

# PERSONAL

# COMPUTER

EVERY THURSDAY

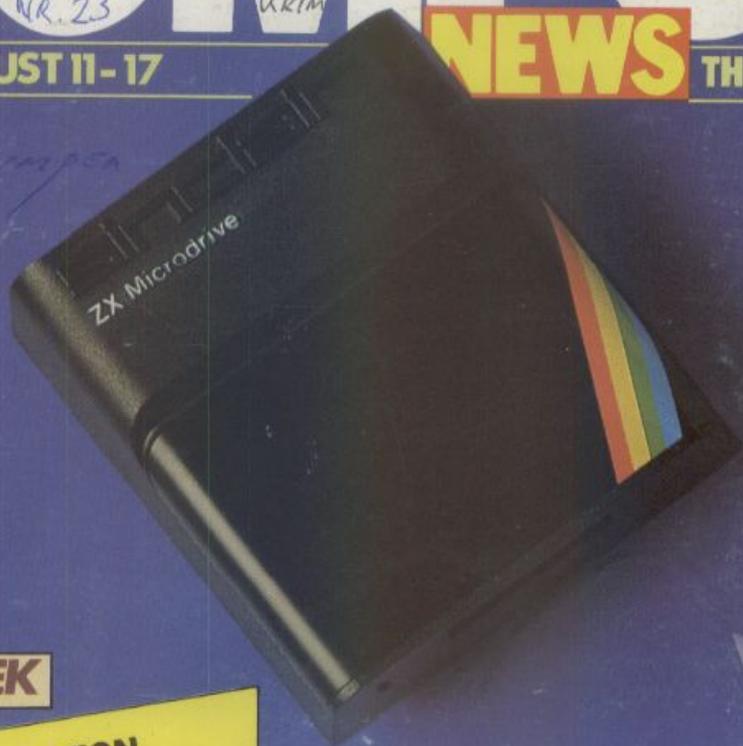
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NEWS

THE COMPLETE COMPUTING WEEKLY



## Is Sir Clive's drive worth the wait?

### THIS WEEK

#### ATARI IN ACTION

Zap, splat and blast-em games

#### TANDY ON TRIAL

Pro-Test of the Model 4

#### SORD'S SOFT EDGE

Sharper sound and graphics control with Basic-G

#### BBC MICROFLOPPIES

Full test of the new 3-inch drives

### EVERY WEEK

#### PCN PROGRAMCARDS

Free software is only a few key-presses away

#### PCN MICROPAEDIA

Pull out and keep to build your microcomputing library



# New TRS-80 Model 4™



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Model 4

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64K  
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Model 4

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Inc.  
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**TRS-80 Model 4 Personal Desktop Computer.** Yes, it looks similar to a Model III, but compare the price and the standard features of this all-new Model 4 to any other computer in its class.

**Amazing Versatility.** Model 4 can run all Tandy® Model III programs without change. It will soon be able to run CP/M-based software. This means that Model III disk owners can upgrade to a Model 4 without making their present software obsolete, and have at their disposal thousands of different applications.

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#### Model 4 Upgrades

**64K RAM Kit For Disk Model 4.** Expands internal memory from 64K to 128K. Installation required (not included).

26-1122 ..... £99.95

**RS232C Interface Board.** Installation required, (not included).

26-1148 ..... £79.95

**Microprocessor:** Advanced Z-80A 8-bit. **Clock Speed:** 4 MHz. **Memory:** 14K ROM, 64K RAM-expandable to 128K. **Keyboard:** 70-key typewriter style with control key, 3 programmable function keys (F1, F2, F3), caps key and 12-key datapad. **Video Display:** 80 characters by 24 lines (Model 4 mode), 64 x 16 (Model III mode), or double-wide 40 or 32 characters per line. Upper and lower case and reverse video. Memory mapped with high-resolution 12" green monitor, includes 96 text, 64 graphics and 96 "special" characters. **Sound:** Obtainable from BASIC with sound command including tone and duration. Toggled "keyclick" filter. **Disk Drives:** One or two built-in double density 184K 5 1/4" drives. **Operating System Compatibility:** TRSDOS 6.0, TRSDOS 1.3, LDOS, CP/M Plus (available soon). **Programming Language:** New Advanced Microsoft BASIC with CHAIN, COMMON and more. **Input/Output Interfaces:** Cassette operation at 500/1500 baud selectable under ROM BASIC. Parallel printer interface with TRSDOS print spooler. Model III/4 Input/Output bus. **Dimensions:** 12 1/2" x 18 7/8" x 21 1/2". **Power:** Integrated power supply, 240v AC, 50 Hz.

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**Model 4 Upgrade Kit.** Allows Model III disk system owners to convert their computer to a Model 4. Installation required, (not included).

26-1123 ..... £599.95

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PCN-1



## PULL-OUT

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Deeper into the system in this the concluding part.

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Cover photo by Pete Smith

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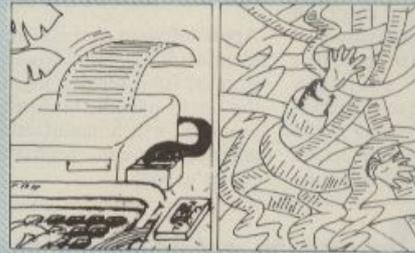
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# Apple lashes mimics

Apple is out to pick off its rival look-alikes, and the company has just brought down an injunction on Sirtel halting imports and sales of the Micro-Professor II. And the move could leave MPF-II dealers with stocks on their hands.

Peter Cobb, Apple UK's managing director, said the company is busy examining micros that advertise themselves as Apple-like machines, 'as we find people advertising these micros, and if we deem them to be look-alikes, and infringing our rights, we request the distributors to stop handling them,' said Mr Cobb. 'Sirtel is the first UK company to decide to carry on handling the micro in any case.'

The High Court has ordered that Peterborough-based electronics importer Sirtel should stop importing, advertising and dealing in the MPF-II, which has an architecture similar to the Apple's, will run some

**PCN PRO-TEST  
HARDWARE**

The MPF II claims Apple compatibility colour and 64K RAM Christopher M

## Micro Professor —oriental Apple?

**T**he Micro-Professor (MPF II) is a product of Taiwan, or more correctly, the Multitech Industrial Corporation. It is not a new machine. Multitech launched it in the US two years ago, and it comes to Britain with a reputation for offering an architecture very like the Apple's, but for much lower price. The similarity between the two machines is great that Multitech has been obliged to pay Apple a fee for the Micro-Professor's name.

and informative. It includes a listing of the monitor program, which is good news for machine code fans. The programme manual attempts to set out from the first benefits of the complete system. It is cluttered with cartoons, none of which attributes much to the text. One drawing has a remarkable caption, in order to comprehend the behaviour, please look at the following picture. The picture shows...

The Micro-Professor has many functions in it which do not clutter the user's view. At a price of £199, it is a very good value for money.

**PCN's Pro-Test of the MPF-II in issue 9: obvious similarities to Apple.**

Apple software, and uses an almost identical Basic. Sirtel has also been stopped from sending its stocks of the micro back to Multitech Corporation, which manufactures the micro in Taiwan, until the case comes to trial.

