception which I suppose puts me somewhat on a plane with an athesist who carries a rabbit's food. As far as I'm concerned there are plenty of adventures and action to be found in working out documentation.

So . . . pretending to be interested I asked the shop assistant for a catalogue. Assuming you're interested, I've enlisted the aid of my wife and what follows are translated highlights of said catalogue. What follows them is the sliver lining.

For the sporty there are Golf Game, 3D Tennis, Blackjack/Poker and MSX Derby. For the cerebral we find Majong, Shogi (a combination of chess and checkers), and at a pinch, Nyorolas — this is a snake game, nyoro-nyoro being the Japanese for how a snake moves. Incorrigible head-bangers will appreciate Marine Battle, Gangmaster, Star Command, Nandarona (cosmic traveller), Chopper, Fireball and many more.

On the educational front there are Yogimo Ego (English for infants), Ke-san ryoku (a maths test/game for seven year olds), Home Study for three year olds, and the Perfect Lesson series. If your educational disadvantages are more specific there is Canconsosai, which teaches etiquette at weedings, funderals, and similar events.

But it isn't all beer and skittles. Otemba bekino daiboken is an adventure search, and in Chutar the quest is for diamonds.

The catalogue also includes more advanced offerings: flatten southern England as commander of the Luftwaffe, master Basic in 24 hours, and so on but I'm sure you have the picture.

Now for the silver lining. The computer superstore had a display of the Macintosh. I'd seen pictures of it, read about it, and been unable to make up my mind whether or not to be impressed by it. I'm impressed — or more properly, depressed, because I want it, can't afford it, can't believe it, and don't think it's fair.

US and UK writers get to play with and write about a micro that is ahead of its time. I get to write about an attempt at compatibility that's undeniably overdue but based on a technology that is behind the times. And yet, it may be that an MSX machine will be the last bastion of the home computer.

Comms eased but at a price

By Ralph Bancroft

Following a barrage of criticism (Issue 52) the Government has announced a quicker approval procedure for modems and other attachments to the telephone system.

But micro owners moving into communications will find the new arrangements won't work entirely in their favour. There may be wider choice but costs could go up.

The cornerstone of the new scheme, which started last week, is the granting of interim approval so that a company can start to sell equipment in advance of full approval.

A modem will only have to pass a basic safety test before its use is legal.

But the manufacturer will have to take out insurance to protect users against financial loss if the modem fails to get full approval. It will also have to give an undertaking to modify any installed modem if changes are required to comply with existing standards. Both these changes could add to costs.

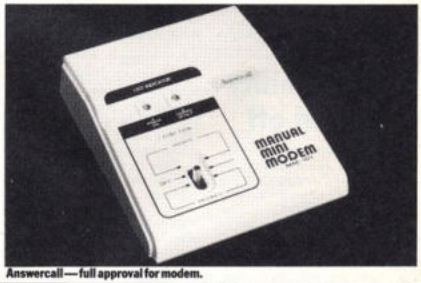
Possibly, some small companies will find the added costs too much and delay the release of new products until full approval is obtained.

Nevertheless, many manufacturers may take advantage of the short cut procedure.

In the longer term it is clear that the Government favours a reduction in the red tape.

The result should be simpler standards that are easy to comply with and which will cut down the costs and delays inherent in the current arrangements.

■ One company which has managed to obtain full approval is Answercall (better known for its answering machines). It has announced a 300/300 baud full duplex modem that will sell for £75 including VAT. It should be in the shops by the middle of next month.



Answercall — full approval for modem.

First opens for business...

A new door opened to high street business micro buyers last week as the First Computer chain pushed the boat out.

First Computer's first store opened on London's Piccadilly; others will follow in the capital and in Slough. Seven shops around the country are due to open in in the next seven weeks and the number will build up to 12 or 13 by the end of the year.

The stores will stock IBM PCs (the first had an impressive number on display, given the shortage of machines), Hewlett-Packard 150s, and Compaq and Apricots in both floppy and hard disk versions. Each store will also have training and maintenance facilities on the premises.

The company's chief executive is Cyril Spencer, former chairman of the Burton group.

. . . as Interface does battle

A new national chain of computer shops was launched last week.

Interface Network opened its first shop last week in Kingston-on-Thames and has plans to open further shops in London and most major provincial towns. The next shop, in Baker Street in London, is due to open in June.

Interface will be selling DEC, Compaq, IBM, Hewlett Packard and Texas Instruments business micros with a clear aim to compete with Computer Land.

James Minotto, the chairman of Interface, knows the competition. He is the former president of ComputerLand Europe.

Pirate wars

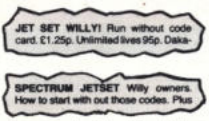
By David Guest

The software industry is finally mobilising to take on the pirates.

In separate developments last week individual companies and a grouping of software producers took steps to move against anybody who infringes their copyrights.

Microdeal and Software Projects in particular have taken the gloves off and look likely to become involved in court battles to defend their games. At the same time the Guild of Software Houses (Gosh) has set up a sub-committee to investigate the problem of piracy. But the experienced anti-pirate Jim Lamont (Issue 56) warned: 'The main thing to bear in mind is that none of us stands a chance unless we work together. We're all in the same boat and we've got to help each other.'

Mr Lamont has been critical of software houses, accusing them of lethargy in tackling pirates, but Software Projects and Microdeal weren't pulling any punches last week. Alan Maton of Software Projects promised: 'If we know of someone who is breaking the law we'll take every step to make sure our investment is protected. We're fighting fire with fire.'



Mr Maton is incensed by the response to Jet Set Willy's protective colour-coded chart (Issue 54). Advertisements have started to appear in another weekly paper, offering a means of side-stepping the protection; *PCN*'s Microwaves section has also received similar routines. Software Projects is replying to the ads, gathering its evidence, and putting the material in the hands of its solicitors.

It used the colour chart to avoid any confusion about software copyright — the law is clearer on the copyright of printed material. But Mr Maton stressed the importance of the software industry actually being seen to do something: 'The Government might take notice if it sees the industry taking up its crutches and trying to walk.'

Microdeal has registered a formal complaint against the operator of a user group in Northern Ireland. It accuses the organiser of piracy. Detective Constable Gibson of the Royal Ulster Constabulary could only confirm that Microdeal's report had been received — he could not comment on what action might be taken.

Gosh has set up a sub-committee under the chairmanship of Quicksilva's Rod Cousens, with representatives of Virgin Games, Softek and Salamander also included. It aims to make recommendations back to the main Gosh membership on the establishment of a legal fighting fund, regional representation, and liaison with magazine publishers.

It intends to work with Trading Standards officers and with the police, at the same time as lobbying for action at various levels of government.



BBC TOOLS — A third book for BBC owners from the Pan/*PCN* Computer Library is now in the shops. 'Invaluable Utilities for the BBC Micro' contains a wide range of routines to help programmers, and includes a disassembler, a music processor and a Teletext picture editor. There are a total of 31 utility programs in 236 pages which cover areas such as sound, graphics and I/O. It costs £5.95. The book joins the growing library of Pan/*PCN* volumes which now cover eight different machines from several different viewpoints.

PERIPHERALS

The new releases

Tape Storage: Tape back-up for the hard disk of the IBM XT is available from P&P (0706 217744) with its Sysgen Image 20 Mb streaming tape unit and from Ambar Components (0296 34141), again with 20 Mb capacity. Micro Memory Systems (0635 40405) is selling a 60 Mb tape back-up unit suitable for the XT, Sirius or Apricot systems — it takes a mere four minutes to save 20 Mb.

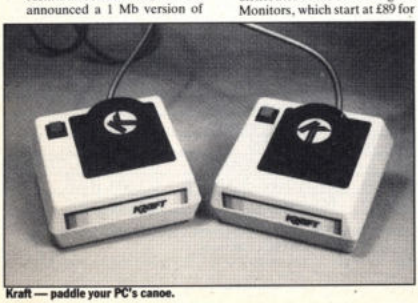
Disks: Altek (0245 355806) has laid its hands on the Mitsubishi M4855 floppy disk drive — this device offers 2 Mb of storage on a 5¼in disk that sits in a drive 1.6in high. The data transfer rate is 500K bps. Hitachi, Matsushita and Hitachi Maxell have announced a 1 Mb version of their 3in Compact Floppy. Alpha Disk (0784 35357) has added LED indicators to the Canon MDD 221 drive to indicate the mode of the unit, which costs £224.

Monitors: The ever-active Microvitec (0274 390011) has put a price of just under £700 on its 20in high resolution PC-compatible monitor, handily labelled the 2046/CI-5. It takes PAL or TTL/RGB input; definition is 860 pixels a line. Another 20in set, but a colour TV with a cable option in this case, comes from Network Marketing (01-286 8961) and is priced at £289. Teleprinter Equipment (044282 4011) has become the sole distributor of the BMC range of Monitors, which start at £89 for the basic green screen and rise to £115 for a high resolution amber monitor.

Modems: Following the DM-2426 (Issue 57) Tech-Nel (0295 65781) has kept the modem pot boiling with the release of the DM-1223. This unit is British Telecom-approved and costs just under £300. It operates asychronously at up to 1200 bps full duplex. Thorn-EMI Datatech has announced the Type 9648 which it says is the first of a new line of cost-effective, compact modems from the company. Since it doesn't mention the cost in its press hand-out, the cost-effectiveness is difficult to judge.

Joysticks: For BBC and Dragon owners Consumer Electronics (061-682 2339) has released Strike Control, a pair of joysticks that costs £16.95. P&P (0706 212321) risks accusations of frivolity by announcing its Kraft Model KPP-011 paddles for no less august a machine than the IBM PC. They cost £37.95.

Cards, Boards: The Snapshot Shuttle from Darkstar Systems (01-900 0104) plugs into an Apple's peripherals slot and gives you the chance to switch between two or more programs held in memory at the same time. It costs £115. Also for Apple systems is the PDA232C from Garingdell Systems (0753 883036) to let your Apple II interface with various serial devices. One-off price is £110. A board called Supervision from MBS (0535 68171) will translate the display on your IBM PC to 132 by 44; at the same time it takes care of printing and also includes a text editor. For the BBC and Electron, Northern Computers (0928 35110) has produced an external ROM box.



Kraft — paddle your PC's canoe.



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Tech-Nel's approved modem.

PCN CHARTS



GAMES

			GAME TITLE	PUBLISHER	MACHINE	PRICE
▲	1	—	Jet Set Willy	Software Projects	SP	£5.95
▼	2	1	Fighter Pilot	Digital Integration	SP	£7.95
▼	3	2	Chequered Flag	Psion	SP	£6.95
▼	4	3	Manic Miner	S/W Projects/Bug-Byte	SP, 64	£7.95
▲	5	22	Bugaboo (The Flea)	Quicksilva	SP, 64	£7.95
▲	6	7	Hunchback	Ocean	SP, 64, OR	£6.90
▼	7	5	Atic Atac	Ultimate	SP	£5.50
▲	8	11	Chinese Juggler	Ocean	64	£6.90
▼	9	6	3D Ant Attack	Quicksilva	SP	£6.95
▼	10	8	Flight	Psion	SP	£7.95
▲	11	15	Fred	Quicksilva	SP	£6.95
▲	12	17	Rev. of Mut.C's	Llamasoft	64	£5.95
▲	13	28	Night Gunner	Digital Integ	SP	£7.95
▲	14	26	Pinball Wizard	CP Soft	64	£5.95
▲	15	18	BlueThunder	Richard Wilcox	SP	£5.95
▼	16	12	Lunar Jetman	Ultimate	SP	£5.50
▼	17	9	Wheelie	Microsphere	SP	£5.95
▲	18	24	Blagger	Alligata	64	£7.95
▶	19	19	Alchemist	Imagine	SP	£6.50
▼	20	4	Scuba Dive	Martech Durell	SP, 64, OR	£6.95
▲	21	—	Forbidden Forest	Cosmi	64	£8.95
▼	22	30	Twin Kingdom Valley	Bug-Byte	SP, 64	£9.50
▲	23	—	Space Pilot	Anirog	64	£7.95
▲	24	—	Super Pipeline	Taskset	64	£6.90
▼	25	10	Stonkers	Imagine	SP	£3.95
▲	26	—	Bear Bovver	Artic	SP	£6.95
▲	27	—	Snooker	Visions	SP,64,AC,OR	£5.95
▲	28	—	Pogo	Ocean	SP	£5.90
▼	29	25	Skull	Games Machine	SP	£6.95
▼	30	21	Deathchase	Micromega	SP	£6.95















MICROS

Top Ten up to £1,000

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

Top Ten over £1,000

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

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the fortnight up to **April 5**. The games chart is updated every other week.
Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT.
Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month.
PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.

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Magic Meanies	CDS	£5.80	Aquaplane	QS	£8.90
Timebomb	CDS	£5.80	Ring Of Power	ANIR	£6.90
German/fun	CDS	£5.80	Space Pilot		
French/fun	QS	£5.90	ORIC/ATMOS	£165.00	
Ant attack	QS	£4.80	ATMOS 48K Computer	£145.00	
Frenzy	QS	£5.90	ATMOS PRINTER	TAN	£6.95
Fred	QS	£4.80	Rat Splat	TAN	£6.95
Astro Blaster	QS	£6.95	Oric Munch	TAN	£7.95
Chessplayer	QS	£4.95	Ultima Zone	TAN	£6.95
Space Int.	QS	£5.90	Defence Force	TAN	£12.50
Snowman	QS	£5.90	Hobbit	TAN	£12.50
Boogaboo	ULT	£5.00	Oric Base	TAN	£12.50
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Lunar Jetman	ULT	£5.00	Bozy Boa		

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Legal copiers could be the answer

The problem of software protection continues. I have, I think, a workable solution.

The main thing customers seem to want is to be able to duplicate a program for their own use, and protect their investment by using only duplicated copies for every day use.

The second reason, is that I, like many others, have bought a disk unit. I would welcome the ability to make disk copies of tape/disk games and utilities, as the original taped programs are the quicker to load, and the original disk copies well protected. Also, not many software houses make all their products available on disk.

It occurs to me that each publisher could make available a program which would make the required copies, either tape to tape, or disk to disk, or a mix of the two.

The point is this, as the software



house gets to sell the copier in the first place, then surely it recovers some of the claimed losses to pirate copying.

If the copiers worked using a code generated by the program to be copied they could be made to copy only the software made by that company. Given the power of super encription today, it shouldn't take a competent professional programmer long to mix things up beyond the talents of even the most determined thief.

The advantages far outweigh the effort and cost involved and the software house makes it 'legal' to copy its products for the legitimate customer wanting security in the form of back-up copies. If the price of the back-up copier isn't too high the software house need not fear pirates so much, as they can't compete for the same price in the way they do at present.

Ian Hay,
Eastbourne, East Sussex

No relief for the teachers

I read with interest the letter by Mr Skelly (Issue 54) about his lack of success in obtaining tax relief on the purchase of his microcomputer.

I was asked in 1980 to start a computer studies department at the school where I teach. To teach the subject properly I went on 12-month part-time course, which cost me a fair amount, and bought a TRS-80 model 1 as I needed the computer time to do the course, and the school did not possess a machine. I use the TRS-80 to write programs which are used at the school, either on my machine, or on the school machines after some modification, for both administrative and educational purposes.

Shortly after I bought my computer a colleague who runs a part-time business also purchased a computer system. He promptly applied for and received tax relief for both the hardware and software he'd bought.

I too applied for relief. The income tax people did not immediately turn me down. By letter I was asked many questions over a period of months. I was finally told I could not obtain any relief as, and I quote: 'Yours is a case of buying your own machine before one is deemed necessary by LCC *ie*, it is your personal choice to merely wish to improve the quality of your work, etc. The expenditure merely enables you to better perform the duties of your employment.'

I appealed against this decision, answered more questions by letter, and eventually received a letter denying me any tax relief, with very detailed reasons given, which in essence cited Section 47 of the Finance Act 1971.

It may be of interest to note that the Education Authority gave little help or advice and further advised me that under no circumstances would I be able to claim if my machine were damaged while on school premises.

I know of other teachers who have spent quite considerable sums of money so they may learn how to teach this new and fascinating subject. It seems a pity that more financial encouragement is not given to such people.

P E Watson,
Nelson, Lancashire

As pointed out in last week's Issue 57, there may be a way around this problem. But perhaps concerted campaigning by similarly grieved teachers might change the rules — Ed.



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

Microdrives are their own standard

I reply to Mr A Smith (Issue 52) who states that 'the much vaunted Microdrives seem to be a step back from IAS 5¼in floppies, . . . I can see no advantage that the Microdrives offer over disk drives.'

Mr Smith misses the point. Who said Microdrives were direct competition for disks? How can they be a 'step back' from disks? A typical 100K disk drive for the BBC costs £200 nowadays, compared with £80 for the Microdrives.

Okay, so the load/save times aren't fantastic, but are they *intended* to approach the S/L times using disks? A typical Research Machines drive takes nearly 4 seconds to load a 16K program — a Commodore 1541 drive takes 28 seconds to load a 48K file . . . So the Microdrives are really fast compared to some so-called disk drives, with a possible time of 3.5 seconds to load a 48K file.

We all agree the cartridges are a bit hefty at £4.95, but compare that with the savings made on the actual drive and you begin to see the difference. Sinclair has refined stringy-floppy technology to the point where it is reliable and made it accessible to thousands of people.

Michael Tomlinson,
Wallasey, Merseyside

It's just not good enough, Sir Clive . . .

The ability to learn from one's mistakes is thought an important characteristic of intelligence. For all his reported IQ of 159, Sir Clive Sinclair, chairman of Mensa, appears to fail this simple test.

Sir Clive may be a breeze when he is placing little round pegs in little round holes, but he is snail-pace slow at supplying ordered computers. It happened with the Spectrum and it is happening at the same massive level with the QL.

As a disgruntled QL customer, I have just received a letter telling me the company expects to deliver my machine 'not later than the end of June.' Whether June, 1984 or June 1985 remains to be seen. My order was posted on Wednesday, February 1, when Sinclair still maintained a promise of delivery within 28 days.

It is not sufficient for Sinclair to offer the opportunity to cancel orders — most people are not in the habit of forking out £400-plus by mail order for an object they are later willing to abandon.

It is also not enough to offer 'phenomenal demand' as an excuse for delay. If Sinclair half-believed its own publicity, it should have expected this interest.

Having obtained a knighthood, Sir Clive may feel he can rest on his laurels. However, when it comes to integrity and the sheer mechanics of making and marketing a product, he has some way to go before he can match the admittedly modest standards set by British industry generally.

G R Eaton,
Maidenhead, Berkshire

. . . but patience has rewards

The QL moaners amaze me. Like A E Black (Issue 51) I ordered a QL in late January. I also bought a long-delayed disk drive for my ancient TRS 80, counting on ample time to learn disk operation before getting my QL. After Microdrives, what did anyone expect?

Who wants 28-day delivery of a radically new machine? By Murphy's Law, it will have bugs; better delay now than have the frustration and longer delay of thousands of QLs sent back.

No floppies or cassettes? X COM already advertises drives; the cassette gap will not be long unplugged.

So QL is 'only' 32:8. Even Sinclair could not provide 'true' 32:16 support chips and circuitry at that price.

32:8 is a whole new ball game for those programmers who shift stale Z80 or 6502 code from one here-today-gone-tomorrow micro-clone to the next. Like Apple II, QL will take years to realise its hardware and software potential, but then it should run and run.

If you buy it as 1984s instant miracle micro, it will become 1984s instant expensive paperweight.

J S Paine
Rhyduchaf, N Wales

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Replacement rather than repair work

Q I purchased a Commodore 64 on January 6, and on February 20 it ceased to function. I immediately returned it to the shop I bought it from.

I am still awaiting its return. Do you think this was a bad machine on purchase, or is six weeks normal for repairs?

J Todd,
Copthorne, Shrewsbury.

A Your big mistake was to actually let the shop take it back for repair. What you should have done was insist that you be given a replacement machine. Your pitch would have been that the machine didn't perform as specified, and that you're therefore entitled to a replacement or a full refund.

In situations like this you shouldn't allow yourself to be fobbed off by the shop, as your contract is with the dealer, not the manufacturer — what the shop does with a broken machine is no concern of yours.

In your situation, we'd advise you to go back to the shop and demand a replacement machine, as you've waited quite long enough for your existing machine to be fixed. As far as micros are concerned, it's generally best to try to get a replacement rather than waiting for repairs as, contrary to popular belief, they don't go wrong all that often, and therefore the manufacturers aren't geared for fast turnaround on repairs.

If you like lots of languages

Q I have an Oric 1, but I'm unhappy with its limitations. I can only afford a cheap (less than £200) micro, and I'd like to know what machine in this range offers the most programming languages.

Mark Haines,
Warminster, Wilts.

A The answer would seem to be a Spectrum. You can get Pascal, Forth, Micro-Prolog, a version of Logo and one of Lisp. There may be others too.

As far as other machines go, the choice in the price range is limited. On the Dragon you can get Petite Pascal and Forth. If you could afford a Dragon 64 you could get into real Pascal, a very nice extended Basic and even C. Given the OS9 operating system you'll probably be able to get things like Lisp as well.

The Commodore 64, which you might find at just under £200, has Logo, Pilot, Pascal and Co.

The Oric 1 (48K) has Forth, while for the Atari there's Logo and Lisp. If you could run to a BBC, you could get Lisp, Forth and Pascal.

This list is by no means complete, the best way to find out is to contact a group like MUSE (Microcomputer Users in Education), or keep checking advertisements. MUSE is on 021-471 3723.

Electron is incommunicado

Q I would like to know if there are any modems available for the Acorn Electron? Also, are there any graphic adventures for it at the moment?

Neil Harris,
Kingsbury, London NW9

A Because the Electron doesn't have a serial (RS232 etc) interface, it is impossible to attach a modem to it. As far as I know, no one makes one so any Electron communications are out.

Graphics adventures seem to be rather thin on the ground for the poor old Electron. The best place to find out if there are any is to look through the adverts in the various computer magazines.

Spectrum won't easily overload

Q I want to add an Interface 1 plus Microdrive to my Spectrum, but have a problem. I own a Cheetah RAMpack, joystick interface and Maplin plug-in keyboard. Will I be able to connect all these add-ons to my computer without draining the ZX power supply?

Neil Ward,
Beauchief, Sheffield.

A It's possible to run extension keyboard and Interface 1 off the same power supply, so you shouldn't have any problems in this direction. According to Cheetah the RAMpack is fully compatible with Interface 1, so you should be ok here too.

If you want to buy more add-ons you'll eventually reach crisis point, but you won't actually damage anything by doing this. Trial and error is probably the easiest way of approaching the problem.

You will find you have compatibility and fitting problems with some Spectrum add-ons and Interface 1, so it's always best to check before you buy them.

Spectrum assembler but not disassembler

Q I am a Spectrum owner in the throes of learning how to program in machine code. Could you advise me on the following:

- **Which is the best assembler to buy?**
- **Is a disassembler necessary?**
- **Where can I get a copy of the Z80A instruction set, codes and effects?**

Could you also tell me if we'll be seeing any articles on machine code, programs and subroutines in the future.

Stephen Bec,
Hartsholme, Lincoln

A The Sinclair/Psion Zeus Assembler is a good one to start with. The Picturesque is also good, and you should be able to pick up either of these in one of the high street chain-stores.

Is a disassembler necessary on a bicycle? This is one of the great philosophical questions of our time, and we can exclusively reveal to you that it isn't. The most common use for a disassembler seems to be to rip apart other people's programs, and we're sure you're much more interested in learning to write your own in assembler.

As regards books, there are Z80 books by Lance Leventhal and Rodney Zacks. Both of these are fearsomely expensive, and we suggest you'd be better off with *The Complete Spectrum ROM Disassembly* by Ian Logan and Frank O'Hara (Melbourne House, £9.95).

We're currently starting a series on assembler, and we'll continue to publish Steve Kramer's Spectrum ROM calls every now and again, so stay tuned for machine code.

ROMs and printers for BBC graphics

Q I own a BBC Model B computer. Could you please tell me if there are any graphic extension ROMs for this computer, apart from that manufactured by Computer Concepts?

Second, do you know if the infamous second processors made by Acorn are in the shops yet (or even available by mail order).

Last, what, in your opinion, is the best printer priced under £400? Is it the Acorn Spark Jet or the Epson FX80, or another type? My main requirements are high resolution graphics capability (colour if possible) good quality typeface and reasonable speed.

Craig F Stevenson,
Rutherglen, Glasgow.

A As far as I know, there are no other graphic extension ROMs available for the BBC micro, although Acorn's Basic II does contain an additional PLOT option that allows a kind of fill to be implemented. Beebug produces quite a versatile sprite system but this is cassette or disk based and needs to be loaded every time the computer is switched on.

One of Acorn's fabled second processors, the 6502, was launched towards the end of March this year and is available by mail order from Vector Marketing for £199. It is not, apparently, available in the shops yet. The other processor, the Z80, has yet to be launched by Acorn, although two other companies have launched their own version for the BBC. The first in the field was Torch with its Z80 disk pack system for £730 + VAT, the latest from Upgrade Technology should be available at the end of April for £236, but comes without drives.

Your final inquiry about printers would normally have illicited the response FX80 from almost anyone. Recently, however, the prices of printers have been dropping like the proverbial stones and it may be worth waiting a month or so, as there are a few high quality low priced printers just over the horizon (keep an eye on the peripherals pages of *PCN*)

M.D.R.

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17 Oric 1	£99	Our price	**£89.10**
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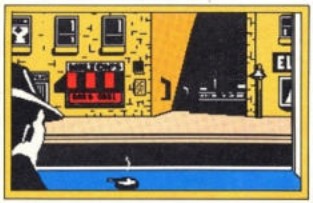
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The computer software for the game is to be designed via a London-wide competition which is open to all *non-commercial* entrants. Software for BBC Model B or Sinclair Spectrum computers will be accepted. The judges for the competition will be GLC members. All entries must be received no later than 8 June 1984.

For further information including a complete set of instructions plus the game's specifications, please phone: Pam Nanda, Ethnic Minorities Unit, 633 4273 or Patricia Devine, Central Computing Services, 633 3348; or write to: COMPUTER GAME COMPETITION Greater London Council, Director-General's Department (DG/EMU), Room 686, County Hall, London SE1 7PB.

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Shoot-em-up Spectrum sounds

Here are some sounds for the Spectrum:

Siren: 10 BEEP .6:18:BEEP .75,14.5:GOTO 10

Firing: 10 FOR f=1 TO 10:BEEP .01,1+F:BEEP .01,10:NEXT f:GOTO 10

Alien: 10 FOR f=1 TO 30:BEEP .05,20:BEEP .05,0:NEXT f

Motor: 10 BEEP .005,5:BEEP .005,−2:PAUSE 2:GOTO 10

Watch Alarm: 10 FOR f=1 TO 10:BEEP .5,40:PAUSE 7:BEEP .5,40:PAUSE 35:NEXT f

Horses: 10 FOR f=10 TO 20:BEEP .003,10:PAUSE 6−f/5:BEEP .003,0:PAUSE 5−f/5:BEEP .003,1:PAUSE 25−f:NEXT f
20 FOR f=20 TO 10 STEP −1:BEEP .003,10:PAUSE 6−f/5:BEEP .003,5:PAUSE 6−f/5:BEEP .003,0:PAUSE 5−f/5:BEEP .003,1:PAUSE 25−f:NEXT f:GOTO 10

Nicholas Saltmarsh,
Bury St Edmunds, Suffolk

Altering Spectrum screen attributes

I own a 48K Spectrum, and while trying some POKES I found that the following routine could be used to change the attributes of the screen without harming the picture or text currently in view.

```
9000 FOR g=22528 TO 23300:POKE g,attr:NEXT g
```

Nir Gov
(Please send address)

Printing with Newbrain CP/M

If you already have a Newbrain CP/M system (unexpanded) and you want to use a printer at 1200 baud, then you could use the following program. This sends the printer signals at 1200 baud instead of the usual 19,200.

```
ORG   0100H
MVI   B,16;19200/16=1200 baud
LXI   H,9EBBH;address baud rate-param
MOV   B,M
RST   0
END
```

This program could be entered with DDT or ED. With SETINIT on your master disk) you could make this program autostart when booting CP/M. Now, to use the printer, use the same Ctrl-P or TYPE etc.

Tom Meijerling,
Emmen, Holland

BBC colours can do more than you think

I read somewhere recently that in MODE 7 it was impossible to change to foreground colour along a horizontal line without displaying a space in the background colour. Below is a short listing to disprove this and to produce a pattern for TV/Monitor adjustment. Use *TV254 as a first line if it comes out too high up on the display.

H. M. Hoffman, London E9.

```
10 REM  program colour bars
20 REM *TV 254 here if required
30
40 MODE 7
50 block$=CHR$255:REM *** GRAPHICS BLOCK
60 bar$=STRING$(4,block$):REM *** 4
   BLOCKS
70 hold$=CHR$158:REM *** HOLD GRAPHICS
   CHARACTER
80 line$=hold$+CHR$151+bar$+CHR$147+bar$
90 line$=line$+CHR$150+bar$+CHR$146+bar$
100 line$=line$+CHR$149+bar$+CHR$145+
    bar$+CHR$148+bar$+block$
110 FOR row=1 TO 24
120 PRINT line$
130 NEXTrow
140 PRINT TAB(10)"Colour bars in mode 7"
```

White noise on a Lynx

The following tip is for the Lynx 48K and is a short machine code routine to produce white noise for a variable length of time. In the listing, line 10 holds the routine and line 20 calls it.

```
10 CODE 3E 01 D3 80 44 4D C5 CD D0
   1E 2A F0 61 3E 00 D3 84 7C 3D 20
   FD 3E 3F D3 84 7D 3D 20 FD C1 0B
   04 05 20 E3 C9
20 CALL LCTN(10),1000
```

The length of time is set by the number after CALL LCTN(10), 1000 gives around one second.

Julian Hodgson,
Audley Park, Bath

What do you think this looks like?

One evening, while messing around with my Spectrum, I discovered this routine. It doesn't serve much of a useful purpose — but it looks good.

```
1 BORDER 2:PAPER 2:INK 7:CLS
2 PLOT 50,50:DRAW 50,50,360
3 PLOT 200,50:DRAW 50,50,360
4 PLOT OVER 1;50,50:DRAW INVERSE 1;50,50,360
5 PLOT OVER 1;200,50:DRAW INVERSE 1;50,50,360
```

G Ferrie,
Dundee, Scotland

Oric goes through character change

Here is an interesting POKE for the Oric-1 that changes the complete character set. If POKEd with 1, the A stays A, B turns into C, L turns into M etc. The location to POKE is at 759. POKE 759,32 converts the whole character set into lower case. POKE 759,0 changes it back again.

Lars Lyer,
Workington,
Berks

Mix and merge your Oric colours

If you have ever wanted to mix colours on the Oric-1, try the following program:

```
5 HIRES
10 FOR A=1 TO 50:FILL1,1,21:
FILL1,1,21:NEXT A
20 CURSET 1,1,3
30 FOR R=1 TO 50:FILL1,1,20:
FILL1,1,17:NEXT F
```

Note that the last two parameters in the FILL command in line 30 plot the background colours blue(20) and red(17) one pixel deep. These colours are painted over the colours in line 10 to give a brown/crimson effect.

So far I have discovered lime, aqua and maroon by experimenting with other colours. Remember to change only the values in line 20 to achieve different effects.

D Singh,
Thamesmead, London SE2

Our mistake — you can stop Oric's AUTO

Routine Inquiries (Issue 52) did not know how to stop the Oric-1's AUTO run. This is actually quite simple.

Locations #229 and #22A contain the address to which the computer jumps directly after a CLOAD; it is usually #EC03. If we change it to, say, #400 it is possible to use a machine code program to stop the AUTO run.

To make this routine work after CLOAD, type DOKE #229,#400. It is important to type DOKE #229,#EC03 before saving any programs, especially machine code.

Use the following loader program. This may also work on the Atmos.

J D Woodcock, Deal, Kent

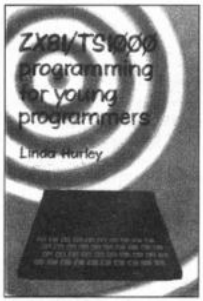
AUTO run breaking program:

```
10 FOR I=#400 TO #408
20 READ D
30 POKE I,D
40 NEXT
50 DOKE #229,#400
60 DATA #48,#A9,#00,#85,#63,#68,
        #4C,#03,#EC
```

Assembly language version:

```
Loc   Hex      Opcode    note
400   48       PHA       ;Push Acc onto stack
401   A9 00    LDA#00    ;Zero accumulator
403   85 63    STA 63    ;Put acc at #63
405   68       PLA       ;Pull acc off the
stack
406   4C 03 EC JMP EC03  ;Carry on as normal
```

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



'ZX81/TS1000 Programming for Young Programmers' by Linda Hurley, published by McGraw Hill at £4.95, cassette £5.13 (paperback, 88 pages)

This book and cassette appear to be aimed at younger people programming for the first time. How young these prospective readers are is debatable since, at first sight, the style is rather jolly and there are pictures of the keys that appear to have been sketched rather than drawn.

After describing how to use the keyboard, the book gets down to programming. The first of the examples is simple, and so is the second and the third.

The first major program is about 11 lines and converts words into anagrams, giving examples of string handling, printing and so on. Following this there are additional lines to add to the program to make it more flashy. The book continues in the same style covering graphics, moving graphics, numbers, subroutines and includes games that use these ideas.

The cassette contains 11 programs, some developed in the book, plus a few others. Some of them need the RAM pack expansion (notably the ZX81). They vary in loading time, from 16 seconds to five minutes, and hence in length, but most are short and are documented in a small booklet included with the tape. These notes describe the tricks that have to be used to get the best from the machine.

The cassette is a nice idea but appears to be sold separately. It might have been better if book and cassette came together as a single package for, say, £6 to £7.

KG

'Choosing and Using a Microcomputer' by Alan Radnor and Howard Kahn, published by Fontana paperbacks at £2.50 (paperback, 144 pages).

If you are in trepidation about splashing out on your first micro, then *Choosing and Using a Microcomputer* will help give you the confidence to make the final plunge.

Newcomers are advised to think carefully what they want the computer for, whether the right software is available, if the system is expandable and whether or not the keyboard and screen are comfortable to use, among many others considerations.

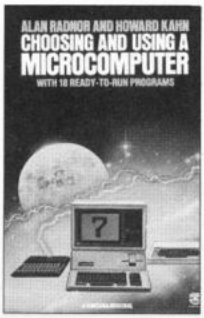
The authors advise buyers to do a little detective work on the dealer to make sure he or she has a reasonable knowledge of computers and to find what back-up services are available. They stress the importance of a 'hands on' test, and a buyer's sample test is included for shop trials.

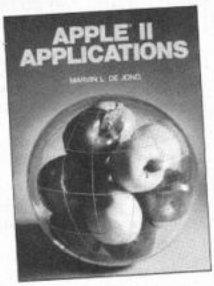
To give a general understanding of the hardware, the book includes short descriptions of the main components of a computer, with each section emphasising the aspects that might be important to first time buyers. Printers are considered an extra and are not included.

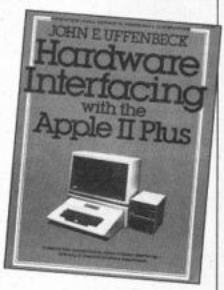
There's help, too, for using a micro at home, such as a plan of an ideal working area, and instructions on how to set it up.

At the end there are useful charts and checklists, plus a questionnaire to indicate which model best suits your needs. These are followed by 18 programs ranging from the obscure (the distance travelled by a bouncing ball) to the useful (mortgage and compound interest).

NR







'Hardware Interfacing with the Apple II Plus' by John Uffenbeck, published by Prentice-Hall at £11.85 (paperback, 238 pages)
'Apple II Applications' by Marvin de Jong, published by Prentice-Hall at £11.85 (paperback, 236 pages)

These two books add to a plethora on hardware interfacing on the Apple, and reflect diverse approaches to the subject.

Apple II Applications differs from *Hardware Interfacing* since it uses commercially available hardware, showing how these may be used in real applications. Mr Uffenbeck shows you how to build the hardware.

This sounds as though the second book is better value, covering as it does a broader scope, but overall *Apple II Applications* is more likely to be useful, simply because the kind of boards described in *Hardware Interfacing* aren't especially complex or specialised, and hence not overly expensive. Anyone using this kind of circuitry would probably be better advised to just buy a board.

If you buy rather than build, you'll find that accompanying software is either non-existent or pitiful, which is where Mr de Jong's book comes in, making your new toy understandable.

This book deals with the different classes of interfacing under fairly arbitrary but reasonable headings, so with a modicum of analysis to a problem one section or another will probably offer a solution.

Mr Uffenbeck's book could be useful if you need to design and build a one-off card, or to learn about the principles involved. In general, his problems are less-obviously useful, though again, a little analysis of a problem will often find that the needed details are handled in his book, which is broken up into a set of experiments.

If I have any dislikes of the book, it's the total reliance upon Basic as the programming language, which simply isn't suitable. Also, I'm not inspired by the idea that I should spend considerable time building something I can buy for a modest sum.

JB

'Personal Computer Book' by Robin Bradbeer, published by Gower Publishing at £5.95 (paperback) or £9.50 (hardback) 272 pages — third edition.

Since the first two editions of this book have appeared many models have come and gone and micro books and magazines have blossomed.

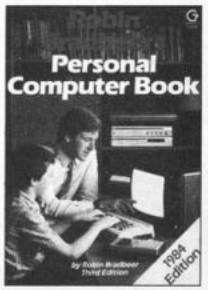
But this one is hard to categorise; I found it hard to see who would find it useful.

It might find a home with a user group or club, but it's not for the average user.

And unfortunately, though not surprisingly, the section on machines is out of date already.

But on the plus side, the book contains very useful appendices.

RK





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Aquarius owners have been out in the cold for a while but a new age may be dawning.

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Clubnet keeps you in touch with enthusiasts throughout the country. It is divided into clubs and user groups and lists of both will be published every four weeks.

Aquarius rising?

Aquarius owners at last have their own national user group, and organiser John Jones is looking for regional organisers to set up local groups.

Meetings will soon be announced, but in the meantime it will operate as a postal club, providing a monthly magazine to 4,000 members.

There'll also be a tape service. Program listings in the magazine will be available to members at £3.95 to £5.95.

'We're trying to get people together to start regional user groups and workshops and hope to have our own microfair for Aquarius products at the end of the year,' said Mr Jones.

'People don't know where to get software or who to go to to solve their problems — that will be one of our functions.'

Wendie Pearson

Name: National Aquarius User Group
Contact: John Jones, 66 Wymering Mansions, Wymering Road, London W9. Tel: (day) 01-930 1612



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Equally important, at TeleVideo we consider the needs of the computer operators as much as the computers themselves. For example, the screen of the TeleVideo can be tilted – so whatever your height, you can work in comfort. Even the design of the keyboard is particularly thoughtful, recognising that hands need a place to rest as well as to operate. The more you get to know TeleVideo, the more you will appreciate why it has become the choice for companies on the move.

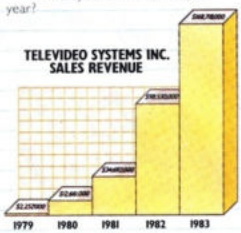


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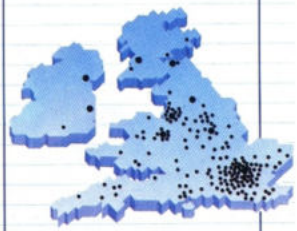
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Wrap-Bit RUN

Looks like an IBM keyboard? Acts like a Coleco Adam? Ken Garroch pulls a Rabbit out of the hat.



Howard Kingsnorth

The Wrap Bit II from Rabbit Computers Inc comes via the USA and Hong Kong. Its release date in the UK is uncertain at the moment since Rabbit has not set up a dealer network. But when Rabbit has established a few outlets, it will offer a Z80 machine boasting eight-colour high density graphics, 32 sprites, three sound channels and (with interface) full Coleco Adam software compatability.

The machine will come in various memory configurations, from 48K through 80K for the standard machine, to 144K maximum. Future expansions include the CP/M operating system with up to four disk drives and 80-column screen driver, and a Datasafe permanent RAM.

Presentation

The Wrap-Bit II comes fairly well packed in a sturdy cardboard box. Once out of its

box, the Wrap-Bit II, or Rabbit, looks like an IBM type keyboard, leading to comments such as: 'Where did you get that IBM from and where is the rest of it?'

In fact, the whole computer is neatly packed into the space under the keyboard and is surrounded by thick metal sheeting making it heavier than first appears.

Accompanying the main computer is a black box that contains the power supply. One end of this plugs into the back of the machine via a sturdy rubberised connector, the other into the mains supply. The review machine came without manuals so not much can be said about their presentation—apparently they are still on their way from Hong Kong, the computer somehow having beaten them into the country.

On power up, the machine displays the 'Rabbit Computer Inc' logo and waits for a key to be pressed. It doesn't actually ask for its keyboard to be tampered with but after watching and waiting, the temptation is irresistible.

Documentation

Although no documentation was supplied with the review machine, a little fiddling around revealed a number of things about the Basic. A list of keywords(see fig 1) revealed a few of the tricks the Rabbit is capable of; notably the sprite handling, the character definition, the graphics and the sound.

There are also commands that do things that most other Basics don't. DEBUG gives access to a machine code monitor allowing memory to be listed (in hex), altered and moved.

The graphics and colour commands are similar to those found on the Spectrum and FAST and SLOW were originally implemented on the ZX81. The FAST command speeds up the processing considerably, compared to SLOW, at apparently no cost. The editing of Basic lines is performed by means of the EDIT command. This is the same method found in nearly all Microsoft Basics.

Keyboard

The Rabbit gives the appearance of being all keyboard. The layout is very similar to that found on IBMs and the various lookalikes. Unfortunately, the quality is not as good as these 'professional' keyboards. In use, it doesn't have the nice solid click of better (probably more expensive) keyboards.

The Rabbit does, however, possess an integral keypad and function keys (though there were no instructions on how to program these).

It is possible to enter Basic keywords, Sinclair-style, at a single keypress by using the shift key or shift lock and on the left of the main keyboard are what appear to be a set of function keys. Normally these can be used to set up the screen colours. All the main colours are accessible from here, the bottom two keys enable the paper and ink colours to be cycled through, a nice, if somewhat excessive facility.

At the bottom left of the keyboard there is a key with a little red LED under it. This light is the power light and pressing this key does absolutely nothing, as far as could be discerned.

Normally, all input from the keyboard is in upper case, the shift being used to access the single keyword entry facility. If CTRL/SHIFT/@ are pressed simultaneously, lower case is available. The problem is, upper case is the norm and the shift key changes to lower case. This is rather off-putting and really not much use at all.

Display

There are two display connections on the Rabbit, one for a monitor, the other for connection to a television set. The picture from the RF (TV) output was rock steady and very clear. The display is 40 characters by 24 lines and the graphic display is 256 by 192 pixels. The character set used is unusual and a bit IBM-like but very readable.

One of the main drawbacks with the screen output is the screen scroll. This, apart from being dreadfully slow, copies lines from various parts of the rest of the screen and briefly flashes them at other places, notably the bottom line.

The sales brochure specifies that 16 colours are available. Actually there only appear to be eight, the rest being brighter versions of the others. The screen is split into three colour sections: the INK or text, the PAPER, which fills the rest of the character block, and the BORDER which is the main background screen colour. These can be independently set to any of the colours available giving a very versatile, if somewhat bilious, display.

The graphics appear to come in various modes although without the documentation, these are difficult to define exactly. The command that changes the mode is GR. It is possible to mix text and graphics modes with this command giving several lines at the bottom of the screen on which to display text or list the program etc, the rest of the screen being used for high-resolution graphics. There are a number of graphics commands making graphic programming pretty straightforward.

The sprite commands allow sprites to be placed on the screen after they have been set up with PATTERN. Once placed, any of the 32 available sprites is moved with the (you've guessed it) MOVE command. This automatically deletes the sprite from its current location and resdisplays it at the new relative position specified in the MOVE command.

This easy access and definition of sprites is a vast improvement over the PEEKs and POKEs used by some machines and makes them easy to access, move, and design.

Storage

The Rabbit has various options for storing programs. One is its Datasafe memory, an 8K optional semi-permanent RAM which can be used to store data after the machine has been switched off. Unfortunately, the review machine did not have this option fitted.

Another option for saving data is a disk drive. These are currently unavailable but the Rabbit will be capable of running four of these, each having a formated capacity of 640Kbytes. In addition an interface will be needed to enable the Rabbit to run them.