But Richard Drewnicki, Sirtel UK's managing director, says Sirtel will fight the case. He could not reveal on what grounds the company will do this, but it is likely to be that the software is not similar enough to constitute a true look-

alike. 'Existing users will be given full support,' Mr Drewnicki also promised.

According to Mr Cobb, the Apple Corporation's policy worldwide is to take action in individual countries against suppliers of Apple imitators. The company has stopped the Apollo micro in this country, along with various others, says Mr Cobb, while in the USA a Californian court upheld Apple's right to claim copyright on software resident in ROM, in a case against the Pineapple.

Other distributors of Apple-like micros could be on the wrong end of Apple action, too.

'There have been several cases, but most of the distributors have taken our word that their product infringes our rights—chiefly on the grounds of software similarity,' he told PCN. 'But there are a number of cases still outstanding.'

## Torch regroups

Torch Computer's deal with electronics giant GEC has collapsed (*PCN, Issue 20*) but the upheavals at Torch seem to be over.

Under the terms of the heads of agreement, GEC was to buy 76 per cent of Torch in exchange for a £3.25 million cash injection. A proportion of this was to buy out the existing shareholders. The remainder was to finance product development and manufacture.

Apparently it was GEC which ended the negotiations. Its reasons are unclear.

However, it has been suggested that the company wanted to increase its shareholding to 100 per cent, turning Torch into a wholly owned subsidiary. This was unacceptable to Torch and many of its staff, who have said that the reason they joined Torch was because it was a young, independent and innovative company.

Following the collapse in the talks with GEC, Torch has gone

back to its original shareholders, Newmarket (Venture Capital), the Welsh Development Agency and Bell Nominees. Their offer to inject a further £1 million into the company has now been taken up.

Two casualties of the re-financing are Martin Vlieland-Boddy and Peter Harris, the original founders of Torch. Mr Vlieland-Boddy has resigned as chairman and has left the company. Mr Harris has resigned as managing director although he remains a member of the board.

In their places come Robert Gilkes as chairman and joint managing director and Guy Neely as the other joint managing director. Mr Gilkes was formerly managing director of UCSL Micro Systems, a Unilever microcomputer manufacturing subsidiary. Mr Neely was until recently financial director of Glaxo Holdings, the food and drugs conglomerate.

megabyte add-on memory board for the PC which has a set of concurrency software routines included, to fit on top of Microsoft's PC DOS.

Encotel isn't yet ready to ship the board, which comes from Profit Systems in Chicago, and will sell for £455. But it will reportedly allow up to nine jobs to be run at the same time on the IBM PC, although PC DOS itself is a single-tasking operating system.

Digital Research is also making moves to capture a slice of the Lisa/VisiOn operating environment market, with a product called VIP now under development. More details in next week's *PCN*.

## Concurrent CP/M-86 now on IBM PC

IBM PC users should soon be able to take their pick of concurrent operating systems for the machine, choosing between the two arch-rivals Digital Research and Microsoft.

Digital Research is now shipping Concurrent CP/M-86 at £226 for the top-of-the-range hard disk version of the IBM micro—the PC XT. And Encotel is importing a half-

## Business micros in 16-bit battle

A gruelling public test of 16-bit business micros was due to get under way at noon yesterday (Wednesday).

The London Computer Marathon will pit 14 systems against each other, against the clock, and against a processing trial scheduled to last one week. It is being held at the boardroom of the World Trade Centre in London, and will be judged by *PCN* and Which Computer.

MicroNetworks, which threw down the gauntlet to the other

manufacturers, has entered its Samurai, Olivetti, Wang, Triumph-Adler, LSI and Comart have accepted the challenge, and the field will include a privately entered IBM PC.

The testing procedure will run until noon on Wednesday of next week, 24 hours a day, and at the end, the number of complete cycles of a test-program and the count of errors will be announced.

Most of the machines are pseudo-16-bit machines running the 8088 or 8086 chips, though the Olivetti uses a Zilog Z3001, a true 16-bit chip, and all have at least 128K RAM and two floppy disk-drives.

*PCN* will have a progress report next week. The final results will be announced at the end of the test, on Wednesday, August 17.

## Dragon bypass

**By Geoff Wheelwright**

Dragon users losing patience in the long wait for disk drives might find help from another quarter.

Tandy will consider selling the parts needed to upgrade the Dragon 32 to run Tandy's Colour Computer disk drives.

This will come as good news to Dragon owners who have waited for Dragon Data's drives, due out this month. But a third-party peripheral manufacturer will probably have to be involved before you can easily make the Dragon-Tandy drive connection.

The easy solution to get your Dragon running the Colour Computer drives is to swap some Dragon ROM for the equivalent Tandy ROM. The only adjustment you might have to make beyond that is some rejigging of the expansion port on the Dragon, after which you

can plug in the Tandy drives and disk controller.

Although a Tandy spokesman said the company would consider requests to buy the necessary ROMs, he added that installation of the Tandy ROMs in a Dragon would mean the Dragon would no longer be able to run existing Dragon cassette software.

He said this problem could be solved if a third-party peripheral manufacturer developed a board to allow Dragon owners to retain their existing ROMs and add the Tandy ROMs on a switchable expansion board, so you could 'call in' the Tandy ROMs when you need them.

The Tandy spokesman declined to comment on the cost of such a ROM deal, although it looks as if £275 would be the price to beat—that's what Dragon said its 40-track drives would cost.

## Boots boost for micros

Boots looks like starting a High Street war with its plans to entice you away from the big micro chain stores.

Boots intends that 250 of its biggest stores will have computers, peripherals and an extensive range of software by the end of September. And 32 of these stores will include a full computer department, with a computer consultant, selling Spectrums, Dragons, Commodores and BBCs.

Boots is attacking a market already experiencing massive growth, and hopes to knock WH Smith off its No 1 spot.

WH Smith holds about 16 per cent of the market, with Dixons and Boots each having about eight per cent.

WH Smith seems to be taking Boots' aims with a pinch of salt, and its only comment was: 'We agree with their view of the market place.' But with 250 'know-how' departments within Smith's stores, three computer shops and another three opening in Cardiff, Exeter and Kensington, Boots has got a lot to compete with to snatch away those sales.

Lasky's too was unperturbed. 'We have got one of the largest ranges of home computers,' said marketing director, Bob Cox.

'Someone coming in making claims that they want to be number one doesn't make that much difference to the way we are operating.'

## Polytechnic course

It isn't everybody's idea of a holiday, but if you have time to spare between August 22 and 26 the organiser of a summer computer course at Middlesex Polytechnic would like to hear from you.

Michael McNamara is looking for volunteers to help run the course, which was originally intended for 24 children from nine to 11. But enthusiasm has been so great that 120 children want to take part, and this is stretching the supervisors.

Mr McNamara plans to have groups of 12 children trying programming, game playing, and using a micro as a tool in a broader project.

He wants volunteers experienced in supervising children — ideally primary school teachers. 'Computer experience would be of incredible value,' he says, 'but I'm not really too worried about that — and the course should benefit the volunteers themselves.'