The old standby, cassette storage, is fitted as standard. This only allows loading and saving of programs — there are no **filing system** commands, such as OPEN, CLOSE etc, so using the Rabbit to handle data files is not possible. Connections to **the cassette** recorder is by **means** of the usual four-way DIN plug.

Internally, the Rabbit comes with 80K of RAM, though 48K and 144K versions will be available. In Basic (on the 80K machine), 44Kbytes are available for use as program storage with 512 bytes set aside for string storage. This string area can be reduced or expanded as necessary using the CLEAR command.

The video RAM is included somewhere in the memory and must take up some of the rest of the 30K or so left since using GR to place the machine into high-resolution mode has no effect on the amount of memory available to Basic.

Interfaces

At the rear of the machine are a number of connectors. At each end are the joystick ports. They appear to be the standard Atari-type connections and although there isn't a command for reading these ports directly from Basic, there is almost definitely a PEEK that can be used.

Other connections are tape recorder, the printer socket, video and RF outputs, and the expansion port. The printer connection is centronics compatible and uses a 20-way IDC plug, similar to that used on the Oric and the Dragon.

The video output produces a composite signal and should be compatible to almost any normal video monitor.

The expansion port is of the edge connector type and presumably will be used to connect the Rabbit to its peripherals, such as disk drives, memory expansions, 80-column cards and Coleco connector.

In use

Using the Rabbit was easy and, except for the keyboard being a little sensitive to accidental knocking of keys, was actually quite nice. The graphics and sprite handling were easy to use and encouraged simple game writing. The sound commands were not so easy to use and while experimenting with these the Rabbit appeared to crash. The only solution was to switch the machine off and on again. Part of the problem here was obviously the lack of documentation about how to use the commands.

It would have been nice had there been a renumber command and considering that commands such as AUTO and WIDTH are supplied it seems a strange omission.

Only two of the commands didn't seem to operate correctly. These were HOME, which cleared the screen as well as sending the cursor to the top lefthand corner of the screen, and EXIT which makes the machine go to its boot up logo. On pressing a key, syntax error was the only result.

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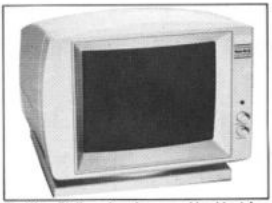
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Software

There was no software available at the time of writing, except for the Basic, included in the ROM, although Rabbit has plans to release a range of cassette software. The brochure announces that the Wrap Bit II is capable of using any of the Colecovision software but this is an option that was not fitted on the review machine.

This optional compatibility gives the Rabbit quite a bright future since one of the main drawbacks of releasing a new micro is having software immediately available.

Another software option is CP/M compatibility, though it would seem that the disk and 80-column card options would need to be fitted before this could be implemented. Upgrading in this way could also be expensive though there are no prices available for these expansions as yet.



The Wrap-Bit II monitor shows considerable style.

Verdict

Rather a nice machine in the main. Various parts are reminiscent of parts of other machines such as the DEBUG facility and parts of the Basic. The keyboard is good enough for professional use and if the CP/M system becomes available at a reasonable price, the Rabbit may well find a niche in this market.

One thing that really needs improvement is the screen scrolling which is pretty nasty. The Basic supplied with the Rabbit is comprehensive and easy to use (except for the editing which is a bit primitive) and the graphics were good. It would have been nice to have seen some documentation, since this is one of the main things that a machine should be judged on.

Perhaps this machine gives the impression of being a Hong Kong copy of something. The trouble is I'm not quite sure what.

Look to the future



The Coleco Adam was featured in Issue 38.

The Wrap-Bit (or Rabbit) is supposed to be Coleco compatible and have the ability to run the CP/M business operating system.

If it does turn out to be thoroughly Coleco compatible, it will have to use a Basic similar to Applesoft and support software with good sound, colour and graphics. If you haven't heard much about the Coleco Adam computer system, read on.

The Adam was introduced here earlier this year as a low-cost colour computer that included in its price 80K of RAM, a word processing program, IBM style keyboard, a digital tape drive storage system and a daisywheel printer. The Adam's biggest problem was that, although it was low-priced when it was originally introduced as a $700 system in the US, by the time it reached the UK that low price had reached £600.

Despite the higher price, the Adam still has a lot going for it. The system can either be bought as a stand-alone unit with everything described above or as an addition to the Coleco vision games machine. As an add-on to the games machine the price comes down to £499 (although you will already have had to pay £150 for the games machine to begin with).

The games machine won a great deal of popularity in the US in 1982 by sporting a line of high resolution games that boasted excellent sound and colour. Coleco hopes that the Adam can inherit the original success of the games machine, despite a series of delivery delays and some recent large financial setbacks to the company.

As far as the Rabbit is concerned, the Adam saga is likely to result in some good games software being available through the Coleco connection. But how long that will be any kind of great benefit is anyone's guess. If the Adam isn't a great success (and recent indications are that it hasn't been as successful as Coleco had hoped), the Rabbit may suffer.

The avenue for expansion into a CP/M system is far more promising. The Rabbit uses a Z80 8-bit processor, has more than 64K and can run disk drives, so it meets the two main criteria for theoretically being able to use CP/M. However, the system will have to run an 80-column screen and use some form of standard disk format for CP/M systems. (Apple format is a likely choice here since the system already uses what is essentially a superset of Applesoft Basic.)

Besides being the 'great leveller' that has given many machines an entry point into professional software, CP/M also includes a number of useful disk utilities.

Considering CP/M at this juncture in its life also raises a number of other intriguing possibilities, such as the option of making use of the proposed Personal CP/M on a chip that Coleco is hoping will shore up the fortunes of the Adam. The choice of CP/M as a business operating system for the Rabbit does seem mildly ironic, however, as the machine looks like an IBM keyboard, acts like a Coleco and is expected to perform like a CP/M Apple.

But with the increasing dominance of Microsoft and MSDOS in the operating system field, Digital should be happy to have another machine (however idiosycratic) on the CP/M bandwagon. If some method of using the new chip-based CP/M could be found for the Rabbit, it would become a truly useful and advantageously priced business system. With all the operating system commands on a chip, the idea of using the Rabbit with only one disk would be a viable option. A workable entry point business system would, in fact, be quite cheap. PCN

SPECIFICATION: Rabbit	
Price	$280 (approx)
Processor	Z80 3.6 MHz
RAM	80K expandable to 144K
Text Screen	40 × 24 characters
Graphics	256 × 192 pixel graphics 32 Sprites
Colour	16 colours (8 normal 8 bright)
Sound	Three channel plus noise
Keyboard	83 keys, IBM style layout with function keys and numeric keypad
Interfaces	Cassette, UHF (TV), Composite colour monitor, Joysticks × 2, expander port (CP/M, Coleco converter, Disk Drives)
Software	Extended Basic, similar to Microsoft and Z80 Debugger
Distributor	Rabbit Computer Inc, Room 610, 39-01 Main Street, Flushing, NY, USA.

SPECIFICATION: Adam	
Price	£595.00
Processor	Z80
RAM	80K
ROM	32K
Text Screen	36 × 24
Graphics	Screen same as Coleco's high-resolution games machine
Storage	Cassette tape digital data pack — 500K formatted storage per tape — (included with machine) and optional disk drives available in future
Interfaces	Daisywheel printer included with machine using non-standard (for disks drives, 80-column cards and others)
OS/Language	Coleco's Smart Basic
Distributor	CBS/Ideal Toys, Hedley Road, East Woodley, Berkshire, 0734 698188

Keith Bowden evaluates the attempts five companies have made to improve the Basic on the 64.

Five better Basics

It's a mystery of micro marketing that a company can build a computer with superb sound and graphics capabilities, then handicap it with an outdated Basic which makes using those features difficult and time consuming. But that is precisely what Commodore did with the 64. In a sense the 64 is almost the perfect micro for the machine code programmer, but that is little consolation to the computer novice, or even someone adept at Basic.

So it was almost inevitable that sooner or later the software companies would attempt to remedy the problem by producing extensions to the built-in Basic. Now, however, you have a choice of about a dozen packages, each offering a variety of commands and extra features.

The choice is further complicated because where there are similar commands, many are implemented in a different way. Some packages also offer what are called 'toolkit' commands. These make it easier to write and debug the program but have no effect when it is actually run.

Of the packages considered here Simons Basic from Commodore has toolkit options, but we will consider only the new Basic commands.

The new commands should generally fall into three main areas: graphics, including high-resolution and sprites; sound; and miscellaneous bits and pieces which improve the structure of your programs.

There are other considerations too. Perhaps foremost among these is the question of format. A cartridge is definitely preferable since there is little point in buying these supplementary commands and never using them because it takes five minutes to load them from tape, followed by several more minutes before your program is loaded. A cartridge gives you access to the new commands as soon as you switch on the machine.

The drawback is likely to be the comparatively high cost: both cartridge products looked at here, Simons Basic and BC Basic, cost £50. The best compromise is probably to go for disks which fall midway between tape and cartridge in cost and speed. However, this is obviously only possible for those who have invested the £200 required for the disk drive.

One point that applies to all products is compatibility. If you have bought toolkit programs, or have interfaces with software drivers, you may find that the Basic extension package will clash with these in memory. Where possible get a demonstration of your choices running together or accept the possibility that you may run into problems.

Graphics

All the packages support high-resolution graphics but there are some odd omissions. Graphix 64 has no CIRCLE command—a fault shared by BC Basic which is also lacking a FILL option. CIRCLE is fairly easy to simulate using DRAW commands but packages claiming to add useful extras to Basic have no excuse for leaving it out.

If you need some extras, Simons Basic and Graphix 64 allow split screens for different modes; UltraBasic has a turtle graphics option; and BC Basic offers a command to synchronise screen changes to eliminate screen flicker.

One of the most important of the 64's graphics modes is multicolour and any Basic extension should support it properly. MultiColour mode offers greatly improved colour resolution at the expense of halving pixel resolution, but this trade-off is worth it in many cases because of a variety of effects it makes possible. Unfortunately, Graphix 64 and Turbo do not support it at all while UltraBasic allows its use but reduces vertical resolution as well, which is a little bizarre. Of the rest only BC Basic allows full exploitation of the many powerful effects in multicolour mode.

Sprite handling is another important area and it is covered pretty thoroughly by all of the packages except Graphix 64 which has no sprite commands.

One extremely powerful extra offered by BC Basic allows sprites to be interrupt driven. This means you can set a sprite moving in a certain direction at a given speed and it will carry out the instruction, even if the program is stopped. Obviously this makes games writing much easier and can produce effects otherwise possible only in machine code.

Sound

Using sound on the 64 can be even more complicated than graphics. The Sound Interface Device (SID) is the most power-

```
10 MODE3,0:CLG
20 DRAW50,25TO100,25
30 GETA$:IFA$=""THEN30
40 MODE0
```

```
10 POKE52,32:POKE56,32:CLR
20 PRINTCHR$(147):SC=8192
30 POKE53272,PEEK(53272)OR8
40 POKE53265,PEEK(53265)OR32
49 REM *** CLEAR HI-RES SCREEN ***
50 FORI=SCTOSC+7999
60 POKEI,0:NEXT
69 REM *** DRAW LINE ***
70 Y=25:FORX=50TO100
80 GOSUB1000
90 NEXT
99 REM *** RETURN TO TEXT MODE ***
100 GETA$:IFA$=""THEN100
110 POKE53265,PEEK(53265)AND223
120 POKE53272,PEEK(53272)AND247
130 END
1000 CH=INT(X/8)
1010 RO=INT(Y/8)
1020 LN=YAND7
1030 BY=SC+RO*320+8*CH+LN
1040 BI=7-(XAND7)
1050 POKEBY,PEEK(BY)OR(2↑BI)
1060 RETURN
```

```
10 X=20:Y=12
20 PRINTATX,Y;"*"
30 X=X+JOYX(2)
40 Y=Y+JOYY(2)
50 GOTO20
```

These sample programs demonstrate the power and convenience of the Basic extensions over the built-in dialect. At top left, a BC Basic program to draw a line in high resolution, and below it a program to achieve the same effect in Commodore Basic. Left, programs to move an object around the screen under joystick control.

```
10 SC=1024:CO=54272
20 X=20:Y=12
30 L=SC+X+Y*40
40 POKEL,42:POKEL+CO,1
50 GOSUB100
60 GOTO30
99 REM *** READ JOYSTICK PORT 2 ***
100 JO=ABS(PEEK(56464)-127)
110 IFJO=1THENY=Y-1
120 IFJO=2THENY=Y+1
130 IFJO=4THENX=X-1
140 IFJO=8THENX=X+1
150 RETURN
```

ful sound synthesiser in any home computer and from the built-in Basic it is a tortuous process to create sound and musical effects.

With the exception of Graphix 64, all the packages offer some sound commands though many have so many parameters that they are still some way short of making sound truly easy to use. Most make no attempt to support every feature of SID, except BC Basic which allows you to use such things as ring modulation and filtering.

Additional commands

BC Basic supports structured programming with IF . . . THEN . . . ELSE and REPEAT . . . UNTIL, and also allows named PROCEDURES. Simons Basic has a large number of structured commands but both reduce to the two mentioned and many are implemented in a very non-standard manner.

These two also offer extra or improved string handling functions and straightforward conversion between decimal, binary and hex, as well as giving new Basic commands for reading and controlling lightpens, joysticks and paddles — a feature shared by UltraBasic.

Summary

With the exception of Graphix 64 which is confined to high-resolution commands, all the packages attempt to cover most of the areas of programming neglected by the 64's built-in Basic.

While Simons Basic is undoubtedly the most comprehensive of the packages, it has been criticised as over-ambitious. It is doubtful whether anyone would make real use of 114 new commands (and Commodore has a supplement in the pipeline which will take it up to over 200 new commands).

BC Basic is not far behind but it is a much more clearly conceived package with many commands better implemented than on Simons Basic.

UltraBasic concentrates on sound and graphics without any concession to structured programming and in the areas covered is very well done.

Turbo is rather a ragbag of extras. Repeat . . . Until is its only concession to structure, it has a DOKE command (to POKE two consecutive bytes) but no DEEK function; however, it is reasonable value for what it offers at £15.

For straightforward value for money, UltraBasic is the winner. However, if you can afford it, BC Basic is the best buy overall with the added convenience of being on cartridge. PCN

Name Simons Basic **Publisher** Commodore UK **Tel** 0753-74111 **Format** Cartridge/disk
Name BC Basic **Publisher** Kuma Computers **Tel** 07357-4335 **Format** Cartridge
Name UltraBasic **Publisher** Adamsoft **Tel** 01-788 8963 **Format** Cassette/disk
Name Graphix 64 **Publisher** Supersoft **Tel** 01-861 1166 **Format** Cassette/disk
Name Turbo **Publisher** Aztec Software **Tel** 0924-492826 **Format** Cassette

Hi-res sketchpad in BC Basic.

```
10 PRINT""
20 X=160:Y=100
30 PEN=1:D$="DRAW"
40 PROC HI-RES
50 PROC SPRITE
60 PROC SPRPOS
70 GETA$
80 IFA$="D"THENPEN=1:D$="DRAW "
90 IFA$="E"THENPEN=0:D$="ERASE"
100 X=X+JOYX(2):Y=Y-JOYY(2)
110 IFX<0THENX=0
120 IFX>319THENX=319
130 IFY<9THENY=9
140 IFY>199THENY=199
150 PROC DRAW
160 GOTO70
999 END
2000 DEFPROC DRAW
2010 DRAWTOX,Y,PEN
2020 PROC SPRPOS
2030 ENDPROC
3500 DEFPROC SPRPOS
3510 SPRINKO,I
3520 SPRPOSO,X+21,199-Y+48
3530 ENDPROC
4000 DEFPROC HI-RES
4010 PRINTAT2,2;"PRESS P TO SELECT PAPER COLOUR"
4020 PRINTAT4,2;"PRESS I TO SELECT INK COLOUR"
4030 PRINTAT6,2;"PRESS RETURN TO CONTINUE"
4040 P=0:I=1:PAPERP:INKI
4050 REPEAT GETA$
4060 IFA$="P"THENP=P+1:IFP=16THENP=0
4070 PAPER P
4080 IFA$="I"THENI=I+1:IFI=16THENI=0
4090 INKI:PRINTAT4,2;"PRESS I TO SELECT INK COLOUR"
4100 UNTILA$=CHR$(13)
4110 CLG:MODE3,0
4120 PLOTX,Y,8
4130 HPRINTAT24,0;D$:HPRINTAT24,15;"X=" X "  "
4140 HPRINTAT24,25;"Y=" Y "  "
4150 ENDPROC
5000 DEFPROC SPRITE
5010 FORR=0TO20:DEFSPR13,R,0:NEXT
5020 DEFSPR13,0,%00110000000000000000000
5030 DEFSPR13,1,%00110000000000000000000
5040 DEFSPR13,2,%11001100000000000000000
5050 DEFSPR13,3,%00110000000000000000000
5060 DEFSPR13,4,%00110000000000000000000
5070 SPRONO,1:SPRPOINT0,13
5080 ENDPROC
```

The program above is a simple utility in BC Basic. It would be considerably longer and slower in Commodore Basic. It allows you to create high-resolution drawings using the joystick, in any colour. Other Basic extensions should be able to reproduce it with minimal conversions. NB: BC Basic has screen coordinate 0,0 at bottom left in hi-res (mode, 3,0).

Basic comparison chart

Product	Graphics	Sprites	Sound	Other	Quality	Price	Value
Simons Basic	8	6	6	5	6	£50	7
BC Basic	8	7	9	4	10	£50	8
UltraBasic	7	6	6	3	8	£20	9
Graphix 64	7	0	0	0	9	£12	6
Turbo	6	5	5	2	7	£15	8

The above chart is obviously subjective but it attempts to compare the different products in terms of the range of commands, how well the commands have been implemented and how each package rates for value.

Gavin Monk shows you how to get more from the Spectrum's mass storage device.

Microdrive conversions made easy

The Spectrum Microdrive is a fast and effective storage medium, and over the next few months we should see cartridge software for it appearing in the shops. But even if a wide range of software does become available most Spectrum owners will have a large number of their own programs on tape.

In some cases conversion will be easy, but it's possible to produce a set of routines that will convert quite complex machine code programs. Most of your own programs loaded by LOAD "" can be converted onto Microdrive cartridges using the programs here.

First type in the cassette header reader program and save it onto tape or cartridge before running. Now run this program and play the cassette you want to convert through the Spectrum. As the tape runs, details of the files on the cassette will be printed onto the screen. When the tape has stopped, copy the information onto the screen (or if you have a printer press BREAK and do a screen COPY). The first file in the list should be a program file, followed by one or more code files (bytes).

Now clear the computer by typing RAND USR 0 [ENTER] and when the copyright message appears type MERGE "" [ENTER]. Now rewind the tape and play it again, when the report code OK appears stop the tape. Now list the program's header. It should be of the form:

```
CLEAR XXXXX
PRINT ". . . . . is loading"
LOAD "" CODE
LOAD "" CODE
PRINT USR yyyyy OR RAND USR yyyyy OR
LET Z=USR yyyyy
```

Make a note of the statement containing the USR call and its address. If the cassette header reader program produced the word SCREEN$ then that file was a screen. This should be loaded and saved onto Microdrive cartridge using:

```
LOAD "name" SCREEN$ : SAVE
*"m";1;"namescr" SCREEN$ [ENTER]
```

Now play the tape and stop it when the screen has loaded. The screen will now be saved onto Microdrive cartridge.

But the code (byte) files also need to be converted. This is not easy to do directly so use the code relocator/loader for cassette to Microdrive conversion program.

Type in the program and save it before running. Run the program and the prompt "Program name" should appear on the screen. In response, type in the name you want the files on the Microdrive cartridge to begin with. When asked for the name of the first cassette code file given by the cassette header reader program, type in the name of the first code (byte) file that appears on the list not marked by SCREEN$.

Next you will be prompted for the start address, which is the first number given, and then the length, which is the next number. For example, if the cassette

Cassette header reader

```
  1 REM ************************
  2 REM *Cassette  TaPe  Head*
  3 REM *     Reader          *
  4 REM *CoPyri9ht   G.B.Monk*
  5 REM ************************
  6 CLEAR 31999: REM Lower RamtoP
 10 PRINT INVERSE 1;"  CASSETTE THPE HEADER READER.  "''
 20 GO SUB 1000: REM Read Machine Code
 30 RANDOMIZE USR 32000: REM Call Machine Code
 40 DIM a(17): FOR i=1 TO 17: LET a(i)=PEEK (32499+i): NEXT i: REM Read header
data into a()
 45 LET a$="": FOR i=2 TO 11: LET a$=a$+CHR$ a(i): NEXT i: REM Let a$=Name
 50 GO SUB 100+100*a(1): REM Go to Program,Bytes or data
 60 PAUSE 100: GO TO 30: REM Pause and rePeat
 99 REM a(1)=0 PROGRAM
100 PRINT "Program: ";a$;" ";
110 LET l=a(14)+256*a(15)
120 IF l<=9999 THEN PRINT "LINE ";l
130 IF l>9999 THEN PRINT "NO LINE"
140 RETURN
199 REM a(1)=1 NUMBER ARRAY
200 PRINT "Number Array: ";a$;" ";CHR$ (a(15)-32);"()"
210 RETURN
299 REM a(1)=2 STRING ARRAY
300 PRINT "String Array: ";a$;" ";CHR$ (a(15)-96);"()"
310 RETURN
399 REM a(1)= BYTES
400 PRINT "Bytes: ";a$;" ";
410 LET s=a(12)+256*a(13)
420 LET l=a(14)+256*a(15)
430 IF l<>16384 AND s<>6912 THEN PRINT l;",";s: RETURN : REM If not SCREEN$ Pri
nt details
440 PRINT "SCREEN$": RETURN
1000 FOR i=32000 TO 32013: READ n: POKE i,n: NEXT i: RETURN
1010 DATA 62,0,55,221,33,244,126,17,17,0,205,86,5,201
```

Code relocator/loader

```
  1 REM ************************
  2 REM *Code Relocater/Loader*
  3 REM *  For  Cassette  to  *
  4 REM *Microdrive Conversion*
  5 REM *CoPyri9ht   G.B.Monk*
  6 REM ************************
 10 CLS : PRINT INVERSE 1;"CASSETTE TO MICRODRIVE CONVERTER"
 20 PRINT "Insert cartridge in drive 1,"''
 30 LET Pb=23296: LET file=0: REM set flags
 40 INPUT "Program name ";n$
 50 IF LEN n$>9 OR n$="" THEN PRINT "Maximum length 9 letters Please.": GO TO 4
0
 60 PRINT "Please input cassette code file names in order from HEADER Prog."
 70 PRINT "Input first file name."
 80 INPUT "File name ";f$
 90 IF f$="$" THEN STOP
100 LET file=file+1
110 INPUT "Start Address ";start
120 INPUT "File length ";length
130 IF start<28000 AND start>23734 THEN GO TO 1000: REM if to low in memory for
MD & not in system variables Jump
140 IF length<10 THEN GO TO 2000: REM if short file Jump
150 GO TO 3000: REM direct save
999 REM file to be relocated
1000 CLS : PRINT "This file will have to be      relocated."
1005 PRINT "Does any other file start      between 23296 & 23312 (y/n)": PAUSE
1: PAUSE 0: IF INKEY$="y" THEN LET Pb=USR "a": REM if Printer buffer used then u
se UDG area for relocator
1010 RESTORE : FOR i=Pb TO Pb+11: READ data: POKE i,data: NEXT i: REM read reloc
ator data
```

header reader program produced:
Bytes: Game1 24576, 12000
then the file name is "Game1", the start address 24576, and the length 12000. The program will now tell you what to do. POKES given by the program should be noted or copied to a printer.