The course will concentrate on the BBC micro. It is being run by local authorities in Barnet and Enfield using the facilities of Middlesex Poly at Cockfosters.

Anyone interested should ring Mr McNamara on 01-368 9583.

# Cheaper Ataris?

By Geof Wheelwright

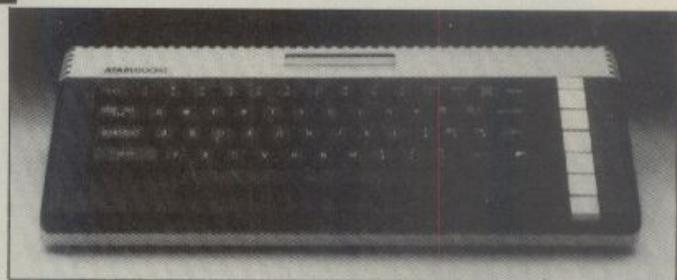
The arrival of Atari's new series of XL home computers in the UK is expected to trigger a substantial price drop for the existing 400 and 800 Atari machines.

The word is that the 16K Atari 400 will be slashed to £99 to compete with Sinclair's Spectrum, while the 800 should drop to around £200 — putting it in line with the £225 price of the Commodore 64.

Although Atari has denied reports of the price drops, Atari dealers say they expect substantial reductions on older machines.

This prediction is well-founded, as the successor to the Atari 400 — the 16K Atari 600XL — is selling in the US for \$150 and the 64K Atari 800XL is tagged at \$300. Even allowing for the normal transatlantic rate of inflation, in which £1 equals \$1, the existing prices for the 400 and 800 would have them selling at the same prices as the new XL machines.

Atari had a press showing of its 600XL last week, and public release of the machine cannot be far off. Atari dealers may have to prepare for stock clearing of the old machines very soon.



Atari 600XL: should trigger more price cuts on the 400 and 800.

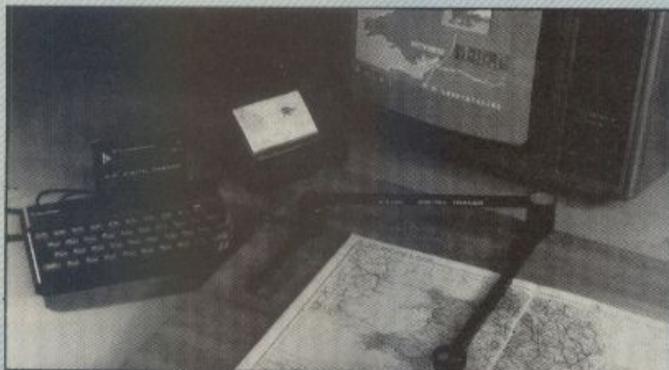
The 600XL comes with 16K RAM (expandable to 64K with a memory module) and 24K of ROM that includes an operating system and Atari Basic. It has a full-travel keyboard, is about the same size as a Commodore 64 and has a slot for cartridge software at the top centre of the machine above the keyboard. It uses standard Atari joysticks and will run existing Atari 400 and 800 cartridge and disk drive software.

A new range of peripherals for the 600XL was introduced at the same time as the machine. A small 80-column letter-quality printer will sell in the US as part of a \$465 package that includes a 600XL, the Atariwriter cartridge and a tape recorder.

Atariwriter is a cartridge update of the ageing disk-based Atari WordProcessor. It is available from Atari dealers for £65 and will run on the 400 and 800 machines, as well as the new XL machines.

Atari has also announced another long-awaited software release in the form of a £159 — officially licensed — Visicalc package for any Atari machine of 32K or more with a disk drive.

Still in the 'serious' software vein, Atari announced the imminent release of a CP/M module including a Z80 processor, 64K RAM, CP/M 2.2 operating system, a switchable 40 or 80 column video output, a serial I/O port and a monitor output.



**SPECTRUM TRACER** — The RD Digital Tracer, to be Pro-Tested in next week's PCN, can now be bought over the counter at 150 Spectrum stores. The £55.50 tracer enables Spectrum owners to transfer graphic images from paper to screen. It consists of two pivoting arms and a tracing head attached to an interface. As well as being able to trace, you can use automatic routines from the controlling software to construct circles and straight lines and to erase defined areas. The device represents another boost for Welsh enterprise, being designed and built at RD's South Wales plant.

## ZX81 packs persist

The ZX81 starter pack price deal may not be available from every Sinclair dealer. Shops holding old stocks of the machine have found they cannot get rid of them at the new prices.

The good news is that you may still be able to get the starter pack deal well after the two-month offer period expires.

This cheap package is an attempt to boost sales of the ZX81, which had plummeted following the Spectrum price cuts earlier this year.

Under the starter pack deal, you get a ZX81, a 16K RAM pack and a software cassette for an all-in price of £45. This is equivalent to £30 off the price of the products if bought separately. The ZX Printer with five rolls of paper has also been

reduced — £11.95 of paper comes free.

But Sinclair gave little advance warning to dealers about the offer, and is only allowing the offer to be applied to machines ordered less than 14 days before the announcement was made.

It is difficult to estimate how many shops have been caught with stocks of the micro at the old prices.

Terry Brown, deputy managing director of Prism Microproducts, which distributes Sinclair micros, says he has received few complaints from dealers.

'No-one has been ordering ZX81s since WH Smith cut prices a couple of months ago. So there aren't many people out there who have ZX81s,' he said.

But those who have could turn out to be a hidden blessing for buyers. Because dealers had scant stocks of the ZX81 there has been what Mr Brown describes as a 'rekindling of interest' since Sinclair brought out the offer.

As a result many dealers have placed large orders and are likely still to have stocks at the offer price when the special deal runs out in two months' time. Mr Brown expects many dealers will still be offering the starter pack at £45 to the end of the year.

'It is the kind of thing that is ideal to buy to put into a Christmas stocking,' he said.

This may be wishful thinking but Christmas 1983 promises to be busy for all micro makers.

## VIEW FROM JAPAN



## Incompatible in more than one sense

By Serge Powell

For a while it looked as if Japan's computer makers were about to come of age. The idea was simple enough. Over the years they have turned to the US's Microsoft to provide the Basic used in their units, but always with a twist to help maintain incompatibility.

In fact, to service this market Microsoft entered into a partnership with Japan's Ascii company, a leading publisher of computer magazines and other vendors' software. That gave the new company Ascii Microsoft a lot of clout. Or so it seemed.

Another normally powerful company is the consumer electrical and electronics giant Matsushita Electrics. Better known as National, Panasonic or Technics it hasn't thrived in the personal computer market. But it could if more software was available for its hardware. Many makers are in the same boat.

It was only a matter of time before someone came up with one standard compatible ROM Basic that, for a fee, all manufacturers could use.

At the beginning of the year Ascii Microsoft, with support from Matsushita, put this idea to a number of manufacturers, including market leaders NEC and Sharp, proposing a compatible Basic known as MSX.