If a file has to be relocated, then an extra file is created on the Microdrive cartridge and the program will give a USR call, which you should also take note of. This call will generally be 23296, but not always. When all files have been converted enter "$" to the prompt "File name" and then enter RAND USR 0.

If a file is too large to be converted, the program will tell you, and if conversion is possible without the program, it will also tell you what to do.

Now the conversion is complete, write a Basic loader program. Catalogue the cartridge by using CAT 1 [ENTER] and a list of the files will appear on the screen. This will contain files with the "program name" followed by a number. A typical catalogue would give:

```
CARTRIDGE NAME
Games 1
Games 2
Games 3
```

These are code files and must be loaded by the Basic loader program, which should be as follows:

```
10 PRINT "Game is loading — please wait."
20 LET d= PEEK 23766
30 LOAD *"m";d; "Games 1" CODE
40 LOAD *"m";d; "Games 2" CODE
50 LOAD *"m";d; "Games 3" CODE
60 RAND USR 23296 (if given by converter program)
70 Any POKES given by converter program
80 RAND USR yyyyy (as mentioned earlier)
```

Line 20 checks what drive the cartridge is in, so you are not restricted to drive 1. Save this loader program using: SAVE *"m";1;"name" LINE 10

Now the conversion is complete and the program is stored on a Microdrive cartridge. To load the program from cartridge first reset the computer using RAND USR 0, and then type:

LOAD *"m";drive number; "name" [ENTER]

■ Cassette header reader program: This reads the header files on the cassette, which are 17 bytes long and contain information about the following file. The first byte contains the program type:

0 = Program
1 = Character Array
2 = Numeric Array
3 = Bytes

The next ten bytes contain the filename in ASCII codes, and the other six contain details of program length, start address, auto start line number, and array visible if appropriate.

The machine code listing for the actual loader is:

```
ORG   3200      ;Start Address
LD    A,0       ;Header file
SCF             ;Load not verify
LD    IX, 32500 ;Load header at 32500
LD    DE, 17    ;Header 17 bytes long
CALL  0556H     ;Call load routine in ROM
RET             ;Return to Basic
END
```

Code relocator/loader (cont.)

```
1020 LET load=65111-length: IF load<28000 THEN PRINT "File to large conversion n
ot   Possible": GO TO 4000: REM load address=hi9h memory, if no room JUMP
1025 GO SUB 6000: REM load and save file
1030 LET v=load: LET a=Pb+1: GO SUB 5000: REM from
1040 LET v=length: LET a=Pb+4: GO SUB 5000: REM length
1050 LET v=start: LET a=Pb+7: GO SUB 5000: REM to
1079 REM save relocator
1080 CLS : LET file=file+1: PRINT "Saving relocator ";n$;file
1090 PRINT "Call with RAND USR ";Pb"before main call."
1100 SAVE *"m";1;n$+CHR$ (file+48)CODE Pb,12
1110 VERIFY *"m";1;n$+CHR$ (file+48)CODE
1120 PRINT n$;file;" Saved and Verified."
1130 PRINT "Press any key to continue."
1140 PAUSE 1: PAUSE 0
1150 GO TO 3020: REM next file
1160 DATA 33,0,0,1,0,0,17,0,0,237,176,201: REM relocator data
1999 REM short file
2000 CLS : PRINT "Please Play cassette."
2010 PRINT "Loading ";f$
2020 LOAD f$CODE 60000
2030 PRINT "This file is so short that it isnot worth saving. Just add thesePOKE
S to the Basic loader Pro9."
2039 REM Print POKE values
2040 FOR i=60000 TO length+59999
2050 PRINT "POKE ";start+i-60000;",";PEEK i
2060 NEXT i
2070 PRINT "Do you want a copy of this y/n."
2080 PAUSE 1: PAUSE 0: IF INKEY$="y" THEN COPY
2090 PRINT AT 20,0;"Please copy Pokes down.          Then Press any key to contin
ue."
2100 LET file=file-1: REM decrease file counter as no save
2110 PAUSE 1: PAUSE 0: GO TO 3020: REM next file
2999 REM direct save
3000 CLS : PRINT "This file is O.K. for a direct  save."
3010 LET load=start
3015 GO SUB 6000: REM load and save file
3020 CLS : PRINT "InPut next file name or $=STOP."
3030 GO TO 80: REM next file
3999 REM not enough memory 9ive instructions
4000 IF load<26000 THEN PRINT "Conversion to Microdrive notn  Possible. Sorry."
: STOP
4005 PRINT " with this Pro9ram.""However conversion may be      Possible by a
direct means do  you wish to try (y/n)."
4010 PAUSE 1: PAUSE 0: IF INKEY$="n" THEN STOP
4020 CLS : PRINT "O.K. I will now save relocator  Program. After relocator saved
 enter $ to 'file name then enterthe followin9."
4030 PRINT "RAND USR 0"
4040 PRINT "CLEAR ";load-1
4050 PRINT "LOAD *""m"";f$;"" CODE ";load
4060 PRINT "Then Play the cassette."
4070 PRINT "SAVE *""m"";1;"""";n$;file;"" CODE ";load;",";length
4080 PRINT "VERIFY *""m"";1;"""";n$;file;"" CODE"""
4090 PRINT "Do you want a copy of this y/n."
4100 PAUSE 1: PAUSE 0: IF INKEY$="y" THEN COPY
4110 PRINT AT 20,0;"Please copy this down & Press a key to continue": FOR i=1 TO
 100: NEXT i: PAUSE 1: PAUSE 0
4120 GO TO 1030: REM save relocator
4999 REM Poke a 16 bit address
5000 POKE a,v-256*INT (v/256): POKE a+1,INT (v/256): RETURN
5999 REM load and save a file
6000 CLS : PRINT "File Name";f$
6010 PRINT "Please Play cassette."
6020 PRINT "Loading ";f$
6030 LOAD f$CODE load
6040 PRINT "File loaded O.K."
6050 PRINT "Saving ";n$;file
6060 SAVE *"m";1;n$+CHR$ (file+48)CODE load,length
6070 VERIFY *"m";1;n$+CHR$ (file+48)CODE
6080 PRINT n$;file;" Saved and Verified."
6090 PRINT "Press any key to continue."
6100 PAUSE 1: PAUSE 0
6110 RETURN
```

■ Code relocater/loader for casstte to Microdrive conversion: this takes the data (entered from the above program) and then loads the file from tape and saves it onto Microdrive. The program contains checks to see if the code needs relocating (line 130), if it is a short file (line 140), and if it is alright for a direct save (line 150). The relocater data are stored at line 1160. This information is POKED into a free area of memory, normally the printer buffer.

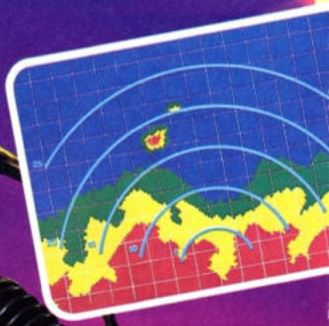
The machine code listing for the relocater is:

```
ORG   Pb        ;Start Address
LD    HL,       ;move from
      FROM
LD    BC,       ;length
      AMOUNT
LD    DE,TO     ;move to
LDIR            ;move it
RET             Return to Basic
```

WARNING

This program must only be used to convert your own software onto Microdrive cartridges for your own use. Sale of cartridges with converted programs on, or copying other people's software onto your cartridges is an infringement of copyright laws.

Fly the world's deadliest mission!



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FOR COMMODORE 64

CREATIVE SPARKS



PCN micropaedia

Vol 21 Part 1

PULL OUT AND KEEP

GAMES COMPENDIUM

Atari arcade action
BBC blast-off
Commodore 64 Cavalcade
Spectrum spectacular
Dragon Digressions

GAMES : BBC AND ELECTRON

Welcome to gameplayers' heaven. This week sees the beginning of our two part Micropaedia devoted exclusively to games reviews. We have collected together a large selection of arcade, adventure and educational games for six of the most popular micros: the BBC B, Electron, Sinclair Spectrum, Dragon, Commodore 64 and Atari.

On the next two pages are six games for the BBC micro B and the Electron — something for everyone, young and old alike.



Name Pengwyn **System** BBC B and Electron **Price** £6.95 **Publisher** Postern, Cheltenham, Tel: 045-16666 **Format** Cassette **Language** Machine Code/Basic **Other versions** None known **Outlet** Mail order and retail

You are a penguin who must survive the rampaging penguin eaters and move around a maze gathering points by kicking blocks out of the way. The yellow penguin eaters chase you, but they can be stopped by kicking one block into another and then into them.

The other way to avoid disaster is to merely clear the maze. This moves the game up a level and gives the player bonus points.

Loading takes a long time as there are three parts. The first program has the display, instructions and set-up for the game, while the second part is the main game.

Warning: the Electron version is noticeably slower than the BBC.

In play, you are faced with a maze two thirds filled with solid blocks. Penguin sets off, only to find some of the blocks hatch into penguin eaters.

Kicking a block once cracks it, twice destroys it. If a block is kicked into the oncoming enemy it stops him. The penguin eaters also eat the blocks as they come across them. As play progresses each level becomes harder and more fun to play.

Apart from the Electron version's slowness, Pengwyn is a winner and a must for your collection.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Bumble Bee **System** BBC B **Price** £7.95 **Publisher** Micro Power, 8 Regent St, Chapel Allerton, Leeds **Format** Cassette **Language** Machine Code **Other versions** None **Outlets** Retail/Mail order.

This enjoyable game's friendly characters and ease of play make it suitable for junior or newer players.

You control a bumble bee and propel it round a garden. As it moves it must try to eat scattered pollen grains. Toadstools and bowls of fruit are also on display, but must be avoided as they are poisonous.

At regular intervals spiders are released from their nest into the garden and attempt to kill the bumble bee. They are immune to the toadstools, but not to the bowls of fruit.

While moving through the garden, the bee collects bonus points by eating the extra large bundles of pollen and by eating the fruit that appears periodically in the spider's nest.

The garden has paths and gates. As the bee moves about, it opens the gates and creates new pathways to follow. The spiders cannot open the gates and so can only follow the bee.

Besides the spider's nest, the other main feature is a tunnel leading from one side of the garden to the other. The bumble bee can follow this, but not the spiders.

No fairies at the bottom of the garden, but a large gate to the next level of play. This only opens when the bee has eaten all the current level's pollen. At higher levels the game is played at successively faster speeds.

The strategy is to direct the bumble bee to open the gates so the spiders are forced to follow the paths: the spiders can be lured toward the bowls of fruit, which kill them. However, giving bonus points for eating the fruit that occasionally appears in the spiders' nest is spoilt by having an indicator telling you when the next spider is due to appear.

This was an enjoyable game to play, but is not for the experienced player.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Nemesis **System** BBC B **Price** £7.95 **Publisher** Micro Power, 8 Regent St, Chapel Allerton, Leeds **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Retail/Mail order.

Yet another variation on space invaders. This time the alien attackers are Vogons, with Chargers, Crushers and Crawlers as allies.

The game is played in an area of outer space, the top half of which contains a good number of asteroids. The Vogons attack in waves, starting from the top. Their allies attack from different places, depending on the level of play attained. You have one spaceship, with an extra life awarded on scoring 5000 points.

You, the defender, are at the bottom of the screen. The Vogons come in waves of about ten. They slowly snake downwards, changing direction as necessary in order to avoid the asteroids which complicate aiming and firing at them. Two direct hits destroy the asteroids, but even then it is necessary to avoid the falling debris. Further, as the attackers are destroyed, they too disintegrate and shower debris.

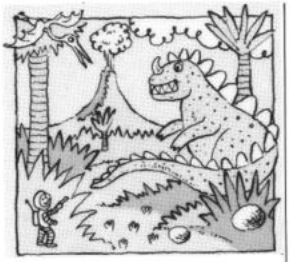
Horizontal movement of your defender is good and not too fast to allow you to keep track of the attackers easily.

As the game progresses, additional hazards are introduced. Chargers dive bomb you and Crushers bounce around from side to side on the screen. The only other type of attacker, the Crawler, creates 'warp vectors' from the asteroids in its path. If any of the Vogons make contact with these, they are immediately transported to the bottom of the screen.

This particular version of space invaders is not too impressive. The idea of introducing additional hazards that move horizontally is not a particularly new one, and they prove relatively easy to avoid.

The overall impression is of having to play in a tightly compressed area, which was increased by the asteroids and by constantly having to avoid so much debris.

RATING	
Lasting appeal	
Playability	
Use of the machine	
Overall value	



Name Lords of Time **System** BBC micro B **Price** £9.90 **Publisher** Level 9 Computing, 229 Hughenden Road, High Wycombe, Bucks **Format** Cassette **Language** Machine code **Outlets** Mail order and dealers.

This program is really nine small adventures in one. The brave adventurer, described as a freelance programmer for Level 9, must search through eight time zones to recover certain objects to be used in the final battle with the timelords in a ninth zone.

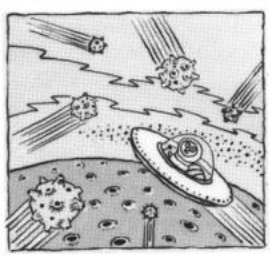
The long program only just fits in a 32K machine, but a catchy little baroque style tune is played *during* the four-to-five minute loading time.

This is an all-text adventure with no trimmings such as colour or flashing effects. In place of these are very full descriptions of in excess of 200 locations. The trek starts from the comfort of your own house but eventually a time machine gives you access to any of the time zones you need to visit. The manual suggests you tackle the zones in numerical (not chronological) order to ensure you have the right equipment with you to combat difficulties. This rather depends on what you pick up and which puzzles you manage to solve. The various areas of history visited are the Ice Age, the Age of Dinosaurs, the Vikings, the Romans, the Middle Ages, the Renaissance, the present day, a possible future and somewhere that might be timeless.

Level 9 makes much play of its sophisticated command interpreter, but I still managed to get 'You can't go in that direction' to my command 'put rope in rucksack'. I also found it annoying to have to open every door to get through.

Lords of Time crams a very large adventure into a comparatively small amount of memory, gives lively and detailed descriptions and copes with quite involved commands. The scenarios are inventive and complex and even the seasoned adventurer should be kept puzzling for a good while.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Sentinel **System** BBC micro B **Price** £7.95 **Publisher** PSS, 452 Stoney Stanton Road, Coventry **Format** Cassette **Language** Machine code **Outlets** Mail order and dealers

In this version of *Tempest* for the BBC, you have charge of a sentry ship on the borders of a one-dimensional universe (actually two) and are required to prevent the incursion of anti-matter aliens trying to make the transition from their galaxy to yours.

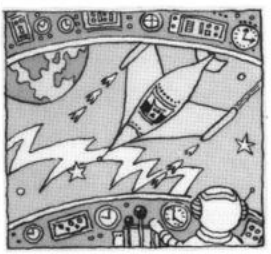
The PSS version of the game is a lot simpler graphically than the dedicated arcade game. Only one shape is used, a square set off-centre within a larger square. A number of lines connect points between the two squares and two types of alien move out along these trying to reach the perimeter. The first type look like flashing arrows and are there only to provide points when you hit them. The second type are more sinister, and look like squashed Vs. When these reach the edge of the figure, they move round trying to settle on the same sector as your ship. If they succeed you lose one of four lives, but you do have access to two Star-Smashers at each level, and these will obliterate all aliens on display.

As you progress up the levels you must contend with intermediate sections of asteroid attack. This involves moving your ship around the perimeter avoiding fast-moving asteroids which again radiate from the centre of the figure. This is the hardest part.

The author of Sentinel has tried, where possible, to overcome the limitations of the BBC micro (mainly speed) by sensible simplifications of the arcade game. There are a couple of minor grumbles, such as that you must complete a section to gain a score for it — losing a life sends you back to the start. The first section is also redundant since two bursts of the Star-Smasher will destroy everything.

Overall, however, Sentinel is very enjoyable, addictive and a change from run-of-the-mill Space Invaders.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Cylon Attack **System** BBC micro B **Price** £7.90 **Publisher** A & F Software, 830 Hyde Road, Gorton, Manchester **Format** Cassette **Language** Machine code **Outlets** Mail order and dealers.

As pilot of an interceptor spacefighter, your task is to protect your mothership from attack by Cylons. After launch from the mothership you have full control over your fighter and must hunt out and destroy the four varieties of Cylon attack craft.

The cockpit display is largely composed of a view of space immediately before you. Above this is a useful long range scan, similar to Defender-type games. Various scores, meters and status indicators are positioned around the main display.

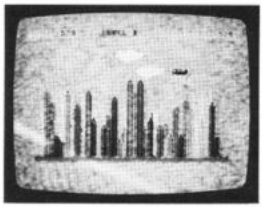
Once lauched out of the mothership, your fighter proves very responsive. The external view shows a backdrop of stars and various other space debris, which move smoothly when you manoeuvre your ship. The Cylons attack rapidly, turning from mere dots to full-blown nasties in a moment. At the first level they shoot one bolt at you when they are as close as possible. Later on they fire whole streams of high energy bolts. Your own lasers are effective, once you've lined up the offending alien in your sights.

Overcome a wave of attackers and you must relocate your mothership and lock on for landing. Your shields and fuel are replenished and you're ready for the next wave — a pity there's no way of pausing between attacks. The game ends when you're hit with your shields exhausted.

A rare phenomenon: a computer game which exceeds the promise of its publicity and packaging. This game sets a new standard for space games on the BBC. The graphics are smooth and convincing, the sound effects are good and, above all, the sense of realism achieved by the game is impressive.

There is the option of loading a hall of fame, on which up to 50 names can be held. A & F is offering a £200 prize for the highest score sent to them on cassette.

RATING	
Lasting Appeal	
Playability	
Use of Machine	
Overall Value	



Name Bomber Run **System** Commodore 64 **Price** £4.95 **Publisher** Softcell, Tel: (0983) 535737/295955 **Format** Cassette **Language** Basic, machine code **Other versions** None **Outlet** Mail Order and retail.

You must land your plane because it is fast running out of fuel, to which end, the city below must be destroyed by bombs. The game gives you the option of joystick or keyboard controls. The joystick facility is a non-starter, there is only one control needed (drop bomb).

This resembles the Commodore-produced Vic 20 game. The aim and keyboard controls are even the same but here the screen layout is superior. The plane flies across the screen in both directions and you have a choice of levels, which Blitz did not. The city is much clearer and there are moving clouds.

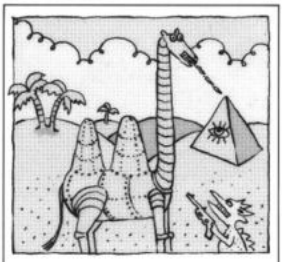
With the city destroyed, your plane is refuelled while the pilot jumps for joy and the game moves up a level. There's a high score table and an option to change levels or quit, as well as a demo mode.

The high-flying jet (biplane on level 5) circles ever lower as the fuel runs out. (There is an unlimited supply of bombs.) Once a bomb has been dropped, no more may be dropped until it has hit the ground, which limits you to the best shots to get the highest score or finish the game. Should you successfully complete a game the plane lands and the pilot goes for a little spin around the screen while the plane refuels. The plane then heads skywards and the game starts again.

Should the plane crash there's a technicolour explosion and the game restarts. At this point you can change levels, end the game or see the demo mode. If this was the first of the bomber range of games it would have to be judged as very good.

All in all, Bomber Run with its added features beats Blitz to the end of the runway but it's all been done before and it's tame stuff today.

RATING	
Lasting appeal	
Playability	
Use of machine	
Value for money	



Name Revenge Of The Mutant Camels **System** Commodore 64 **Price** £8.50 **Publisher** Llamasoft, Tadley, Hants **Format** Cassette **Language** Machine code **Other Versions** None **Outlets** Most retailers.

You gave those poor old camels a thumping in Llamasoft's earlier game but now you're on their side against a madcap multitude of aliens.

Rather special, these camels. Ninety-foot high, neutronium skins, Olympic high-jump champions, spitters of deadly missiles.

The tape comes with a different version on each side. One loads in the normal way (approx 15 minutes), the other uses an experimental loading system called Turbo. You can choose the length of each attacking wave, and order. This is an excellent idea since it gives you the chance to see most of the screens. Your giant camel strides elegantly across the sands, which scroll smoothly from right to left. The camel walks, jumps, sits down, and stops. It also fires in any of the eight joystick directions (no keyboard options).

The scrolling background is at first suitably camel-related — there are pyramids with winking eyes and waving palm trees but mountains and space cities appear later. All is mesmerisingly picturesque and tranquil before the first attack.

The aliens come thick, fast and weird, each wave more bizarre than the last. A few of the less exotic are kangaroos on skis, portable loos, clouds raining real cats and dogs, eagles dropping ten ton weights, flying CND badges, telephone booths, music stands and walking sticks.

Surviving is a question of ducking, leaping, running and firing back. Each enemy hit on your camel damages its shields, causing it to slowly change colour. When maximum damage is reached the camel flips over onto its back, legs in the air.