The response was positive, if not enthusiastic, in the case of the software houses which have to write their most popular programs in the dozens of Basics in Japan and their less popular programs for a limited number of makers and a limited number of consumers.

In mid-June the breakthrough — MSX Basic — was unveiled to the public and that's when things began to unravel. Upon contracting to use the MSX Basic, manufacturers were to be hit with a one time fee of \$100,000. When manufacturing began there would be an additional royalty of \$4.50 per unit on a minimum of 33,000 units. If you run these numbers through your computer you would see a minimum cost per manufacturer rounds up \$250,000.

A lot of makers thought that was on the high side and there was no clear indication as to how much the software houses were to be charged for using the MSX Basic.

Into the fray stepped Japan Soft Bank, a leading software vendor. It too would develop a universally compatible ROM Basic and its royalty would be much less than that proposed by Ascii Microsoft. (Though there's debate whether Japan Soft Bank could produce such a Basic at such short notice.)

Within a week, however, the two parties settled. Japan Soft Bank agreed to back the Ascii Microsoft version along with Matsushita and some of the other makers. In return Ascii Microsoft agreed to a lower price.

By then NEC, with some 40 per cent of the PC market and the only assured supply of quality software, was questioning the wisdom of participating in the first place.

After all, the whole fracas was about computers in the \$100 to \$200 range. With software compatibility only price would give one machine advantage over another. And that would lead to a price war which no one could win except, perhaps, Matsushita with its massive consumer electronics distribution channels.

But what about the consumer? Wouldn't the buyers win? As one software authority in Tokyo put it: 'Do we really need compatibility in Basic? Wouldn't it be better to do something around one of the newer high-level languages and make possible a new generation of smaller more powerful home computers?'

Who knows? Certainly not the computer makers in Japan. At this point it looks like the makers who have never done well up to now will go with MSX. Those who have, won't.

And the Apples, Commodores, Sinclairs, Ataris and the rest will continue to gobble up world market share until Japan Inc can get it back together.

# Return of The Last One

If you feel that £330 (or even £185) is a bit much to pay for The Last One, the controversial program generator, there's a bit of good news... you can get a cut-down version for £50 plus VAT.

However, the new program is heavily cut down from its precursor, and as a result it can't handle such large jobs.

The principal differences are that only one file, of only 20 fields, may be handled by each program you write, which is limited to a maximum of 25 'flowchart lines'.

Just how limiting this will prove to be is difficult to say, but one question immediately arises... assuming you can do all you want in those 25 lines, how do you write a program that will compare one file with another?

The full-blown version will take 150 lines on CP/M and Apple, and 250 lines on pseudo-16s like the

IBM. And it allows up to 13 files, each of which may have up to 99 fields, so most reasonable applications should be workable with it.

There's another difference, too. The new 'little' TLO doesn't have a modify file option on the main menu, so it will not be simple to alter a data-format after it has been created.

This job isn't difficult on the big TLO, but it's time-consuming, since any program which uses that file must be modified, and this is something of a drawback.

So not being able to do it all on the new version may be something of a blessing in disguise. Provided you get your file-format right first time.

The new Compact TLO is currently available by mail-order from D.J. 'AI' Systems, Station Road, Ilminster, Somerset, tel: (04605) 4117.

# Cut-price turtle

Primary schools which send cash when ordering an Edinburgh Turtle can now pick one up for as little as £155.92.

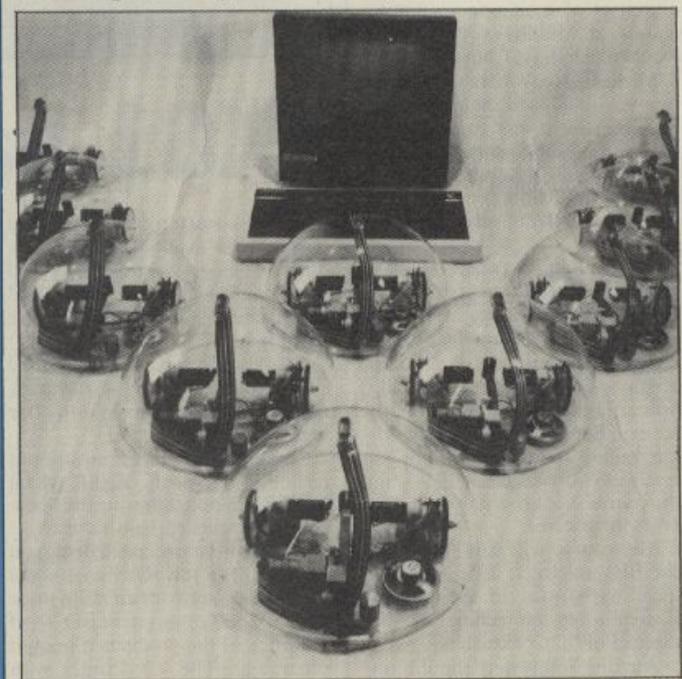
The mechanical robot originally cost £367.67 but Jessop Microelectronics (01-739 3232) redesigned it to almost halve the price. 'It was too expensive for primary schools,' said a spokesman from the company.

The turtle was designed by the Artificial Intelligence Department at Edinburgh University as an aid to

learning for young children. The robot is a two-wheeled machine equipped with a pen which can draw pictures or paper laid on the floor under the control of a computer.

For this cheaper price the turtle now runs off a parallel interface instead of an RS232 serial port. The turtle also has to be configured for different micros.

Schools ordering the device can expect delivery towards the end of September.



A flock of turtles — Jessop Microelectronics has cut the price by more than half.

# Jobs dream fades

Young people were warned last week that Youth Training Schemes (YTS) might not be a passport to getting work in the computer field.

Patrick Raymont, of the National Computing Centre in Manchester, said: 'YTSs are not going to produce people suitable for jobs in computing. It only gives basic training and they wouldn't reach the standard to become, for instance, computer operators.'

'I would say that people coming out of Information Technology Exchange Centres have a better chance.'

Mr Raymont is not the only critic. Companies in the computer industry are also cautious about the scheme.

A spokeswoman from software house Lifeboat said: 'I don't think

we would employ someone who came from this scheme. I feel you've got to be a reasonably sized company with enough staff to supervise trainees for them to get any real benefit.'

'We've been approached by a company to take on two trainees from one of these schemes, and the company hinted that we wouldn't have to train them. This, of course, would be totally unfair.' So it seems there are companies prepared to use YTSs to buy cheap labour and give nothing in return, leaving the trainee without instruction. Colin Stokes, sales manager of Imagine said: 'I don't see any reason why we wouldn't use people who came from the scheme. But I think it's useful that companies involved in these schemes have some sort of prog-

ramme ready and train the youngsters properly — or it's just a waste of time.'

The jobs should be there. While other industrial sectors are laying-off workers companies such as Acorn are recruiting 15 people every month. A spokesman from Acorn said: 'Acorn is committed to research and development, therefore the kind of people we would employ would be highly technical. People who come off the YTSs I think would be more suitable on the distribution or selling side.'

'After gaining experience in that area they could then go on to be a support engineer perhaps, with further training.'