Graphically superb and thoroughly testing — the best yet from Llamasoft.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Enchanter **System** Commodore 64 **Price** £34.95 **Publisher** Infocom, USA **Format** Disk **Language** Machine code **Other Versions** Atari 32K **Outlet** Retail from Softsell distributors and major dealers.

Evil warlock Krill is on the move again, in this new all-text adventure. What is required is someone unknown to Krill, someone who is a newly fledged Enchanter, someone who is you. Fear not, you at least have a Book of Spells. True, it is a slim volume to start with but then you are a very inexperienced Enchanter.

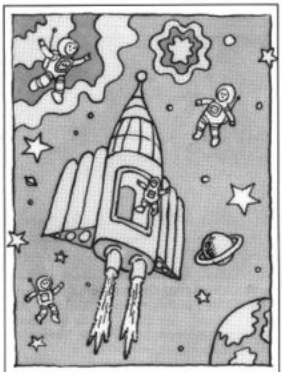
As in all Infocom Adventures, the narrative and descriptions of locations are beautifully detailed. It's like a really good read, in which you take on the major role.

Your ability to cast spells is your major weapon against evil. The catch is you must first find some spell scrolls. The spells can be used immediately but that way they can only be cast once: far better to record them in your spell book — fortunately, you already have a spell to do that for you. Some are too powerful to be written away and so can only be used directly from the scroll. The spells have peculiar names and it's easy in the heat of the moment to panic and cast the wrong one.

As usual with Infocom adventures, the vocabulary is wide and commands can be complex. The accompanying documentation sample lists over 40 verbs. Abbreviations are accepted and you can save and restore the game-state to and from disk. The range of verbs and nouns and the sophistication of the command parser make the playing seem that much more natural.

Expensive but worth every penny — it is an engrossing and thoroughly entertaining, large-scale enchanting adventure.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Zoids **System** Commodore 64 **Price** £7.95 **Publisher** Softek International, London WC2 **Format** Cassette **Language** Machine code **Other Versions** None **Outlets** Mail order.

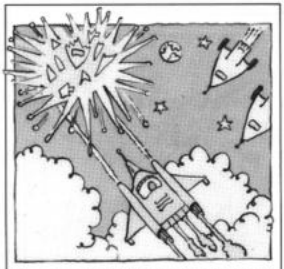
The game for someone who wants to fight mutating aliens accompanied by a Bach Fugue. A distant cousin of JS Bach fell asleep, and dreamt in technicolor of views which he would have seen through an electron microscope (if he had had one at his disposal).

Your aim is to blast Zoids out of existence, with the laser of your Plectoid — none too easy as the enemy require more energy to eliminate them as they become more mature. This is a solo game, and offers a number of levels of difficulty, measured in rounds which you progress through automatically. You start with three lives, losing one whenever the Zoids touch your Plectoid ship.

Your energy level is replenished by your colleagues who float about your ship in space suits. Unfortunately they are in suits of planned obsolescence: they blow up if you don't pick them up, (by putting your ship into contact with them). You score 100 points for each man picked up, and you score higher numbers of points according to how far the mutation process has gone before you blow up the developing zoids. At the right of the screen display is a constantly updated scoreboard, with how many lives you have left. Unfortunately, the later rounds do not offer a change of scenery. You merely have to work faster.

While there is excellent high speed joystick response, good graphics, smooth animation, good use of colour and sound, the game is too repetitious to retain your interest for very long.

RATING	
Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Arcadia 64 **System** Commodore 64 **Price** £5.50 **Publisher** Imagine Software. Tel: (051) 236-8100 **Format** Cassette **Language** Machine code **Other Versions** VIC 20, Spectrum **Outlets** Retail.

Arcadia is a super all-action arcade game for the 64. It's got all the features of the best arcade games around so basically it's a high-quality 'blast-em-down' game.

You're responsible for staving off successive waves of alien fighters. To do this you can use the keyboard or joystick to move your spaceship around the screen, firing continuously at oncoming enemy ships.

If you survive an attack wave, the game moves up a level.

Arcadia takes some 18 minutes to load, which should give you some idea of the standard of the game. When it's finally in RAM you get a stylish title screen. Then comes an option list from which you can select keyboard or joystick, one or two players and the starting level.

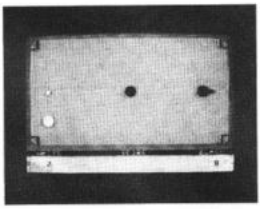
Joystick control is standard but the keyboard controls are a complicated affair. Moving left and right is via the bottom row of keys, alternate keys moving you in opposite directions. The second row of keys give you thrust and any key on the third row fires missiles.

The aliens appear at the top of the screen and descend toward you. Survival depends on avoiding them or, better still, shooting them down. Each level has a time limit and once this is up the next level is started.

The aliens come from different directions on later screens, and they come in a wide variety of shapes and colours which helps to maintain the interest.

The game has a strong addictive quality and is certainly fast and complex enough to keep enthusiasts at it for days on end. It falls down in one area, the screen display is neither as good nor as clear as the earlier Vic 20 version. Nevertheless, it's a very good game and more than worth a try.

RATING	
Lasting appeal	
Playability	
Use of machine	
Value for money	



Name Pottit **System** Commodore 64 **Price** £6.99 **Publisher** Romik. Tel: 0753-71535 **Format** Cassette **Language** Machine Code **Other Versions** None **Outlet** Retail and Mail order.

Just the thing for billiards players: this is a spoof on the game for two players. They control a ball each and have to pocket a red ball. Each cue ball is controlled by joystick.

As they move the cue balls gather speed, only slowing down after collisions and not always then, which makes them hard to control.

Romik have added a note on the instructions: 'Bending the joysticks will not make the balls go any faster.' This is certainly true — you have to learn other techniques to beat your opponent.

The players score points whenever they pot the red ball or hit their opponent's ball immediately after potting the red. Points also go to the player who hits the red ball first, after a collision of cue balls. If the opponent's cue ball is pocketed, points are scored against them, and the first player to reach 50 points wins the game.

If nothing else, the game follows in much the same spirit as full-size billiards — but compacted down to a 26in cathode ray tube.

The initial screen display is a pool table with three balls. One red ball, one white and one black. The black and white are the cue balls. At the start of each game the balls are placed in a line each on their own spots. The balls are re-spotted each time one is pocketed.

The sooner you get used to the unusual operation of the joysticks the better. The score is displayed along with a coloured indicator, to show potential scores. One of the best ploys is to keep between the red ball and the opponents ball. The only drawback to Pottit is the need for two joysticks but it would not be the same game without the joystick controls. The game is original, responsive and entertaining.

RATING	
Lasting appeal	
Playability	
Use of machine	
Value for money	



Name Bimbo **System** Any Spectrum **Price** £5.45 **Publisher** Joe the Lion (061-366 7431) **Format** Cassette **Language** Basic **Other Versions** None **Outlets** Mail order/retail

You're in a fixed-shape maze, only part of which appears on the screen, and scattered around are ten carrots which you must eat to progress to the next level. Eating ten raw carrots is preferable to being eaten by the black rabbits who are after blue Bimbo.

The game is well-designed, but limited. You start at the centre with a black rabbit hot on your fluffy little tail . . . well, it would be if you had a tail, the rabbits being represented by mobile heads. At the top of the screen is a row of up to ten carrots, which is the number you've still to find and at the bottom a row of five heads: your remaining lives. You get an extra life every 10,000 points.

At the top left is the latest device no rabbit should be without. Not a video or an electric toothbrush, but a radar of the whole maze, with dots indicating where the carrots are, and flashing dots showing for the rabbits. Other features of the maze are pieces of clover, which you don't have to eat but give you extra energy if you do, as will the carrots. There's no indication of how you're doing for energy. There are pits, which are easy to spot but still claim the occasional panicky rabbit victim.

After the first level the number of black rabbits increases by one each time, except that every fourth level you're spared the pursuers but have to battle on a time trial to collect all the carrots.

The major drawback is the jerky movement of the maze.

Good fun in a limited way, but probably one of those games that's hare today, gone tomorrow.

RATING	
Lasting appeal	
Playability;	
Use of the machine	
Overall value	



Name The Oracle's Cave **System** 48K Spectrum **Price** £7.95 **Publisher** Doric Computer Services, 3 The Oasis, Glenfield, Leicester **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order/retail

The Oracle's Cave could be a parable of what is wrong with humanity today. As you plod through the cave complex, you bump into a whole range of elaborate graphics characters, beautiful creations, and what do you do? You kill them . . .

You're a nasty piece of work. You've gone into the Oracle's Cave on a treasure hunt, and you can't leave until you've killed the Thing of your choice plus the Oracle itself, and collected a large store of treasure. Gambling debts? Saving up for an IBM PC? The instructions do not elaborate.

You have just five days — which works out at about an hour's play — to leave the place looking like a turkey factory.

The field of play is a vertical cross-section of a series of caverns, on a number of levels, where you meet and generally kill the Giant Rat, Ogre, Mummy or whatever before you can go anywhere but back the way you came. As you fight them, your strength and energy decrease which you build up again by eating and resting.

Commands are single key, presented in the form of a menu of single letter options. So, initially you opt to move, explore, rest or use an object, then if you opt to move, you'll be given the options left, right, up, down or secret passage.

Once you're locked into one of these menus, it's not possible to get out — you say move, you move. This explains the *h for help* function, which sends you straight back to the start.

Winning is about tooling up with axe and sword, and using the magic ring and the magic cloak to improve the odds.

In principle, an adventure where you hit things rather than solve puzzles makes a nice change, but this one may be too simple.

RATING	
Lasting appeal	
Playability	
Use of the machine	
Overall value	



Name Demon Lord **System 48K Spectrum Price** £9.95 **Publisher** Javlin Software, 33 Albert Street, Mansfield, Notts **Format** Cassette **Language** Basic **Other Versions** None **Outlets** Mail order/retail

This cassette contains the first half of four-part *Demon Lord:* Fortress of Fear and Forbidden Forest. There's a simple picture for each location.

Set in England at the time of King Arthur, your task is to infiltrate Perilous Castle, lair of the vile Demon Lord, where Arthur himself is 'held in chains of finest steel, tempered in hell.'

The graphics occupy the top half of the screen, with a description underneath, including exits and visible objects (still worth having a look for others) and room for your responses at the bottom. The drawings are adequate, and you have to wait for the picture to be drawn even if you're just passing through a location. As the author has chosen to include his objects in the picture, it has to be drawn each time you take an object. What's more, some locations have several objects yet you are allowed only single entry commands.

Your tasks require careful planning though, and you often have to decide whether discretion or violence is preferable. Do you stay and fight the head hunters, run away, hide, or what? The customary healthy dose of magic is involved.

A help feature in each location suggests what line of thought you ought to be following; you also need to uncover secret words at different stages, as these are needed to go through doorways and past an Elf in Section Two who gives you a grilling worthy of Magnus Magnusson. At

Demon Lord has good points, and taxes the brain at times but the clumsy text isn't especially evocative. Your commands are read as strings, so unless you have it spot on within the two or three possibilities you get the standard response: "Sorry not acceptable."

RATING	
Lasting appeal	
Playability	
Use of the machine	
Overall value	



Name Wheelie **System** 48K Spectrum **Price** £5.95 **Publisher** Microsphere, London N10 **Format** Cassette **Language** Machine code **Other Versions** None **Outlets** Mail order.

Wheelie's plain packaging belies an excellent game.

You drive a powerful Zedexaki 500 bike through a maze of tunnels in search of the slumbering ghostrider, whom you wake and then race back to the start, avoiding the bouncing hedgehogs. You control a small motor cycle and rider that stay centre screen with the passing background scrolling left and right. The tunnels have ramps leading up and down onto other roads. As you see only a part of the maze you've no idea whether you're heading towards a brick wall, a patch of ice . . . or the bouncing hedgehogs. At the foot of the screen is your MPH, RPM and how much fuel is left in your tank. This is replenished by riding through the gas signs that appear.

There's a high-score record, and you have four lives. Further hazards are cars and buses to jump over, and humps in the road which require doing a wheelie.

Once through the first screen you're given a codeword to enable progress to tougher levels, involving kangaroos and birds — all well versed in karate.

The main attraction of *Wheelie* though is undoubtedly the excellent graphics — if a little gruesome — the biker parts company from his bike in a most realistic manner. The speed of every manoeuvre has to be just right, with ice patches driven through very slowly to avoid spinning. The sound effects too are first class, even the little putt-putt noise as you run out of fuel. The maze is frustratingly well worked-out. Usually you know if there's a hazard then there's likely to be gas beyond it, but just occasionally you'll crawl through two ice patches and duck under a hedgehog only to find yourself in a dead end.

With a different maze generated for each play, this is an exceptionally addictive game.

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Alchemist **System** 48K Spectrum **Price** £5.50 **Publisher** Imagine, 5 Sir Thomas Street, Liverpool, Merseyside **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Retail.

In this stylish arcade cum adventure quest, you are the most skilful alchemist on earth (obviously did well in your Chemistry 'O' level) and have been summoned to do battle with the Evil Warlock in his castle to prevent him terrorising the earth. You must find the four sections of magic scroll which, when assembled, will turn the Warlock's own Spell of Destruction against him.

The Warlock's castle is a series of passages, part of which is shown on the screen above a block of information. You begin as the Alchemist and can move left and right, with the background scrolling as you approach the edge of the screen. A flick of the wrist or press of a key transforms you into an eagle, enabling you to fly over gaps and through passages off the top and bottom of the screen.

However you travel, you will see such objects as daggers, swords, shields, vases, rings and similar tempting items (including the odd trap) and it's up to you to discover what you're meant to do with them as you can carry only one item at a time. Trying to bar your way and generally do you mischief is a range of adversaries, such as ghosts, skulls and killer ants, not to mention killer tortoises and killer brollies.

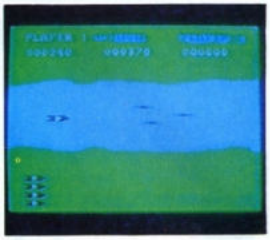
Information at the foot of the screen shows your Spell Energy, Stamina and any spell or object you are carrying. An hour-glass indicates how long you can stay in a spot before discovery.

The graphics are colourful and impressive, but the most intriguing part of *Alchemist* is you're not quite sure what you're doing, so you experiment with moving objects from place to place, trying different spells: will the bucket see off the brolly, and so on.

While *Alchemist* is not breathtakingly original, it's up there with the best of the recent releases.

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	



Name River Rescue **System** 48K Spectrum **Price** £6.95 **Publisher** Thorn-EMI, London WC2 **Format** Cassette **Language** Machine code **Other Versions** Atari **Outlets** Spectrum retailers.

One or two players can show off their speedboat skills by rescuing a bunch of Dr Livingstones stranded in the jungle. Navigating a patrol boat along a narrow river, you must pick up lost explorers from one bank and set them down on another. Hazards include crocodiles, islands, sandbanks and mines dropped by enemy planes.

You can shoot the mines and crocs — firing at anything else is a waste of time. Up to two players can take part, each with five boats — joysticks are optional. There is only one skill level.

A bird's-eye view of the scene shows a blue river running from left to right, with green banks on either side. Your patrol boat is a black, sleek craft which moves up and down, left and right but can only travel at one speed.

The screen scrolls rapidly to the left, giving the impression that the boat is ploughing along the river. Black crocodiles, jaws snapping, are soon encountered — they can be shot or dodged. Floating islands and sandbanks sink your vessel on contact.

The rescue point is indicated by red jetties; docking is accomplished by pulling in beside one.

If you dock at a jetty on the north bank, a tiny figure runs out and jumps into the boat. Dock at a south jetty and any passengers leap off.

Depositing six or more explorers at one time results in a pair of piers ahead, and steering through them earns a bonus boat. Dumping nine passengers earns you a bonus score.

The single skill level means the interest of the challenge does wear thin. Reasonable to start with, but not enough to pull you back again and again.

RATING

Lasting Appeal	
Playabilty	
Use of Machine	
Overall Value	



Name Scuba Dive **System** 48K Spectrum **Price** £5.50 **Publisher** Durell Software, Castle Lodge, Castle Green, Taunton, Somerset TA1 4AB **Format** Cassette **Language** Machine code **Other versions** Oric-1 **Outlets** Mail order.

The standard of excellence of the loading graphics is maintained throughout the game.

You must dive to the sea bed and collect pearls first from oysters, then larger pearls from clams in underwater caverns, then look for treasure chests in the caverns beyond the caverns. My sole carp is the lack of a joystick option, though you can choose your own keys to control the diver's four movements: accelerate, decelerate, and rotate clockwise and anti-clockwise. You can also choose from four skill levels and say whether you want to load a previously saved high-score table.

You start on the back of a launch with three divers ready to go overboard. Pressing the accelerate key tumbles the first one over the side and into the water, and you move him down to the seabed to look out the oysters. He can collect a pearl only by touching an oyster when it's open, with the skill level affecting how long and how often they open. Touching the oyster is tricky as it's easy to either bump against the seabed and render youself temporarily unconscious or get a little too close and allow the oyster fatally to snap shut on you.

A table at the side of the screen shows your depth, amount of oxygen left, a high score, and the number of points you are holding or have actually scored — they're not scored till you return your goodies to the boat, being careful to avoid the propellers.

On the seabed a giant octopus guards the cavern entrance where the clams are. You must speed past the waving tentacles, and then beyond this cavern another entrance is guarded by another octopus, this being where the treasure chests are. You earn an extra life if you get this far. At this stage there are oxygen cylinders around to save repeatedly returning to the surface.

As if all this wasn't enough, millions of colourful sea creatures teem around you, fatal to the touch. You hardly need reminding that sharks are not vegetarians. It's here the graphics really impress, with jaws opening and closing smoothly, and impressive 3D effects as the creatures lazily turn in the water. There are also squid, jellyfish, schools of small fish, and others you won't meet this side of a fishmonger's slab.

An excellent game showing the full potential of the Spectrum's graphics, and worth fishing out.

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	



Name Stonkers **System** 48K Spectrum **Price** £5.50 **Publisher** Imagine, 5 Sir Thomas Street, Liverpool **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order/most dealers.

Stonkers is *the* war strategy game, streets ahead of anything else available. It may take as long to load as the Americans took to come into World War II, but it's worth the wait.

You have a port and HQ to defend while trying to attack the enemy's, and as you both start with equal numbers of divisions it's strategy that decides the outcome.

There are two levels of play — in the more difficult one you don't see the enemy till it's in the vicinity of one of your own units. The action occurs at the edge of two land masses, joined by a bridge, the terrain being hilly and partially wooded. Initially you see a large scale map of the area, on which is a diagonally striped cursor. By pressing the fire-button, or appropriate key, the area under the cursor is immediately magnified 64 times and the screen switches instantly to the more detailed map.

On the smaller map the cursor becomes a cross, and you can move this to scroll the map in any direction. Placing the cursor over one of the unit symbols prints its details underneath, and, provided it is not already in motion, allows you to move it. Units don't move instantly, but follow the path you take with the cursor, and will stop at the place where you next press the fire-button, or when they reach the limit of their travel for that move. Their speed is governed by the terrain. You must keep supply trucks moving to back up your forces, and take care that your cursor doesn't stray into a patch of water.

Units engage in combat when they confront each other, by chance or choice, and an armoured division will always beat an artillery division, which will always beat an infantry division, though the result of a match between the same divisions depends on their fatigue through travel, back-up and so on. You can always take the coward's way out and retreat. There are also regular ticker-tape bulletins across the screen, telling you when supplies are needed, when ships or enemy divisions are moving etc. The graphics are good without being particularly spectacular, but the speed with which you can move around and switch maps, to see your mobilised forces moving across the landscape, is very impressive, and the whole game is presented with style.

RATING

Lasting appeal	
Playability	
Use of the machine	
Overall value	

Micropaedia editor: Geof Wheelwright
Contributors: Kevin Bergin, Bob Chappell, Tony Harrington, Russell Jones, John Lettice, Barry Miles and Simon Williams
Design: Paul Clarkson

NEXT WEEK

We have bagged another brace of games for popular micros including the Spectrum, BBC, Dragon 32 and Atari. If you're thinking of stocking up your games collection for Easter, don't miss the next vital instalment.

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PCN 1

Pixit Paintbox

Helena Siedlecka says Pixit doesn't fixit for all Apple graphics applications.

The Pixit high-resolution package promises good, easy graphics for the computer-illiterate Apple user. It's designed with the classroom in mind, but claims to be a useful tool for the 'seasoned hi-res hacker'. In practice, however, Pixit has limited applicability. Shapes can be drawn, but not animated, without an understanding of Basic.

Presentation

Publishers Baudville have made the most of attractive packaging. The grey wallet displays the Pixit logo in Liquorice Allsort pastels and black. The wallet has two fold-out panels, and on the inner sleeve is a brief description of its features, with some mouth-watering samples.

Documentation

On first reading, the manual seems quite straightforward. The text aspires to clarity, anticipating likely mistakes throughout. The final chapter is devoted to screen messages like 'oops! disk problem' when things go wrong. The manual contains a useful primer on Apple Graphics. The description of the four colour screen as an 'electronic billboard' is helpful.

Features

The demo features an entertaining little sequence before the Pixit shape tables are displayed, which offer pre-drawn animals, geometric shapes, buildngs, trees etc. The shapes are simple but can be modified, enlarged, rotated and moved around the screen easily. The steam train, trees and the beetle are quite impressive, though animation is slow.

Shapes are created using square, circle, line and dot. Text can be added and shapes filled with colour. Line drawing is nice and smooth, and uses the 'rubber-banding' technique seen in many recent packages of this type. Plotting shapes is simple — the W, A, S and Z keys move the cursor up, down, left and right, but do not plot. The I, J, K and M keys move the cursor up, down, left and right, and do.

In general, the instructions are easy to follow, and switching from function to function is smooth, but if you forget, and can't be bothered to hunt for the manual,





an on-line 'Help' facility makes an acceptable substitute — an idea that greatly improves the usability of this package.

Pixit colours are attractive and easy on the eye. A surprising number of shades can be obtained by combining the four Apple colours — green, purple, orange and blue, but not without loss of resolution.

Pixit does not work with Doublestuff, the modified version of Applesoft which gives 16 high-resolution colours and 560-dot resolution horizontally on the IIe, not because of any real conflict, but simply because the Pixit program doesn't know about the additional facilities. Presumably Pixit could be adapted, and it is to be hoped that future releases will be so modified.