So far several companies have undertaken to liaise with the Manpower Service Commission to give

some training to unemployed school leavers (*PCN, Issue 22*). One of these is Silica Shop, 01-309 1111, which will start its scheme on August 15.

Mike West, director of the company, said: 'I think YTS is worthwhile.'

During the year on the scheme trainees will spend six weeks at college and 47 weeks gaining work experience.

'I can't see that a scheme of this sort will be of no good,' added Mr West. 'Computers are going to affect everyone in one way or another. And under the discipline of a real life environment and issues, it gives the trainee a chance to look at a wide spectrum of jobs without committing themselves to one particular career.'

## Falling flat

The day when all micros come with a full colour, high resolution flat screen display could be a long way off.

Despite progress in the development of alternatives to the cathode ray tube it is unlikely the cost of flat screen displays will come down to the cost of conventional monitors or televisions until the end of the decade.

This gloomy forecast comes from Stanford Resources which has studied more than 20 techniques for producing flat screen displays.

At the moment, the organisation says, each of these technologies is at least five times the cost of cathode ray tubes on a cost per character basis.

But prices are likely to fall in the next few years and by the end of the decade liquid crystal displays (LCDs) and electrophoretic imaging displays (EPIDs) will be only 50 per cent more costly.

For the foreseeable future, micro makers will rely on TVs and monitors and use flat screen technologies only for special applications, such as portables.

Mind you, it's not only the flatscreen technology that's costly, the report doesn't come cheap either. It costs \$2,275 — but if you're still interested you can get it from International Planning Information, Nordre Rngvej 201, 2600 Glostrup Denmark.

## DEC opens the doors on Rainbow

Rainbow users can format their own disks now DEC has retreated from its monopoly of disk supplies.

A spokeswoman from DEC said: 'Originally we wanted to maintain a high quality on disks and the best way to do that was manufacture and sell our own. We have made this latest move in response to public demands — they wanted their own formatting facility.'

The company is giving a Rainbow Utility Diskette to users which includes the previously restricted format program. So now Rainbow users can buy blank disks from other sources than DEC.

But unlike IBM, which publishes all the engineering standards of its micro, including hardware and operating system, DEC has played its cards close to its chest. However, with a utility disk it is launching the new Rainbow 100 technical documentation set.

This is a three volume set of manuals that contains all of the technical details on the Rainbow 100, says DEC. The move is seen as a positive sign by the UK software industry.

In addition, the company has made Microsoft MS-DOS 2.0 an operating system option.

**MULTILINGUAL PC** — The newest version of Microtrend's Trendtext IBM word processing package can cope with every letter in six European alphabets, as well as mathematical notation. It has a double-sized character set, built by using 8-bit character codes rather than the 7-bit ASCII codes. The package is also able to handle business graphics. You can contact Microtrend on (0423) 711878.



**SPIRIT** — This expensive looking micro, comprising what looks like an IBM keyboard and repainted Sirius cabinet, actually contains the powerful Motorola 68000 16-bit microprocessor. The machine is part of the Almarc Data Systems Spirit range of micros which now offers a choice of 280, 8086 and 68000 processors. The 68000 version can run the multi-user operating system Unix and you get 10Mb of Winchester disk storage as an extra bonus. Almarc claims the Spirit 1-68 is ready for delivery in exchange for £4,000 plus VAT. The company is on 0602-52657.

## New Apple DOS

Apple aficionados finally have a new disk operating system. ProDos is the name, and SOS is its game . . . the new system is, if not the same, very similar to the Apple III's operating system.

It's more advanced with new features which should ensure continued popularity of the Apple II and IIe.

Among these are the ability to handle disks of any size and to treat them all the same, even 143K 5¼ inch floppies or 40Mb Winchesters!

However, applications written in Applesoft won't have to change, because a program called the Applesoft Command Interpreter, which replaces the old DOS, will interpret 'old' DOS calls, and

change them so they call ProDos.

They're clever, too, since the new Directory structure is automatically recognised.

This is almost UNIX-like in effect, with hierarchical directories, interrupts, and other glossy features, though these won't be terribly useful until you're using a big disk.

The actual ProDos code sits in the language-card, and though it doesn't use all of it, the spare areas are earmarked for 'future expansion'.

According to Bill Schelderup, who is in charge of ProDos development at Apple Cupertino, the new operating system should be available in early 1984 for about \$50.



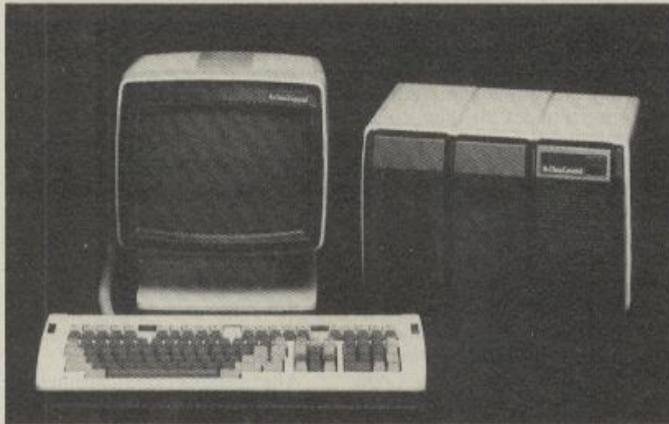
# DG on the march

Minibuilder Data General is having a second stab at the personal computer market. The launch of its Desktop Generation machines should make more impact than the company's embarrassing failure with its Enterprise micro.

The 'cat among the pigeons' machine is the Model 10. For just less than the price of an IBM (£2,500), you get a twin processor machine with an 8086 and DG's own MicroEclipse. The Model 10 runs both MSDOS and CP/M86 as well as the minicomputer operating systems AOS, RDOS and MP/AOS.

The Model 10's memory can be expanded from 128K to 768K. Disk storage starts off with IBM PC-compatible floppies and can be upgraded to 15Mb hard disks. A graphics option provides 4,096 colours on a 640 x 240 screen using the GKS standard.

The other two models (numbers 20 and 30) are based on just the



One of DG's Desktop Generation micros, which major on networking.

MicroEclipse processor and are intended for heavier workloads. Data General views stand-alone desk top systems as an underuse of resources and so is pushing the communications and networking aspects of the range. Most systems

are supported including Ethernet and Data General's CEO office system.

Reactions to the system have been very favourable and software houses have already started work on ports to the new machines.

## Floppy disk interface for Spectrum

Sinclair's Microdrive hasn't stopped companies such as Technology Research (01-699 5332) developing floppy disk interfaces for the Spectrum.

Selling at £68.25, the card from Technology Research will work with any Shugart standard disk drive. The disk operating system that runs the drives is TRDOS, which the company says has been specially developed for the Spectrum.

The command set is made up of the following functions: SAVE, LOAD, ERASE, DIRECTORY, INITIATE and BASIC, with PASS used to change the disk access password and LOCK used to initiate user-only software access.

The company says the PASS and LOCK commands mean a disk is only accessible to password holders. The LOCK feature reduces the chances of software being copied.

## New Tandy to cost under £100

Tandy's new sub-£100, Spectrum-style micro will be unveiled at the Personal Computer World show in September.

The machine comes with a hard-key qwerty keyboard, and full-size space bar — but only 4K RAM standard. It will sell for \$119.95 in the US, but hints from Tandy are that it will come in at under £100 in the UK. It could cost less, since no-one knows yet how much the 16K memory add-on will cost.

The real surprise in this otherwise standard colour micro is the RS232 interface and communications capacity of the machine. The Tandy will use an optional 600 baud modem to communicate with other machines and run standard Centronics printers.

Tandy has departed from its long-standing affair with the 6809 processor and gone for a 6803, but the chips are similar enough to reduce differences in operation.

The machine is light, weighing only 29.5 ounces, and takes up no more space than the Sinclair machine it resembles so much.

Cassette software for the machine will be provided for use through a DIN-style plug at the back — and programming should be easy enough for anyone familiar with either the Dragon or existing Tandy machines as the MC-10 uses yet another version of Microsoft Basic.

The machine should be in Tandy's stores shortly after the PCW show launch.

## Apple hatches plot

Apple has responded to the increasingly demanding needs of its users by bringing out a four-pen plotter that crashes through the £1,000 barrier.

The Apple 410 Plotter features an unusual inclined plotting bed that can handle paper or transparency materials up to A3 in size. It will be available in September for around £700.

The plotter, which will be compatible with both the Apple IIe and the Apple III, does not depend on the computer's intelligence. It has its own 126 byte ROM. As a result, all you require to draw complex shapes is a single command.

With the machine will come a wide range of accessories including four types of pen in eight colours.



At the core of the Apple 410 is an inclined plotting bed.

The pens can be filled with either water-based or oil-based ink. There are also two widths available: 0.3mm and 0.7mm.

Apple is promising full after-sales support through dealers.

'Although a customer may be prepared to wait a week for his plotter there is no reason for him to wait for pens,' said Stephen Holmes, Apple IIe product manager.

## Welsh air byte



Chris Jones, programmed to present 'The Micro Show'.

If you can pick up BBC Wales on your radio you could be in for a treat: your very own computer club of the air.

The station is launching a programme to be called *The Micro Show*

on Friday evenings beginning in October and running for six weeks.

It aims to be a cut above the programmes that have been run before, going beyond the purely educational objective. Presenter

Chris Jones sees the series as a forum for micro users where ideas, information and programs can be exchanged and new developments analysed and explained.

There will be a beginner's section, software and hardware reviews and features and reports covering the whole field of micro-computer use at large.

The most ambitious part of the series will be the broadcasting of software over the airwaves. This is not the first time it has been done but BBC Wales is claiming that this will be the first time that it has been done on a regular basis in the UK. The telesoftware broadcasts will be done at a different time to the main programme. Sunday seems to be the most likely day.

The station is inviting advance comments and suggestion.

# QUESTION

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SINCLAIR SPECTRUM 16K	FOR	£99.00
SINCLAIR SPECTRUM 48K	FOR	£129.00
ORIC-1 48K	FOR	£139.00
SINCLAIR ZX PRINTER	FOR	£39.00
SINCLAIR ZX81 RAM PACK	FOR	£28.50
SEIKOSHA GP-250X PRINTER	FOR	£260.00
SEIKOSHA GP-100A PRINTER	FOR	£215.00
SANYO SCM12H GREEN MONITOR	FOR	£100.00
SANYO SCM12N GREEN MONITOR	FOR	£85.00
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# Micros under cover

Hot on the heels of CTA's bonding scheme for mail order houses (*PCN Issues 21 and 22*) comes a CTA approved insurance scheme for home computers.

The scheme is underwritten by Domestic & General Insurance Company and is designed to provide owners of low-cost micros with full cover against breakdown and failure of their systems.

All risks insurance (fire, theft and accidental damage) for when the

micro is out of the house can be obtained as an add-on to the policy at extra cost.

The cost of the scheme is broadly in line with the prices suggested in *PCN's* special feature about insurance (*Issue 19*).

For a system, including computer, printer, disk or monitor, costing up to £200 the annual premium is £15. For a system costing between £400 and £500 the premium is £37.50. Above £500 the premium

should work out at around 7.5 per cent of the value of the equipment insured.

The all risks option costs around 2.5 per cent of the system's value and will be useful if you want something in addition to your household contents insurance.

'People have complained to us that their household contents policy does not cover them for when they take their micros out of the house to places like computer clubs,' said

Nigel Backhurst, CTA's general secretary. He said there has been an enthusiastic response from CTA members. Apart from dealers, who would be selling the policy to cover users for the costs of repair after the guarantee runs out, at least two manufacturers had expressed interest in enclosing a leaflet on the scheme with each computer.

It is hoped the insurance policy will also be sold by non-CTA dealers and manufacturers.



**TAKE THE STAND** — Tired of setting up your computer equipment, then putting it away again? Well, the Timpro Personal Computer Desk could help. A choice of widths in a teak-like finish. Contact: Timpro Manufacturing Company, 0253 884105.

## Armageddon with a modem

Who will start World War III: will it be Margaret Thatcher, Yuri Andropov, Ron Reagan or a Seattle teenager with a home micro?

If you said the latter, there could be a lucrative career in Hollywood scriptwriting awaiting you. Wargames, a new film on general release from August 18, sees 17-year-old David Lightman inadvertently take on the Defence Department's Wargames computer when he tries to rip-off software from the 'Provision' software company.

Thinking that he's tapped into Provision and is playing their latest strategy game on his Imsai S-100 type machine (using a modem

and 8 inch floppies) David sets in motion a process that could lead to nuclear war.

The computer thinks the 'game' is real and begins the process of calling the US to arms.

Back in the real world, Thorn EMI has announced the release of a video game based on the movie. 'Computer Wars' casts you in the part of David (no surprise there) and asks you to convince Joshua that it's all only a game.

The game will be available to run on the Commodore Vic-20, Atari computers and the Texas Instruments 99/4A from September 12. Prices have not yet been revealed.

## GEM SOFTWARE



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Escape from the mine with as much money as you can, but don't get closed in or caught by the prowling monsters. An addictive machine code game, with superb graphics and save facility. (SPECTRUM & ZX81)..... £4.95

**SULTAN'S MAZE** by Christopher Hunt (LYNX & DRAGON)..... £7.95  
Enter the 3D Maze in search of the Sultan's jewels, but beware, your strength may run out, or, you may come face to face with the Mad Guardian. A multi-difficulty game with fantastic graphics and sound.

**LYNX COMPUTING BOOK** by Ian Sinclair..... £6.95  
Excellent book, which the beginner will find an invaluable aid, in helping to unravel the LYNX's many varied features!!

**GEMPACK IV** by W. E. MacGowan (DRAGON & LYNX)..... £7.95  
Two great machine code games, with full colour graphics.  
In **Sea Harrier** you must land your plane on the aircraft carrier, after dispersing the clouds with chemical bombs, but don't hit the ship!  
In **Sub Chase** you must depth charge the wolf pack without being sunk. Both with 4 levels of play from easy to kamikaze!