Performance

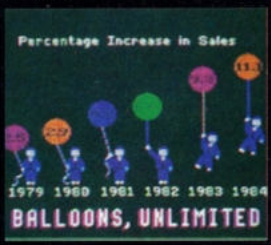
Pixit seemed ideal to try out an idea for a hazard in a game, *Exploding Major*, where the sole function is to move around erratically and blow up everything in the way, but only sometimes.

I had to select Create a Shape from the main menu. The drawing screen which appears has an option allowing drawing with or without grid to make things easier, and magnification up to seven times for detailed work. The flashing cursor appears and plots a tiny square wherever you wish on the screen, and though not a simple process, the instructions are clear and easy.

The first *Exploding Major* took 1,146 moves to complete. I didn't plan first, and so spent a lot of time making, then unmaking, moves. I looked unsuccessfully in the various Editors for some way of removing those unwanted moves, but found none. This was disappointing, and certainly makes the drawing process tedious and time-consuming . . . especially if you don't plan ahead.

The inability to back-track and erase wastes time — it's a common fault in graphics packages. The drawing screen does not function as an electronic layout pad for working out roughs and works better as a method of producing pre-planned, finished images. It seems unsatisfactory to be relieved of folding stuff only to find you really have to start on paper and transfer to the computer screen. In the end I resorted to another package to finish off the Major. Granted, it was well over twice as expensive, but more than twice as fast and far easier to use.

Still, once the Major had arrived, I wanted to animate him and send him blasting away down the street. The manual says it is easy to use shape tables (your own or those provided) in your programs. This is fine if you understand and can write programs in Basic. If you don't, animation with Pixit is out of the question. In which case, Pixit does not 'do all the hard work for you'. There are other graphics packages on the market which give more value for money. Pixit costs $49.95, and for less than double the price, packages with easier and better documented programs, a wider choice of colour and even 3D animation are available.



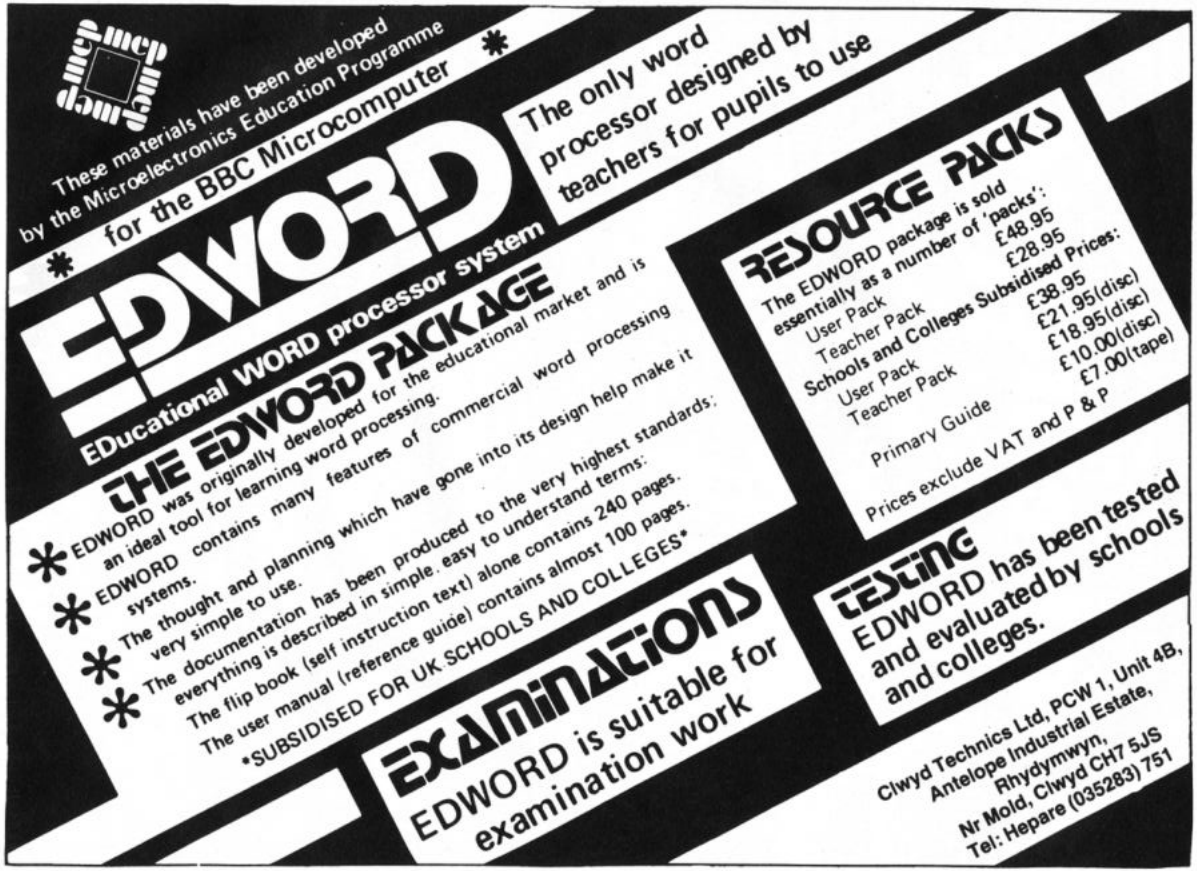
Verdict

Pixit might be useful to a commercial artist for simple artwork and logos, and fun for children. But given the competition, it doesn't really come up to scratch as a serious graphics package. PCN

RATING (/5)

Features	3
Performance	3
Documentation	4
Reliability	4
Overall value	2

Name Pixit **System** Apple II series **Price** $49.95 (upgrade $19.95) **Publisher** Baudville, 1001 Medical Park Dr. S.E., Grand Rapids, Michigan 49506, (616) 957 3036 **Format** Disk **Language** Basic/Machine code **Outlets** Mail order


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the LLAMA has LANDED!

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EDUCATING EDWORD

The whys and wherefores of word processing can be taught with Edword, says Kenn Garroch.

ROMs are clearly the in thing for the BBC micro. Edword (EDucational WORDprocessor) is a ROM-based word processor, priced between Wordwise and View. It is intended for educational use, though the User Pack which includes the ROM and handbooks is available to the home user.

Features

Edword comes in two packages, the teacher's pack and the user's. The user's pack consists of the plug-in sideways ROM, Word For Word, the self-instruction guide, the User Reference Guide and, of course, the fitting instructions for the ROM. The pack also has a sturdy plastic function key strip that fits under the perspex bar above the keyboard and a cassette or disk with some example documents and the printer driver routine.

In the Teacher's pack's snazzy plastic folders are a set of printed sheets describing what a word processor does, why, and who uses one; a set of transparencies for overhead projectors; and some wall charts. These explain the terms used in Edword and how to use the system. Users without access to an overhead projector needn't worry as the charts and transparencies are more or less identical. Last, but by no means least, is the useful Guidelines for Teachers booklet.



In use

Typing *EDWORD takes you into the word processor and you're given the somewhat cryptic options Create, Revise, View, Format and Index. These allow you to start a new document, edit an old one, see what it will look like when printed out, alter the format — tabs, margins, line spacing and the like — and look at the disk catalogue.

The screen display is normally 80 columns but by entering Edword with *EDWORD40, a 40-column display is possible — an advantage to users without monitors.

Some printers need control codes to program large characters or change the font. Edword provides two programmable embedded commands to facilitate the use of the various printer features but, in the main, the 80-column screen display is printed out. The printer driver routine that comes with the system is for the Epson MX82 F/T III but other printers can be used if the printer driver routine is modified with the help of the manual.

One of Edword's main features is its single-key control commands. All the word processing controls, such as to move the top of the document, use only one key press at a time. There are no simultaneous keypresses needed, except to get upper case with the shift key. The commonly used commands are accessed by function keys. Other commands use the command key f9, followed by the appropriate letter or symbol.

The command keys are easily remembered as they are mnemonics of the command to be executed. The only drawback to the f9 key is that it's right next to the Break key which, if pressed accidentally during Create, will lose the document.

Pressing Break during Revise leaves the file locked and Edword will not access it as it thinks it is being used by someone else (it is: by Edword). Fortunately all is not lost as there is an UNLOCK command.

The other 'concept' part of this package is the method of splitting up the document into its component parts, from letters and words, through lines and paragraphs to pages and eventually the complete document. Should a particular operation need to be done to, say, a whole paragraph, just press the paragraph key and the lines from the starting position, up to the next carriage return, are displayed in reverse text. The operation, move or format etc, can then be executed. This paring of the document gives a good idea of structure to someone who has not previously used a word processor.

One of Edword's neater tricks is to display all the carriage returns in a document as inverted triangles. This shows why a certain paragraph is not justifying correctly. It also shows exactly what happens after a document has been justified. Apart from these features, Edword contains all the standard commands found in word processing packages.

The error trapping in Edword is excellent. The error messages are not code numbers or code words but whole sentences and informative at that.

Edword is designed to be largely self-instructional and the two booklets that come with the user pack are nicely printed and fairly straightforward, though the self-instruction manual could have done with a better index.

The user reference guide gives all the possible commands and how to use them. With each one it gives additional instructions on how to restore the display should an instruction be used by accident.

What is most unfortunate about Edword is that it does not allow you to edit Basic programs as the text is not stored in 'spooled' form *ie* it's not stored as a straight ASCII file, so Basic programs cannot be directly loaded back as a Basic program via Exec.

This feature is due at a later date, but only for disk users. This disadvantage cannot be ignored by home users. Another inconvenience is that, because of the format in which the documents are held on file, editing documents other than one written using Edword is impossible. This means any text files you have lying around that require re-editing cannot be done on Edword unless they are reformated using a specially written converter program.

Verdict

Edword has potential as a useful tool for teaching word processing.

As for home users, Edword lacks the flexibility of some other word processors for the BBC, so though it is a useful teaching aid, that's all it is.

RATING

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

Name Edword **Application** Educational Word Processor **System** BBC A/B **Price** User pack cassette £48.95 + VAT, Disk £51.95 + VAT, Teachers Pack £28.95 + VAT **Format** ROM **Publisher** CET & Clwyd Technics, Microprocessor Centre, Coach House, Flint, Clwyd.

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Both authors are regular adventure players, and despite spending many hours in underground caverns throwing axes at dwarfs they still manage to write for a range of computer magazines. Both are regular contributors to *Which Micro?* and *Personal Computer News*, where Mike Gerrard writes their recently introduced adventure column. Peter Gerrard is the author of many of the titles in the Duckworth Home Computing list, including the *Exploring Adventures . . .* series, as well as contributing to *Popular Computing Weekly*, *Commodore Horizons* and *Micro Adventurers*.

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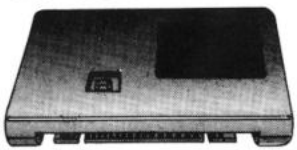


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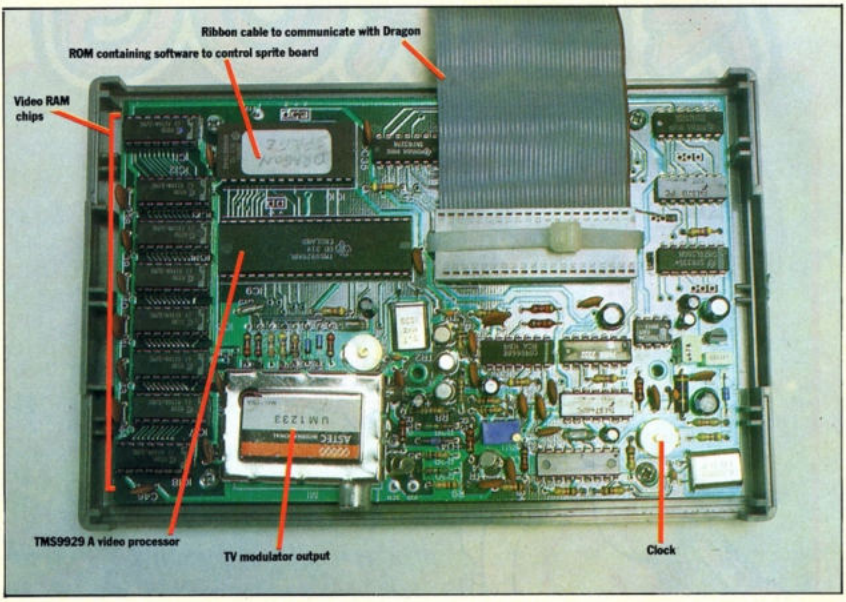
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SPRITELY DRAGON



Bring your Dragon to life with this sprite board, says Piers Letcher.

Dragon owners who have suffered the limitations of poor graphics and colour, can put new life into their machines with the new plug-in Sprite board.

This new device from Premier Microsystems quadruples the number of colours available, from four to 16, and gives 32 levels of sprites, where there were none before. In short, what it does is turn a weak, feeble display into one that is clear, firm and much more flexible.

Setting up

The board comes in two forms: kit, or ready built. Unless you are well acquainted with soldering, and the practicalities of fitting the various chips, resistors and capacitors, I would recommend that you buy it assembled. The extra cost is justified by the time and effort it saves.

If you decide to solder the bits together you will find this the hardest part of setting up the sprite board. A word of warning here too: if you don't get it right then Premier can repair it for you, but it is very expensive, as they charge £25 per hour. The reason for this is obvious — it's not very easy to unsolder someone else's mistakes and often it would have been much simpler to have the kit made up in the first place.

Once the soldering is done the rest is simple. The cartridge part of the device is plugged into the cartridge socket, and the system is powered up. Nothing looks different yet, as you're still working with the normal TV output. You then type EXEC&HEE02, to initialise the board, and plug the TV lead into this rather than directly into the Dragon.

Documentation

The sprite board is documented in two parts. The first of these is a technical guide to the sprite board, and how best to assemble it. It assumes a fair amount of electronic expertise, but given that you are not going to solder the kit together without it this seems fair. Sensible hints are given (solder resistors in before IC sockets etc) along with a full diagram of the finished board, showing where each component should be located.

The second, and more bulky part at 25 pages, is a guide to actually using the sprite board, from initialisation to graphics and sprites use. The whole thing is perhaps a little over technical, but the information you need is there. *PCN* was also supplied with the program given here, which shows off some of the best features of the sprite board. It would have been a good idea to include the program in the manual, as this gives you a much better idea of what can be done.

The only drawback in the manual is that since the sprite board can also be used with the UK101 and the VG/TRS80 you have to sift out the parts relevant to the Dragon.

Features

To illustrate Premier's system it is worth looking at the Dragon, which has a total of eight colours, but you can only use four of these at a time. Colour mixing — the printing of alternate lines of different colours to give the illusion of a new colour — helps a little, but hardly gives the flexibility or clarity of other computers.

This problem is compounded by the Dragon's graphic capabilities: although the on-screen resolution is quite good, at 256 by 192 pixels, if more than two colours are being used it drops to 128 by 192 (each distinct dot becomes two pixels wide). This leads to drawings designed with square pixels being elongated when they reach the screen.

The other problem is that movement is ▸

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difficult as the screen refresh is rather slow and no sprites are available.

If you have built the board, or look at the inside of one that's been built already, you will see that the whole thing is well put together, with the components neatly laid out. Across one end are eight RAM chips, which simulate the screen memory in the Dragon. This frees the part of the Dragon's memory that was being used to control the screen, and the result is that on powering up you have over 30K of usable memory.



The sprite board plugs straight into the cartridge port of the Dragon. The TV now gets plugged into the board, and the signals all come from this, not the Dragon.

Quite a benefit for those of us used to much less than this.

Another feature of the board is that it gives a full 16 colours on the screen. These are vivid and clear, and put Dragon's own to shame. Because you see the normal screen when you switch on before tansferring to the sprite board output the contrast is even stronger.

The sprite board also adds a whole list of plotting commands to the Dragon which give games and particularly graphics-based games much more potential.

In use

The sprite board is actually rather unnerving to use with the Dragon because it feels as if you are using a new micro. Only the familiar Basic and keyboard are the same — the bit you look at is startlingly different.

To use the sprite board effectively you have to learn a whole vocabulary of new Basic commands for the Dragon. These control the colours, graphics and sprites, and tie in with the existing Basic.

Once these have been learned you can use the extended Basic to do all sorts of new things on your Dragon, including lines, circles and a new version of high-resolution graphics.

The heart of the sprite board is the TI99 video chip, the TMS 9929 A video display processor. This is used with a ROM containing Premier's sprite software to interface it to the Dragon.

One slight problem with the board is that not all of the Dragon power supplies give enough power for both the Dragon and the sprite board. Our PSU didn't work, but the one that Premier supplied with the board was fine. It's worth checking with Premier just what you need before buying.

Verdict

The sprite board is a tremendous piece of engineering, and brings the Dragon to life. However, it does have one or two disadvantages, the first of which is its cost — the assembled board costs nearly as much as the Dragon itself. The other serious disadvantage is compatibility. Programs written to work with the sprite board are not compatible with any other Dragon programs, and so there won't be masses of new graphics games programs coming onto the market designed for the package.

The whole project is a little over the top since what you are buying is really a dedicated micro.

Sprites can also be achieved via software, and there are several packages to do this. One of the best of these is the Dragon Sprite from Knight Software at £17.25. This has some of the features of the sprite board, but gives neither the colours nor the extra program memory. Dragon Sprite will be reviewed in a forthcoming issue of *PCN*.

Product Sprite board **Manufacturer** Premier Microsystems, 208 Croydon Rd, Anerley, London SE20 Tel 01-659 7131 **Price** £99 inc VAT for the kit, £119 inc VAT for assembled version **Other machines** UK101, Video Genie/TRS80.

The following program shows off most of the features of the sprite board. With the section from lines 140 to 170 colour bars are displayed (these have to be seen to be believed.) After this the sprites and colour graphics are shown, followed by a few examples of redefinition of character shapes and colours.

```
 10 REM Sprite Demonstration Program
 20 REM (C) Justin Johnson 1984
 30 REM For Premier Microsystems
 40 REM Display Character Sets in Text Modes"
 50 FORM=1TO2:L=40:IFM=2THEN L=32
 60 PMODEM
 70 PRINT@10,"MODE";M;"CHARS"
 80 PRINT
 90 FORJ=32 TO 255
100 PRINTCHR$(J);" ";
110 K=J-32:IF K#2/L=INT(K#2/L)
    AND J>127 AND M=2THENPRINT
120 NEXTJ
130 FORD=1TO1000:NEXTD:NEXTM
140 REM Display Colour Bars
150 CLS15:PMODE4:CLS15
160 FORX=0TO63:C=INT(X/4)
170 LINEX,0,X,48,C:NEXTX
180 REM Add Sprites
190 SCREEN1,0
200 FORX=0TO255
210 Y=96+70#SIN(X/5):Y1=96+70#COS(X/5)
220 PUT@X,Y,RND(14)+1,9,0:
    PUT@X,Y1,RND(14)+1,9,1
230 NEXTX
240 REM Draw 3D Circles and axes
250 PMODE3:CLS7
260 LINE0,0,255,191,1
270 LINE255,0,0,191,1
280 LINE128,0,128,191,1
290 FORR=9 TO 72 STEP 9
300 C=R/9:IF C=7 THEN C=13
310 CIRCLE128,96,C,R;2,5
320 NEXT
330 REM Animate Sprites
340 SCREEN1,1
350 FORX=0TO218:Y=X#3/4
360 PUT@X,Y,6,15,0
370 PUT@218-X,Y,10,17,1
380 PUT@112,Y,4,16,2
390 NEXTX:CLS
400 REM Redefine Character
    shapes and colurs
410 PMODE2:COLOR 1,7:CLS:PRINT@68,
   "Redefinable Characters"
420 PRINT!35,0,0,0,0,0,0,0,0
430 PRINT!36,0,0,0,0,0,0,0,0
440 PRINT@168,"1 2 3 4 5 6 7 "
450 FORM=0TO320 STEP64
460 PRINT@232+M,"# $ # $ # $ # "
470 PRINT@265+M,"$ # $ # $ # "
480 NEXTM
490 FORJ=1TO15:K=16-J
500 COLOR! 4@,J,K
510 FORD=1TO300:NEXTD:NEXTJ
520 COLOR!35,10,1
530 FORK=1TO75
540 PRINT!35,128,64,32,16,8,4,2,0
550 PRINT!36,0,2,4,8,16,32,64,0
560 PRINT!35,16,16,16,16,16,16,16,0
570 PRINT!36,16,16,16,16,16,16,16,0
580 PRINT!35,0,2,4,8,16,32,64,0
590 PRINT!36,128,64,32,16,8,4,2,0
600 PRINT!35,0,0,0,0,254,0,0,0
610 PRINT!36,0,0,0,0,254,0,0,0
620 NEXTK
630 PRINT!35,0,0,0,0,0,0,0,0
640 PRINT!36,0,0,0,0,0,0,0,0
650 COLOR!48,15,6:COLOR!56,15,6
660 PRINT@640,"All this & ";MEM;"Bytes Free"
670 FORD=1TO4000:NEXTD
680 CLS15:PMODE4:CLS15:FORX=0TO15:FORY=0TO47:
    C=(INT(X)+INT(Y)) AND15:SETX,Y,C: NEXTY,X
690 FORX=16TO31:FORY=0TO47:C=(INT(63-X)+INT(Y))
    AND15:SETX,Y,C:NEXTY,X
700 FORX=32TO47:FORY=0TO47:C=(INT(X)+INT(Y))
    AND15:SETX,Y,C:NEXTY,X
710 FORX=48TO63:FORY=0TO47:C=(INT(63-X)+INT(Y))
    AND15:SETX,Y,C:NEXTY,X
720 FORD=1TO2000:NEXT:RUN
```

Three of a kind

Steve McClure scrutinises three of the best Spectrum graphics packages

Each of the graphics programs reviewed here — Dynamic Graphics, Paintbox and Melbourne Draw — has its own merits. But it's none too easy to find out what a program is like to use from a quick glance at a manual. This article should give you an idea of the relative pros and cons of three good programs.

Dynamic Graphics

Procom Software's package is ambitiously designed and it will take you many weeks to explore all its possibilties. You get two tapes, one of which has two sides of programming material.

The manual claims 'you do not have to read through the instructions before commencing'. Well yes . . . and no. It's certainly true of the second part of tape 2's program, Drawmaster. This allows you to create full-screen graphics and the menu is self-explanatory. However, when it comes to Tape 1, where you can design animated sprites and user defined graphics (UDGs) you definitely do need the instructions. I found myself staring for rather a long time at six small frames, each containing a picture of a small bird in various stages of flight, with no real idea of what to do next.

Having loaded the first part of Dynamic Graphics you see the six frames described above. These are offered as examples of what you can do with the animation capacity of the package. The manual describes how to combine the panels into a brief animated sequence, and very impressive it is too. Needless to say, once you've mastered the 'art' of design and animation, you get immense pleasure from seeing your own creations hop, skip, jump and wriggle across the screen.

The first section of the program offers you 11 menu commands to help you create your own characters using 'G' for 'Get character', or 'A' for 'Amend' to draw a character 'freehand'. This turns out to be a rather imprecise way of creating graphics as you have to repeat the function over a series of boxes which will eventually come together to make up a full image.

Other handy functions in the first menu are 'clear' and 'reverse', which do just what their names suggest.

Menu two lets you play around with the images you've created. In addition to useful functions like 'rotate' and 'flip' vertically or horizontally, you can also move a character about without losing any of the image off the edge of the screen.

Command menu 3 deals solely with storing your UDGs for use in your programs.

The fourth menu has some pretty spectacular tricks in store: you can swap sprites from box to box, as well as flipping them and rotating them in the same ways as you can their constituent characters.



Title screen from the Hobbit, Melbourne Draw.


Many choices from Dynamic Graphics.

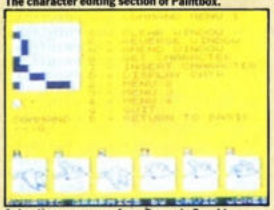


A sample screen from Paintbox. Well worth the time and effort.



The character editing section of Paintbox.


Paintbox again...


Animation sequences from Dynamic Graphics.


Abstract doodles in minutes from Paintbox.

Side two of the first tape lets you take any of the six 'sprites' you've constructed and place them anywhere on the screen. Using side one of the tape you will have created a subroutine which can be placed anywhere in user memory and is relocatable.

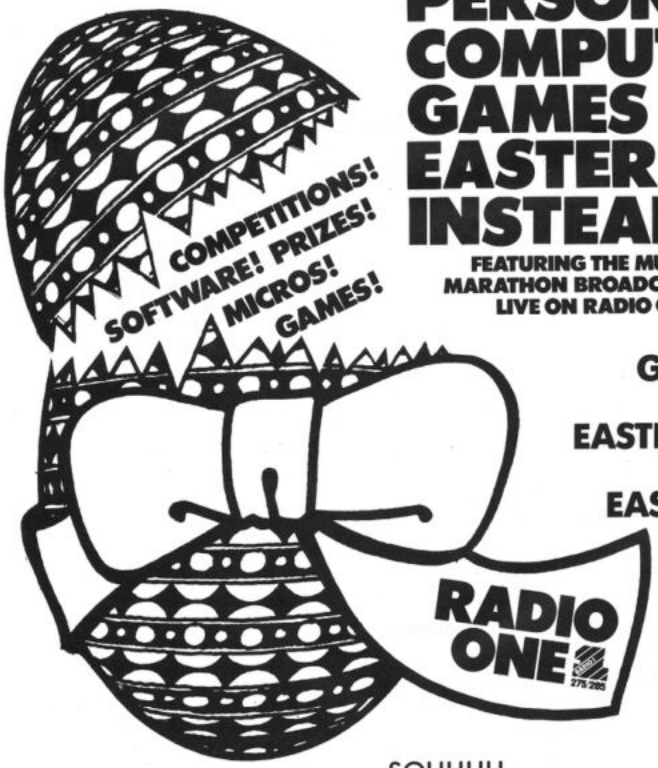
Should you lose track of your masterpieces, there are several blank 'Sprite Planner' pages provided in the manual so you can sketch sprites you've designed. ▶

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Dynamic Graphics — a series of designs for sprite animation.

◀ 46 Tape two of Dynamic Graphics consists of a fairly conventional full-screen drawing program, called 'Drawmaster'. This is a basic drawing program which simply allows you to move the cursor about the screen, drawing pictures. It has the disadvantage that in 'transparent mode' the program changes the colour of those areas it moves over, even if you're not drawing anything.

One notable feature of Drawmaster is that you can 'hop' about the screen with the cursor. The function lets you draw at specific intervals and thus gives you a great deal of flexibility if you need to mark-up the screen. Other features include changing the speed of the cursor, drawing arcs and lines between the cursor and any other point, saving images to tape and so on. All in all, this part of the program compares well with similar limited graphics packages.

Undoubtedly, Dynamic Graphic's best feature is the ability to create and animate sprites. The rest of the package is very good, and well-thought out, but it is in making the unique UDGs that the program excels.

Paintbox

Print 'n' Plotter Products' Paintbox also deals with UDGs but no animation is involved.

The emphasis in Paintbox is on creating high-resolution characters, starting with a series of pre-defined characters. The novice graphics programmer can choose from a wide variety of subjects, ranging from battleships and aeroplanes to tulips and trees. Of course, you can design your own graphics which are then stored in one of four UDG banks. This adds up to an impressive 84 UDG capacity (168 if their inverse equivalents are included) — not something to be sneezed at.

Paintbox comes with a demo program which is a good way of getting a quick look at the program's capabilities.

The UDG banks can be viewed simultaneously, and this is very useful for keeping track of how you're progressing with the development of a set of characters.

In use

Creating a character to be stored in a bank is very similar to the process used in Dynamic Graphics. With Paintbox, however, the idea is to create and store a large group of UDGs for later use in your programs.

Using the Sketchpad and Drawing Board sections of the program, you set up UDGs in a very neat and precise manner. Sketchpad lets you play around with characters from the UDG banks, arranging them as desired. In Drawing Board, you can modify a character from the Sinclair set, or start with a blank and design your own. Functions like 'inverse', 'rotate' and 'mirror' allow you to alter the character as you like.

Unlike Dynamic Graphics, there is no facility for shifting the character left, right, up or down the screen edge.

The next section of Paintbox is called Precision Plotter. One unique feature here is 'erase', which lets you wipe out the last operation performed, not all previous operations. There are the standard functions of circle, line and arc which produce very good curves on the screen; no mean feat when it comes to drawing with the Spectrum. There's also a fill command which paints blocks of colour on-screen without your having to handpaint every single pixel.

By far the most interesting section of Paintbox is the part called Planner, where all the work you do in other sections comes together. In essence, this lets you combine the UDGs you've created with designs you've drawn using the full-screen precision plotter. There are possibilities here for creating graphics of great beauty and imagination.

Each bank of previously designed UDGs is displayed at the foot of the screen, while the rest of the screen area is taken up with graphics from the precision plotter.

Two ways of saving your works are listed in the manual which is clear and well laid-out. One way to save what you've done is simply to dump the file to tape using SCREEN$. This is rather slow. A faster way, and one which can be used from within Basic programs, involves dumping the screen into memory as bytes, then calling it to screen via machine code routines. There is also a clear explanation in the manual of how to use the Spectrum to hold as many as five full files.

Melbourne Draw

This is perhaps the most visually appealing of the three programs. It differs from the previous two in that it emphasises almost exclusively a function which forms only one section of Dynamic Graphics and Paintbox, namely the full-screen rectangle across which you move the cursor to create lines and blocks of colour. It does this far better than either of the other two programs.

Melbourne House has taken a calculated risk in making the package's appeal rest entirely on its capacity to draw full-screen graphics. Of course you can design individual UDGs if you want, but Melbourne Draw is far more useful for drawing graphs and the like. It also lends itself more to purely 'leisure' uses than the other two programs.

Since all Melbourne Draw's functions are based on the full screen, it makes sense that the window at the foot of the screen is full of well laid-out information. This is a definite plus as the windows of both Paintbox and Dynamic Graphics are somewhat skimpy on information. Different alternatives are also clearly presented as to the colour of ink or paper, degree of brightness and so on.

In use

In terms of making your mark on the screen, Melbourne Draw is no different to the other two packages. Where it really comes into its own is the facility which lets you magnify the screen as much as 16 times. Anyone using the program is likely to find this the most appealing and widely used function. It may not sound like much, but when you're trying to create a finely-detailed picture it's an invaluable aid.

A handy guide as to where you are on the full screen while in this magnification mode is provided by a miniature version of the screen located in the information window which shows your exact position. As you move to the edge of the magnified screen you find the cursor has automatically moved into the next quadrant, the movement being echoed by a corresponding movement in the small version of the screen in the window.

Another unique feature of the program is the 'grid' function which is useful for position your graphic designs. It's totally independent of the design you have on-screen at the time and can, like any other image, be magnified up to 16 times.

Yet another bonus is that you canb expand or contract the screen as a whole, down by ⅞ths of up by½th. This allows a flexibility not found in most graphics programs.

Melbourne Draw is useful mainly or drawing ontricate backgrounds for title pages of games, although it lets you store UDGs in an efficient way that economises on memory. The manual claims that Melbourne Draw is useful for more specialised applications such as drawing circuit diagrams, and this claim is boune out by the high degree of pecision that can be achieved.

Verdict

The three programs reviewed present very different facilities. Of the three, Dynamic Graphics will probably find most appeal, but the other two bear careful consideration. It all depends on what you want to b able to do with the graphics capabilities of your Spectrum.

Name Dynamic Graphics **Price** £14.95 **Publisher** Procom Software, 309 High Road Loughton, Essex 01-508 1216 **Other versions** None **Outlets** Mail order/retail

Name Paintbox **Price** £7.50 **Publisher** Print 'n' Plotter Pruducts, 19 Borough High Street, London SE1 9SE 01-403 6644 **Other versions** None **Outlets** Mail order/retail

Name Melbourne Draw **Price** £8.95 **Publisher** Melbourne House Software, 131 Trafalgar Street, Greenwich, London SE10 01-941 4540 **Other versions** None **Outlets** Mail order/retail

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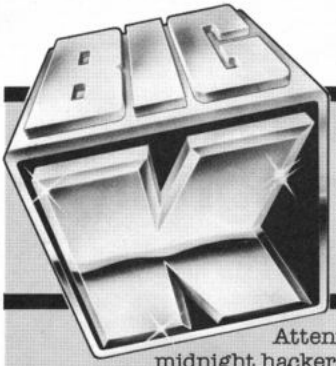
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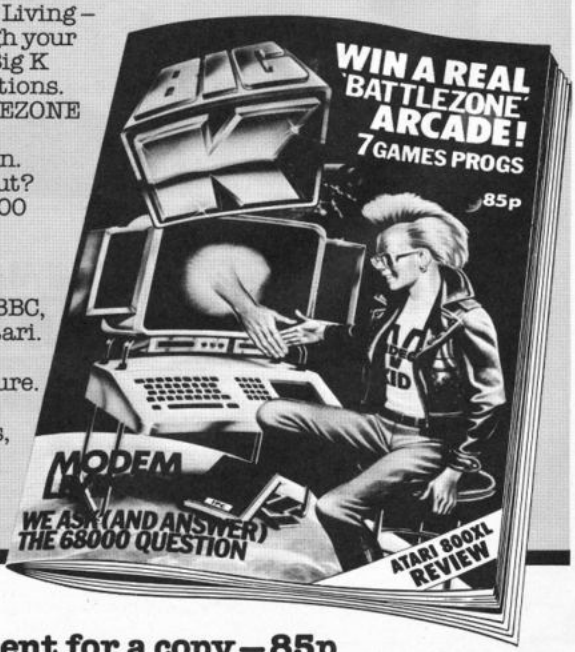
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C-FILE



C-File, from Mark Leaver of Halifax in West Yorkshire, is a very comprehensive database program for the 48K Sinclair Spectrum. It comes in two parts: program 1 is used purely to set up a new file from scratch.

After entering the file title, the program will ask for the total character string length for a card. The file is held in A$ which is dimensioned according to this length. If, for instance, there are 100 characters per card there will be 350 cards available (35000/100=350). Note that the card layout should be done fairly carefully, squeezing as much information into as short a substring (Field) as possible (see Spectrum user manual page 79). After this the number of fields per card is entered up to a maximum of nine, and following this section the colours and positions of the fields are entered. The cursor position of the field is displayed at the top right hand corner of the screen and the program automatically ensures that the screen limits are not exceeded.

After formatting is complete, program 1 automatically merges with program 2. The interval between programs 1 and 2, on the tape, should be around 15 seconds. When the merging is complete wait several seconds as the process takes a little time. If all is well the option page of C-File will appear. None of the options will work, besides option one, unless you enter the details for at least one card. Use option 1 to enter some information. When a few cards have been entered the option page can be explored. Note that Caps mode is assumed at all times, to assist C-File in its searches.

2 Number search — entering the card number you require will display the card.

3 Word search — a prompt of all the field titles will be displayed. Enter the number of the field you wish to search. The search option will search for a whole sentence, a word or a single character. If the search proves fruitless, or the search is exhausted, the program will come back with 'No further entries'.

4 Report — these two pages give the file title, field titles, card length, field lengths, cards used and the cards unused.

5 Amend Card — after giving the number of the card to be altered, the program will request which section is to be altered. After any alteration the old record can be compared with the new.

6 Print label — will print the contents of a specified card without the titles.

7 List cards — will display the cards starting from a specified card. Selecting 'R' returns to the option page.

8 Delete card — deletes a specified card and shunts the other cards around to fill the space.

F Sort Cards — uses a bubble sort to sort the records for a specified field. For long files this can be quite slow.

S Save file — saves the whole program including the file data and then verifies it. With some small modifications it is possible to save A$ alone and load in another file separately. This is not usually worthwhile.

If the program should accidentally be broken into restart with GO TO 1 *Do not run* as this will clear all the variables. Options 2, 3 and 8 all allow the screen to be dumped to the ZX printer by entering 'Y' when asked for 'COPY Y/N'.

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Title: ***C-File***
Machine: ***48K Spectrum***
Language: ***Spectrum Basic***
Application: ***Database***
Author: ***Mark Leaver***

Program 1

5-10	Set up variables and print the intro.
15	Get file title.
20	Get total number of characters.
25	Print up the number of cards in the file.
30	Get number of fields.
35	Dimension the arrays appropriately.
40-80	Set up the colours of the card.

```
  5 BORDER 1: PAPER 2: INK 4: CLS : LET
 E=0: LET H=0: LET I=5: LET J=2400: LET
T=0: LET N$="CARD No.": LET P$="NO MORE
ENTRIES, any key/return": POKE 23609,100
: POKE 23658,8
  10 PRINT '' INK 4;TAB 9;"
 ";TAB 9;"                ";TAB 9;"
       ";TAB 8;"                ": PRINT
  INK 0;''' THE INDEX-RETRIEVAL SYSTEM F
OR"'''  THE 48K SINCLAIR ZX SPECTRUM"'''
"  @ COPYRIGHT MARK LEAVER 1983  ": PRIN
T AT 17,9; PAPER 2; INK 6; FLASH 1; BRIG
HT 1;"STOP THE TAPE": FOR N=1 TO 40: BEE
P .02,N: BEEP .02,-N: NEXT N
  15 DIM B$(1,10): INPUT "ENTER FILE TIT
LE: "; LINE B$(1): BORDER 7: PAPER 7: IN
K 0: CLS
  20 PRINT AT 10,0;"ENTER  THE  TOTAL
NUMBER   OF"''"CHARACTERS A CARD MAY CON
TAIN."''"(TO A MAXIMUM OF 255)": GO SUB
170: LET C=A: IF A>255 OR A=0 THEN  GO T
O 20
```

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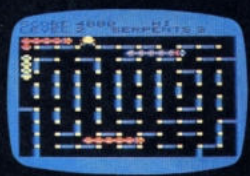
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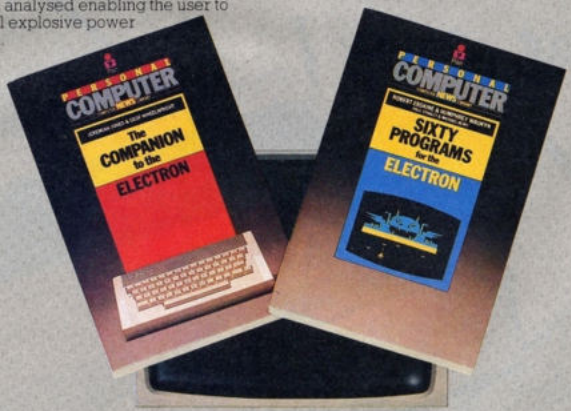
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PCN PROGRAMS: 48K SPECTRUM

C-FILE

85-100	Position the fields and titles. Inform user of merging.
105	Select colours routine.
110-115	Print the colours onto the
120-130	screen. Read the keyboard and
135-195	position the cursor accordingly.
245	Merge with the next program. Note that this is called 'is loading'.

```
  25 LET D=INT (35000/C): PRINT AT 10,4;
"YOU WILL HAVE ";D;" CARDS"''''    AVAILA
BLE. CONTINUE? Y/N": PAUSE 0: CLS : IF I
NKEY$="N" THEN  GO TO 20
  30 PRINT AT 10,0;"HOW MANY FIELDS DO Y
OU REQUIRE"''"FOR THIS FILE? (MAXIMUM OF
 9)": GO SUB 170: LET S=A: IF S<1 OR S>9
 THEN  GO TO 30
  35 DIM A$(1,C): DIM T$(S,10): DIM F(S)
: DIM G(S): DIM O(S): DIM P(S): DIM Q(S)
: DIM R(S): DIM T(S): DIM U(S): DIM V(S)
: DIM X(S): DIM Y(S)
  40 PRINT AT 5,1;"YOU MUST NOW FORMAT T
HE INDEX"''''   CARD, EACH TITLE AND IT'S
 "''"   CORRESPONDING FIELD MAY BE"''''
INDIVIDUALLY COLOURED AND"''''   POSITION
ED ON THE SCREEN": PAUSE 2000: CLS
  45 PRINT ; FLASH 1;"SELECT CARD COLOUR
": LET N=1: GO SUB 110: LET T=A
  50 LET W=0: FOR N=1 TO S: CLS : IF W>C
 THEN  GO TO 100
  55 PRINT AT 10,3;"ENTER TITLE OF SECTI
ON ";N; INPUT  LINE T$(N)
  60 PRINT AT 10,3;"ENTER LENGTH OF SECT
ION ";N;''''  YOU HAVE ";C-W;" CHARACTERS
 LEFT": GO SUB 170
  65 LET W=W+A: LET T(N)=A: LET F(N)=W-(
A-1)
  70 LET G(N)=W: CLS : IF W>C THEN  PRIN
T  FLASH 1;AT 10,0;"YOU HAVE EXCEEDED ";
C;" CHARACTERS": BEEP .5,0: PAUSE 250: R
UN 15
  75 PRINT AT 1,0; FLASH 1;"SELECT TITLE
 ";N;" BACKGROUND": GO SUB 110: LET O(N)
=A: CLS : PRINT AT 1,0; FLASH 1;"SELECT
 TITLE ";N;" INK": GO SUB 110: LET P(N)=A
: IF A=O(N) THEN  GO TO 75
  80 CLS : PRINT AT 1,0; FLASH 1;"SELECT
 FIELD ";N;" BACKGROUND": GO SUB 110: LE
T Q(N)=A: CLS : PRINT AT 1,0; FLASH 1;"S
ELECT FIELD ";N;" INK": GO SUB 110: LET
 R(N)=A: IF A=Q(N) THEN  GO TO 80
  85 BORDER 4: CLS : LET U(N)=0: LET V(N
)=0: PRINT "YOU MUST NOW POSITION TITLE
 ";N;'''' BY USING THE CURSOR KEYS."''"PRE
SS ""P"" WHEN POSITIONED.": PAUSE 500: L
ET B=20: CLS : GO SUB 120: GO SUB 135: L
ET U(N)=X: LET V(N)=Y: PRINT "IS THIS CO
RRECT? Y/N": PRINT AT Y,X; PAPER O(N); I
NK P(N);N;">";T$(N,): PAUSE 0: CLS : IF
 INKEY$="N" THEN  GO TO 85
  90 CLS : LET X(N)=0: LET Y(N)=0: PRINT
 "POSITION FIELD NUMBER ";N;''"USING THE
 CURSOR KEYS."''"PRESS ""P"" WHEN POSITI
ONED.": PAUSE 500: LET B=30: CLS : GO SU
B 120: GO SUB 135: IF H+T(N)>672 THEN  P
RINT AT 10,1; FLASH 1;"FIELD No.";N;" GO
ES OUT OF SCREEN": BEEP 1,0: PAUSE 150:
GO TO 85
  95 LET X(N)=X: LET Y(N)=Y: CLS : GO SU
B 120: PRINT AT 0,0;"IS THIS CORRECT? Y/
N": PAUSE 0: IF INKEY$="N" THEN  GO TO 9
0
 100 BORDER 7: CLS : NEXT N
 105 FOR N=1 TO 40: BEEP .01,N: NEXT N:
PRINT AT 10,0;"YOU ARE NOW READY TO USE
 C-FILE.";AT 14,9; FLASH 1;"START THE TAP
E": LET H=2550: BEEP 1,0: PRINT '" PLEAS
E WAIT, C-FILE IS LOADING": GO TO 245
 110 BORDER 5: INK 5: PLOT 115,124: DRAW
 112,0: DRAW 0,-40: DRAW -112,0: DRAW 0,
40: INK 0: PRINT AT 7,15;"CARD COLOUR>";
T;AT 8,15;"TITLE PAPER>";O(N);AT 9,16;"'
'     INK>";P(N);AT 10,15;"FIELD PAPER>"
;Q(N);AT 12,23;AT 2,0;"COLOUR SELECTION
CHART"''"0>BLACK"''"1>BLUE"''"2>RED"''"3
>MAGENTA"''"4>GREEN"''"5>CYAN"''"6>YELLO
W"''"7>WHITE"''" PLEASE ENTER YOUR PREFE
RENCE": GO SUB 170: IF A>7 THEN  GO TO 1
10
 115 BORDER 7: CLS : RETURN
 120 FOR M=1 TO N: IF V(M)=0 THEN  GO TO
 130
 125 PRINT AT V(M),U(M); PAPER O(M); INK
 P(M);M;">";T$(M): PRINT AT Y(M),X(M); P
APER Q(M);A$(1,F(M) TO G(M))
 130 NEXT M: RETURN
 135 LET X=0: LET Y=1
 140 PRINT AT Y,X;"P": PRINT AT 0,22;"L>
";Y;" C>";X;" ": IF INKEY$="P" THEN  CLS
 : LET H=(Y*32)+X: RETURN
 145 IF INKEY$="5" THEN  BEEP .02,30: PR
INT AT Y,X;" ": LET X=X-1: IF X<0 THEN
LET X=0: GO TO 140
 150 IF INKEY$="6" THEN  BEEP .02,30: PR
INT AT Y,X;" ": LET Y=Y+1: IF Y>20 THEN
 LET Y=20: GO TO 140
 155 IF INKEY$="7" THEN  BEEP .02,30: PR
INT AT Y,X;" ": LET Y=Y-1: IF Y<1 THEN
LET Y=1: GO TO 140
 160 IF INKEY$="8" THEN  BEEP .02,30: PR
INT AT Y,X;" ": LET X=X+1: IF X>B THEN
LET X=B
 165 GO TO 140
 170 BEEP .1,10: LET Z=0
 175 INPUT  LINE Z$: FOR M=1 TO LEN Z$:
IF CODE Z$(M)<48 OR CODE Z$(M)>57 THEN
LET Z=1
 180 NEXT M: IF Z=1 THEN  GO TO 170
 185 IF Z$="" THEN  GO TO 170
 190 LET A=VAL Z$
 195 CLS : RETURN
 245 MERGE "is loading": GO TO 250
   0>REM C-FILE @ M.Leaver 1983
```