**CHATEAU** by Pete Allen (DRAGON)..... £7.95  
A new type adventure, in which you must wander the Count's old mansion in search of treasure! Of course, when the Count died and hid his treasure, he also left lots of unpleasant surprises for those brave enough to try and seek out his riches!! Come face to face with Ghouls and Ghosts, Vampires and Trolls; do you run or fight? Will the mysterious Travel Agent suddenly appear and whisk you away to far off places? Where can you find the key or the lamp? Is the clock booby-trapped? Will you die a cold and lonely death, or will you win through to claim the fantastic treasures of The Chateau??

**GAMES PACK III** by Christopher Hunt (LYNX)..... £7.95  
**REVERSI** Pit your wits against the LYNX with this easy to learn, yet extremely demanding board game. Five skill levels, from novice to grand master. **SNAKE** Guide the snake to the food, but watch out, he will grow and must not eat the wall or himself.  
**PONTOON** An excellent implementation of a favourite card game in full colour with sound. LYNX is a mean Banker.

**GOLF** by Pete Allen (LYNX & DRAGON)..... £7.95  
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PCN 11/8

PCN AUGUST 11-AUGUST 17, 1983

# Logo log

The man who invented Logo, Professor Seymour Papert, will be on hand at the British Logo User Group's conference and workshop, to answer teachers' problems on his language.

The two-day meeting on September 2-4 will be held at Loughborough University of Technology and will cover the philosophy underlying Logo through to specific practical applications at levels varying from beginners to experts.

Other principal speakers at the conference will include Dr Peter Ross of Edinburgh University, and Deborah Booth, a teacher and member of the Chiltern Logo Project Team.

During the two-day event delegates will get the opportunity to use different machines supporting Logo and there'll be an exhibition.

Contact Pam Valley, 26 Tithby Road, Bingham, Notts NG13 8GN.



**FAX 'N' FIGURES** — Apple and IBM users can create their own database applications with a new program called File-Fax from Pete & Pam Computers (01-769 1022). Each File-Fax database record occupies one screen page, and you can have up to 31 fields per record. It allows you to make up to four reports for each application, and you can design the reports to suit your specific needs. File-Fax costs £145.95.

## Dragon additives

Using your Dragon 32 could become a lot easier with three new products from Elkan Electronics (061-798 7613).

If you find thumbing through your manual a bit tiresome, how about looking at an 18-page quick reference card that holds all the information you may need?

At £3.95 the card shows you Basic statements, how to play music, a look at memory mapping and so on. Cards are also available for the Vic 20 at £3.95 and for the 6502 microchip at £2.95.

Dragon Cruncher is a handy conversion program. The menu-driven program converts most Dragon 32 programs for use on the Tandy Colour Computer and vice versa, and costs £7.95 on cassette.

Fast wrist action for playing arcade type games is where the Quickshot joystick could gain you more points. At £14.95 the self-centring joystick has a fire button and contour grip and plugs directly into the Dragon or Tandy Colour Computer with no need for expensive adaptors.

## Out of school

School holidays seem to have brought an outburst of educational software.

Currah Computer Components (0632-323535) has produced Chattermaths, a talking program designed to teach four- to six-year-olds addition and subtraction.

The package runs on the unexpanded Vic 20, using allophone synthesis to generate the voice. The commands and the corrective responses are spoken as they appear on the screen. The graphic display enables the child to understand and interpret numbers and sequences heard and seen on the screen.

At £4.99 it can be used as a

teaching aid both in the school and at home.

Collins Educational (041-772 3200) has also slipped onto the educational software scene with several new packages for the Spectrum.

For the games addicts is Game Writer's Pack, at £7.95, which teaches children how to design and invent their own games.

First Numbers at £5.95 is a counting pack consisting of a workbook and a cassette for children starting school.

Also selling at £5.95 you can get What's The Time and Know Your Tables.

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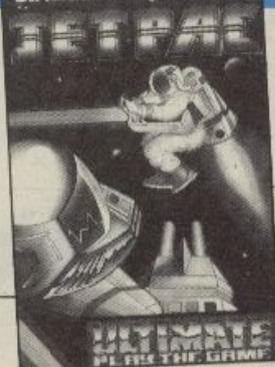
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# PCN Charts

You've followed the micro charts — now here's the games top 30 compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets in the two weeks up to July 28 and, like the micro charts, do not take account of mail order sales.

The micro charts this week show the number of machines sold in the two-week period ending two weeks before publication date, so they tell the story in the high street

Sinclair ZX Spectrum



GAMES



Top Thirty

		GAME TITLE	PUBLISHER	MACHINE	PRICE
▶	1 (1)	Jet-Pac	Ultimate	Spectrum	£5.50
▲	2 (6)	Ah Diddums	Imagine	Spectrum	£5.50
▼	3 (2)	Penetrator	Melbourne	Spectrum	£6.95
▲	4 (8)	Arcadia	Imagine	Spectrum	£5.50
▶	5 (5)	Transylvanian Tower	Shepherd	Spectrum	£6.50
▲	6 (—)	Terror 4D		Spectrum	
▲	7 (—)	Trans AM		Spectrum	
▲	8 (10)	SS Enterprise	Silversoft	Spectrum	£6.00
▶	9 (9)	Killer Gorilla	Micropower	BBC	£7.99
▲	10 (21)	Psst	Ultimate	Spectrum	£5.50
▶	11 (11)	The Hobbit	Melbourne	Spectrum	£14.95
▶	12 (12)	Flight Simulation	Psion	Spectrum	£5.95
▲	13 (—)	Horace and the Spiders		Spectrum	
▼	14 (7)	The King	Microdeal	Dragon 32	£8.00
▲	15 (26)	Krazy Kong	Interceptor	Vic 20	£6.00
▲	16 (24)	Zenon 1	LJK	Oric	£5.50
▲	17 (27)	Horace Goes Skiing	Psion	Spectrum	£5.95
▲	18 (—)	Cookie		Spectrum	
▲	19 (—)	3D Tanx		Spectrum	
▼	20 (13)	Zaxxon	Datasoft	Atari	£29.90
▼	21 (15)	Timegate	Quicksilva	Spectrum	£6.95
▲	22 (23)	3D Combat Zone	Artic	Spectrum	£4.95
▼	23 (3)	Gridrunner	Llamasoft	Vic 20	£8.50
▲	24 (—)	Heathrow ATC		Spectrum	
▲	25 (—)	Lazerzone		Commodore 64	
▲	26 (—)	Chess		Spectrum	
▼	27 (18)	Miner 2049er		Atari	
▲	28 (—)	Life Cycle		Spectrum	
▲	29 (—)	Attack of the Mutant Camels	Llamasoft	Commodore 64	
▲	30 (—)	Monstershell		Spectrum	

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# PCN Charts

between June 14 and July 28.

Neither mail order nor deposit-only orders are included and the prices quoted are for the no-frills models and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and, like the games, will be updated every alternate week.