Program 2

5-145 Print the option page and get option from the keyboard.
150-250 Do the report option.
1200-1275 Enter cards option.
1300-1345 Save file option.
1350-1380 Number search.
1450-1595 Print the label.
1600-1740 Alter a card.

```
  5 BEEP 1,0
 10 LET Z=0: POKE 23609,100: POKE 23658
,8
 15 BORDER 6: PAPER 6: INK 0
 20 CLS
 25 PRINT  INK 4;TAB 9;"                "
;TAB 9;"               ";TAB 9;"
    "
 30 PRINT 'TAB 6;"FILE NAME:"; PAPER 2;
 INK 7;B$(1)
 35 PRINT  PAPER 5;AT 6,12;"OPTIONS";AT
 6,12; OVER 1;"_______"
 40 PRINT AT 8,0;"1-ENTER CARDS"
 45 PRINT AT 10,0;"2-No. SEARCH"
 50 PRINT AT 12,0;"3-WORD SEARCH"
 55 PRINT AT 14,0;"4-REPORT"
 60 PRINT AT 16,0;"5-AMEND CARD"
 65 PRINT AT 8,16;"6-PRINT LABEL"
 70 PRINT AT 10,16;"7-LIST CARDS"
 75 PRINT AT 12,16;"8-DELETE CARD"
 80 PRINT AT 14,16;"F-SORT CARDS"
 85 PRINT AT 16,16;"S-SAVE FILE"
 90 PRINT AT 19,7; PAPER 1; INK 6; BRIG
HT 1;"                ";AT 20,7;"@ Mar
k Leaver 1983";AT 19,7; OVER 1;"_______
_____";AT 20,7; OVER 1;" _____________
_____";AT 21,7;"                "
 95 IF INKEY$="1" THEN  GO TO 1200
100 IF INKEY$="2" THEN  GO TO 1350
105 IF INKEY$="3" THEN  GO TO 1750
110 IF INKEY$="4" THEN  GO TO 150
115 IF INKEY$="5" THEN  GO TO 1600
120 IF INKEY$="6" THEN  GO TO 1450
125 IF INKEY$="7" THEN  GO TO 2000
130 IF INKEY$="8" THEN  GO TO 2100
135 IF INKEY$="F" THEN  GO TO 2300
140 IF INKEY$="S" THEN  GO TO 1300
145 GO TO 95
150 CLS
155 BORDER 4
160 PRINT AT 0,12; PAPER 6;" REPORT ";
OVER 1;AT 0,12;"________"
165 PRINT '"FILE TITLE.........."; PAPE
R 2; INK 6;B$(1)
170 PRINT '"NUMBER OF CARDS....."D
175 PRINT '"TOTAL CHR$ LENGTH..."C
180 PRINT '"NUMBER OF SECTIONS.."S
185 PRINT '"No. OF BLANK CARDS.."D-E
190 PRINT AT 21,0;"Press any key to dis
play TITLES": PAUSE 0
195 CLS : BORDER 5
200 PRINT AT 0,8; PAPER 1; INK 7;" SECT
ION TITLES "; OVER 1;AT 0,8;"___________
_____"
205 PRINT
210 FOR N=1 TO S
215 PRINT "TITLE OF SEC.";N;" IS "; PAP
ER 5;T$(N, TO 10)
220 PRINT "  MAX. CHR$ LENGTH="; PAPER
4;T(N)
225 NEXT N
230 PRINT AT 21,0; BRIGHT 1;" Press any
key,return to OPTIONS"
235 PAUSE 0
240 GO TO I+I
250 DIM A$(D,C): GO TO I
1200 CLS
1201 IF E=D THEN  PRINT AT 10,10; FLASH
1;" FILE FULL ": GO TO I
1205 PRINT AT 10,0;"HOW MANY CARDS TO BE
 FILED NOW"
1210 GO SUB H: IF A=0 OR A+E>D THEN  PRI
NT AT 10,10; FLASH 1;"INVALID": GO TO I
1215 LET E=E+A: LET A=E-A+1
1220 FOR N=A TO E
1230 FOR M=1 TO S
1245 CLS
1250 PRINT  PAPER 1; INK 6;N$;N;"  SECT.
";M;"-";T$(M)
1260 INPUT  LINE A$(N)(F(M) TO G(M))
1265 NEXT M
1270 NEXT N
1275 GO TO I
1300 PAPER 2: CLS
1310 PRINT  INK 7;"NAME:";B$(1)
1315 SAVE B$(1) LINE 1
1320 BEEP 2,10: PAPER 5
1330 PRINT '" REWIND TAPE, ANY KEY TO VE
RIFY ": PAUSE 0
1335 PRINT '" START TAPE"
1340 VERIFY ""
1345 GO TO I
1350 CLS
1355 PRINT AT 10,0;"WHICH CARD No. DO YO
U REQUIRE?"
1360 GO SUB H: IF A<1 OR A>D THEN  GO TO
 I
1365 IF A>E THEN  CLS : PRINT AT 10,10;"
BLANK CARD": GO TO I
1370 LET N=A: GO SUB J
1380 GO TO I
1450 CLS
1460 PRINT AT 10,1;"ENTER CARD No. TO PR
INT LABEL"
1470 GO SUB H: IF A<1 OR A>E THEN  GO TO
 I
1480 FOR N=1 TO S
1490 LPRINT A$(A)(F(N) TO G(N))
1500 NEXT N
1595 GO TO I+I
1600 CLS
1605 PRINT AT 10,1;"ENTER CARD No. TO BE
 ALTERED"
1610 GO SUB H: IF A<1 OR A>E THEN  GO TO
 I
1615 LET Z=1: LET N=A: LET L=1
1620 GO SUB J
```

PCN PROGRAMS: 48K SPECTRUM

PCN PROGRAMS: 48K SPECTRUM

C-FILE

1750-1920 Word search.
2000-2090 List cards.
2100-2195 Delete card.
2300-2399 Sort cards.
2400-2480 Print a card subroutine.
2500-2520 Print the section titles.

```
1630 PRINT  FLASH 1;AT 0,0;"  ENTER SECT
ION TO BE ALTERED    ": GO SUB H: CLS
1660 IF A<1 OR A>S THEN  GO TO I
1670 PRINT  PAPER 5;N$;N;"  SECTION ";A
1680 LET F=F(A): LET G=G(A): LET L=0
1690 PRINT 'A$(N,F TO G)
1700 PRINT AT 10,0;"ENTER ALTERATION"
1705 INPUT  LINE X$
1710 LET A$(N)(F TO G)=X$
1720 PRINT AT 10,0;"NOW READS:-      "; P
APER 7;'A$(N)(F TO G)
1730 PAUSE 1000
1740 GO TO I+I
1750 CLS
1760 GO SUB 2500: PRINT '"  ENTER SECTIO
N TO BE SEARCHED  "
1770 GO SUB H
1800 IF A<1 OR A>S THEN  GO TO I
1810 CLS : PRINT AT 9,3;"ENTER WORD OR L
ETTER TO BE";AT 11,10;"SEARCHED FOR"
1820 INPUT  LINE X$
1825 LET K=LEN X$-1
1830 CLS
1840 FOR N=1 TO E
1845 IF X$<>A$(N)(F(A), TO F(A)+K) THEN
GO TO 1890
1850 CLS
1860 GO SUB J
1890 PRINT AT 21,10; FLASH 1;"SEARCHING"
1900 NEXT N: BEEP .5,0
1905 PRINT AT 21,0; PAPER 7; INK 0;P$
1910 PAUSE 500
1920 GO TO I+I
2000 CLS : IF E=0 THEN  GO TO 5
2005 PRINT AT 10,1;"LIST ALL CARDS FROM
NUMBER..."
2010 GO SUB H: IF A<1 OR A>E THEN  GO TO
 I
2015 CLS
2020 FOR N=A TO E
2040 IF INKEY$="R" THEN  GO TO 2085
2045 LET Z=1
2050 GO SUB J
2085 NEXT N
2090 GO TO I+I
2100 CLS
2105 PRINT AT 10,2;"ENTER CARD No. TO BE
 DELETED"
2110 GO SUB H: IF A<1 OR A>E THEN  GO TO
 I
2115 CLS : BORDER 1
2120 LET A$(A, TO C)=" "
2125 PRINT AT 10,4;"SORTING "; FLASH 1;"
DO NOT INTERRUPT"
2130 IF A=E THEN  GO TO 2185
2140 FOR N=A TO E
2145 IF N=E THEN  GO TO 2160
2150 LET B=N+1
2160 LET X$=A$(B)
2170 LET A$(N)=X$
2180 NEXT N
2185 LET E=E-1
2195 GO TO I
2200 PRINT AT 21,0; PAPER T;"
                    "
2210 COPY
2250 RETURN
2300 CLS : BORDER 2: PAPER 7
2310 IF E<2 THEN  GO TO I
2320 GO SUB 2500
2335 PRINT '"  ENTER SECTION TO BE SORT
ED    ": GO SUB H: CLS
2340 IF A<1 OR A>S THEN  GO TO I
2345 LET F=F(A): LET G=G(A)
2350 PRINT AT 10,4;"SORTING "; FLASH 1;"
DO NOT INTERRUPT"
2355 FOR N=1 TO E
2360 FOR M=E TO (N+1) STEP -1
2365 IF A$(M,F TO G)>=A$(N,F TO G) THEN
 GO TO 2390
2370 LET X$=A$(M)
2375 LET A$(M)=A$(N)
2380 LET A$(N)=X$
2385 LET A$(N)=X$
2390 NEXT M
2395 NEXT N
2399 GO TO I
2400 PAPER T: CLS
2410 PRINT AT 0,10; PAPER 7; INK 0;N$;N
2420 FOR M=1 TO S
2430 PRINT AT V(M),U(M); PAPER O(M); INK
 R(M);M;">";T$(M)
2440 PRINT AT Y(M),X(M); PAPER O(M); INK
 P(M);A$(N)(F(M) TO G(M))
2445 NEXT M
2450 IF Z=0 THEN  GO TO 2460
2455 PRINT AT 21,23; PAPER 7; INK 0;"R t
o EXIT"
2460 PRINT AT 21,0; PAPER 7; INK 0;"COPY
? Y/N"
2470 PAUSE 0: IF INKEY$="Y" THEN  GO SUB
 2200
2480 RETURN
2500 CLS : BORDER 2: PAPER 7
2505 FOR N=1 TO S
2510 PRINT AT 2*N,10; PAPER 5;N;">";T$(N
)
2515 NEXT N
2520 RETURN
2550 BEEP .1,0: LET Z=0
2555 INPUT  LINE X$: FOR M=1 TO LEN X$:
IF CODE X$(M)<48 OR CODE X$(M)>57 THEN
LET Z=1
2560 NEXT M: IF Z=1 THEN  GO TO 2550
2565 IF X$="" THEN  GO TO 2550
2570 LET A=VAL X$: RETURN
```

PCN Billboard

Dragon 32 plus 2 joysticks and 10 games including Donkey Kong, Defender and Scramble. Worth £220, but will sell for £155. Tel: Sunbury 82304.

Texas TI 99/4A Parsec, £14; January 99'er, £2.50; Tank, £8; Winging It + Adventure, £8; Maze of Ariel, £5.49; Mission 99, £4. The lot for £41. Tel: 0377 87600 (eves).

Microtan 65 Tanex Tanbug, Xbug toolkit, ASCII keyboard, Hexpad 8K RAM + 16K RAMboard invaders, ROMchip Basic, £120 including manuals. Tel: 0282 22601 (after 6pm), Anthony Watson.

Epson RX80 virtually unused, still under guarantee. Must sell, family commitments, £190 ono or swap for a Daisywheel. Tel: S.Gill on 01-485 6672 (work) or 01-485 6922 (eves).

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CBM 64 Easyscript word processor for sale, cost £75, will accept £50. Also Renaissance and Hungry Horace at £5. All originals. Contact Martin Jenkins. Tel: (0269) 850438 (after 6pm).

Epson MX80F/T3 type 3 graphics chip installed cable for Atari, will sell for £195. Manual included. Tel: David on 01-948 6654 (after 1pm Mon-Fri).

Atari 400/800 original cassettes. Canyon Climber, Ghost Hunter, £7 each. Le Stick joystick, £10. Wanted: Atariwriter, Joust, Jungle Hunt, Robotron, original cartridges. Tel: 01-341 0464 (eves).

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Spectrum software for sale. Hunter Killer, £6.50; Flight Simulation, £6.50; Ant Attack, £4.50. Tel: Chris on Rugby (0788) 832468 (after 5pm).

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Atari 400 16K Dig Dug and Donkey Kong cartridges, two joysticks. Also dedicated cassette recorder. Tel: Basildon 46250 (after 7pm weekdays, anytime weekends).

Vic-20, C2N, 16K, joystick, introduction to Basic Part 1, motherboard, over £120 software. All boxed, £180 ono. Tel: Limekilns (0383) 872103 (eves, ask for Steve).

Oric 48K, leads, manual and tapes including Xenon-1, Zorgon's Revenge and Hunchback. Magazines, Three books. Excellent condition, worth £250, selling lot for £160. Tel: Tyneside (091) 274 3133.

Spectrum 48K cassette recorder, Currah Speech software includes Miner, Jetman, Jetpac, Melbourne Draw. Also ZX printer books and mags, offers of £180+. Tel: Basildon 46250 (after 7pm).

Oric-1 48K, perfect condition including software Xenon 1, Harrier Attack, Invaders, Ultra worth £30 plus cassette recorder worth £25. Want £125. Tel: 021-429 6056 (after 4pm).

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Nascom 2, 48K RAM card, Gemini EPROM card. All factory built and tested. Lots of software with manuals, £300 ono. Tel: (0698) 887473 (after 6pm).

Atari programs for sale, including SAM Speech Synth, Disk dupe. Also ZX81 RAMpack, £10. Tel: Mickie Trafford 300122 (ask for Stephen, after 6.30pm).

Atari 800 48K + 18 months guarantee + recorder + Pointmaster joystick + books + cassette programs, £200. Tel: Mike on 0904 799416.

Wanted Bitstick graphics system for Apple II, cash waiting. For sale, Tandy DMP100 printer, as new, boxed, £150. Tel: 01-527 2350 ext 54 (office hours).

Newbrain A boxed, as new, £185 ono. Tel: 0532 622982 (ask for Dennis after 5pm weekdays, anytime weekends).

Oric software for sale. Xenon, £4.50; Ultra, £3, plus many more. J. W. Macuie, 22 Loanhead Street, Kilmarnock. Sae for list or Tel: 0563 42816 (eves).

Dragon 32 for sale plus two joysticks and Maplin I/O port. Also much software including Starship Chameleon cartridge and Dragon magazines, £150. Tel: Cirencester 712564.

For sale BBC software. 3 Scott Adams adventures. Games, Pirate Adventure, Secret Mission, Voodoo Castle, £5 each or swap for other adventures. Tel: 01-859 1688.

Commodore 64 with C2N cassette deck, paddles, joysticks, over £100 worth of software. For sale at £200, no offers. Tel: Birmingham 021-706 6985 (after 6pm).

BBC 100K Teac disk drive, disk doctor ROM, and £500 worth of software, all worth over £700, sale price only £225. Tel: Harpenden 69152.

48K Lynx, 5 years guarantee, hardly used, selling for only £180. (Need to sell because Pascal is not available). Tel: 01-534 5171 (weekends).

Atari 400 cassette recorder, Pacman, Apple, Panic, Winky, joysticks everything for serious work and fun and much more. Around £140/£150. Tel: 0792-898363 (eves).

Oric-1 16K, only two months old, fully guaranteed plus cassette recorder plus software, £100 ono. Tel: Basildon 554070.

Commodore Vic 20 cassette deck, boxed, £95. Tel: Southampton 769885.

Sharp MZ80A as new condition, little used plus software etc, £295 for quick sale. Tel: 0698 842826.

Dragon 32. Set of 30 programs from Microdeal, Morrisons, etc, with full instructions for only £35. Send sae for list. Tomy, 24 Irving Place, Blackburn BB2 6LR.

Atari owner will swap or sell programs. Tel: 03303 367.

Walters Microsystems Dolphin BD 80 P printer with IEEE 488 interface, £80 or swap for Centronics printer. Tel: Bishops Stortford (0279) 870325.

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Sharp PC 1500 pocket computer plus CE-150 printer and 8K RAM pack. Cost £390, will sell for £250 ono, almost new. Tel: (027581) 2029 (after 7pm).

Acorn Atom 12K + 12K, 6522 VIA, regulated PSU, leads, Word Pack ROM, Peeko Computer, Life, Atom Database, Game Pack 3, Utility Pack 1 etc, manuals, 3 books, £100 ono. Tel: 01-679 6340 (eves/weekends).

Sinclair Spectrum 48K, £100 ono. Tel: 0926 21004 (eves).

For Vic 20, 16K RAM (switchable) Super Expander and machine code cartridges, 32 top arcade games (Matrix, Jet-Pac), joystick, leads. £55 ono. Tel: Sheffield (0742) 692537 (eves).

BBC B 1.20S, dual disk-drives with RGB monitor, printer and cassette recorder. Plenty of software on disk and cassette. £995. Tel: Worthing 62287 (after 6pm).

Dragon 32 including DASM and host of software, £130. Seikosha GP100A (including friction-feed), £150, moving up to OS-9. Also software for exchange. Tel: Parkstone (0202) 722599.

Commodore 64 software. Ultisynth, £10; Gridrunner, £4; Mutant Camels, £4; Space Shuttle (disk), £8. For sale or swap. Tel: 01-582 4608.

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Vic 20 36K recorder, £150 worth of games and utilities including Softswitch, m/c monitor, switchable RAM pack, spread sheet, word processor etc. Tel: 0752 660212 (after 6pm).

Dragon 32, joysticks, software, books, £175-ish. Nic Coome, 9 Fairford Crescent, Swindon, Wilts. Tel: Reading (0734) 59977 ext 2442 (during working hours).

ZX81 with built-in 32K,tons of software including Mazogs, Hopper, Gloops, Galaxians, Avenger, Space Invaders. Tel: 061-973 7244 (eves and weekends).

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Atari 800, disk drive, program recorder and over £800 of software including Donkey Kong, Popeye and many more. Offers to Martin. Tel: 01-300 7039 (after 6pm).

Oric-1 48K with manual, book, all leads, ROM information, £60 of software including Forth and manual. Only £140 ono. Tel: 0232-661480.

Atari 400 32K, Basic, recorder and £200 software plus books, £150. Tel: Bollington (0625) 74034.

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Dragon 32 including joystick, lightpen, 25 software titles (education and games programs), lots of magazines (PCN + monthlies). Worth £450+, only £210. Tel: 07373 51021.

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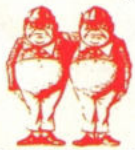
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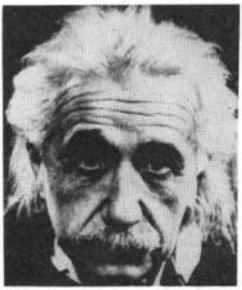
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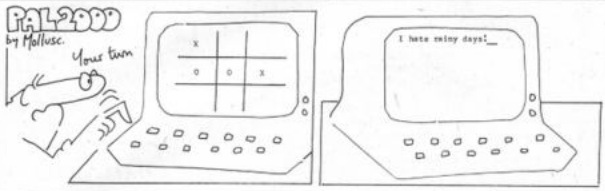
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First things first

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But that can't be the case with a compilation called The World's Greatest Computer Games, Volume I. It is due to appear in the shops by the end of this month but its contents, according to executive producer Norman Thomas, will come as a surprise to people.

Odd, then, that the production company TVC Video should already be saying things like: 'Following the extremely successful launch of The World's Greatest Computer Games Volume I, TVC Video is planning the second volume . . .'



SYNTAX ERRORS

The Lynx program in Issue 56 had a few errors. The upper case X and Y in lines 80,90,100 and 110 should actually be lower case, and when the function is entered it should be in terms of lower case x.

Line 380 was short of a minus sign — it should have read:

```
380 PRINT @ z,y+1;a;
    @ q/2-3*LEN(STR$(b)), y+1;b;
```

NEXT WEEK

Take three — PCN *carries off three examples of the portable maker's art — the Grid Compass, the Canon, and the Husky.*

CP/M-64 — *What happens when ubiquitous operating system meets popular home micro? Check our look at CP/M on the Commodore 64.*

Spritely — *The sparks fly as the Dragon generates sprites.*

Oric-1 — PCN's Program *section includes the roof-top adventures of Huebert for the Oric-1.*

Reviews — *We assess games for the Spectrum, BBC, Atari and Dragon.*

PCN DATELINES

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UK EVENTS

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

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Videotex '84	April 16-18	Hyatt Regency, Chicago	Sally Summers, 0101 212 279 8890
Computerised Office Equipment Exhibition	May 1-3	Rosemont, USA	Cahners Exposition Group, 0483 38085
Data Processing, Computer & Automatic Systems Fairs	May 9-12	Lyon, France	Societe d'Epoitation due Parc des Expositions de Lyon. S.E.P.L., BP, 6416 69413 Lyon Cedex 06.

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