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

## HARDWARE



### Top Twenty up to £1,000

▲	1	(2)	Spectrum	£99	(SI)
▲	2	(4)	Dragon 32	£175	(DR)
▶	3	(3)	Vic 20	£150	(CO)
▼	4	(1)	BBC B	£399	(AC)
▲	5	(6)	Commodore 64	£299	(CO)
▼	6	(5)	Atari 800	£300	(AT)
▲	7	(11)	Newbrain A	£228	(GR)
▶	8	(8)	Oric 1	£99	(OR)
▼	9	(7)	ZX81	£40	(SI)
▲	10	(13)	Lynx 48	£225	(CA)
▼	11	(9)	Atari 400	£150	(AT)
▼	12	(10)	TI99/4A	£150	(TI)
▼	13	(12)	Colour Genie	£168	(LO)
▲	14	(15)	Tandy Colour	£240	(TA)
▲	15	(16)	Sharp PC1500	£169	(SH)
▲	16	(17)	Apple IIe	£969	(AP)
▼	17	(14)	Epson HX20	£472	(EP)
▲	18	(19)	Sharp MZ80A	£549	(SH)
▲	19	(—)	Aquarius	£99	(MA)
▼	20	(18)	Jupiter Ace	£90	(JU)

### Top Ten over £1,000

▶	1	(1)	Sirius 1	£2,754	(ACT)
▶	2	(2)	IBM PC	£2,392	(IBM)
▲	3	(4)	DEC Rainbow	£2,714	(DEC)
▼	4	(3)	Commodore 8096	£1,374	(CO)
▲	5	(7)	Apple III	£2,780	(AP)
▲	6	(8)	Olivetti M20	£2,754	(OL)
▼	7	(6)	HP86A	£1,541	(HP)
▼	8	(5)	Osborne 1	£1,581	(OS)
▲	9	(—)	Televideo TS800	£2,220	(MI)
▲	10	(—)	Tandy TRS80 III	£1,999	(TA)

AC—Acorn Computers. ACT—ACT. AP—Apple Computer. AT—Atari International. CA—Computers. CGL—Computer Games Ltd. 60—Commodore. DEC—Digital. DR—Dragon Data. EP—Epson. GR—Grundy Business. HP—Hewlett-Packard. IBM—IBM. IC—Icarus Computers. JU—Jupiter Cantab. LO—Lowe Electronics. LL—LucasLogic. MA—Mattel. MI—Midlectron. OL—Olivetti. OR—Oric. OS—Osborne Computers Corporation. SA—Sanyo. SH—Sharp. SI—Sinclair. SO—Sord. TA—Tandy. TI—Texas Instruments.

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## My plea on the price of printers

You don't like Mrs T do you? Here we have an administration that at least is showing some resolve in some directions and even some success, especially in the struggle against the stupidity and cupidity of man, as illustrated by the phenomenon of inflation, and then PCN's price is advanced by 10p on 35p.

My calculator reckons this is inflation in excess of 28½%. I realise you are in business to make a living, and there is such a thing as 'What the market will bear', but 28½% is reminiscent of yesteryear, not 1983.

Now for the real object of these few lines — is it possible to mount some sort of campaign to get the prices of printers down to a level more commensurate with other items of hardware? Failing that I would ask if you would run an article which supports the present level so that I can come to terms with the difference between the cost of a computer and price of a printer.

As a rider to the above, is it possible for a more clear indication to be given of the country of origin of items advertised or featured in articles? For many of us it is difficult to be sure from their very anglicised names whether items of equipment are in fact made in Japan, Korea and other such Far Eastern areas. Having seen what has happened to the British motorcycle industry (among others) I am extremely disturbed at the possible appearance of Japanese goods in vast quantities here. Surely we have enough, nay more than enough, cheap material in Britain already that at least identification can help to combat.

British industry has been jolted sufficiently now to realise that it has a tremendous struggle. I suggest PCN supports that struggle in every way it can. Refusal to accept advertisements is one such way.

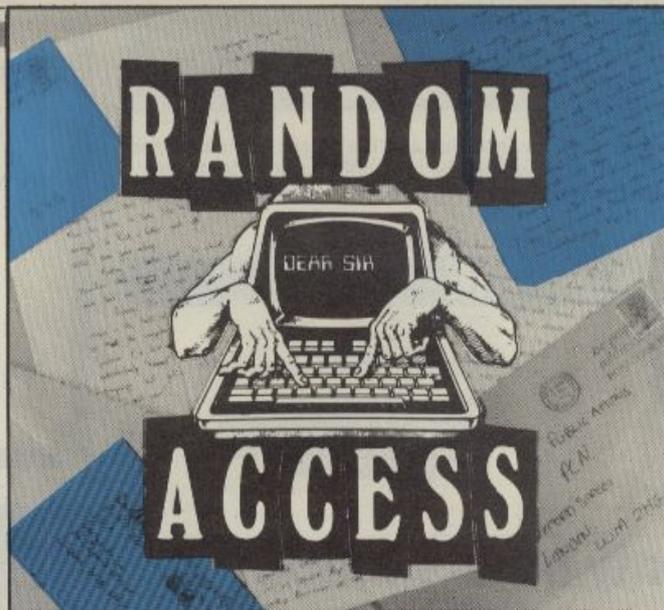
J Nixon,

Pinner, Middx.

*Perhaps Apple and Commodore owners would care to comment, meanwhile we'll bend our minds to the printer problem — Ed.*

## The Sphinx keeps its mystery

Arghhhh! Once again I have rushed away jerking spasmodically and salivating profusely to lie sobbing on the floor. Once again the mindless boredom of



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

wandering between the 'gardener's store' and the 'blacksmith's forge' has overcome me.

Sphinx Adventure — that's what I'm gabbling about. How for Egypt's sake do you get to forbidden fruits such as the 'Dead End Diamond Mine' or the room with walls resembling 'warm ice cream'? Somebody help, please! If I ever find the Sphinx I will smash it into little pieces and jump on them. At the moment the game is about as interesting as watching Tipex dry.

N Sayers

Ware, Herts

## The finer points of Commodore 64

Peter Chadwick's letter (*PCN Issue 21*) is inaccurate and misleading in its comparison of the Sinclair ZX81 and the Commodore 64.

It is as simple to learn from scratch with the 64 as with the ZX81. Anyone who has taught themselves to program on the 64 would experience difficulties similar to his were they to move onto a Sinclair, but not were they to move onto most other machines. This is because Commodore Basic is an implementation of the industry standard Microsoft Basic, not a unique dialect like Sinclair's.

Microsoft Basic does not support computed GOSUB or GOTO. The syntax used by most programmers to respond to a selection entered following a multiple choice menu is

```
100 INPUT X
```

```
110 ON X GOSUB 1000, 2000, 3000
```

and this is documented on page 122 of the *User's Guide* supplied with the 64.

This *Guide* is intended for people who are using a computer for the first time, so has intentionally been kept simple. It is only the user who has already learnt some programming who will be able enough to move onto more complicated activities such as creating multiple sprites. How to do this is fully explained on pages 133-134 of *The Commodore 64 Programmer's Reference Guide*.

This is sold separately (£9.95) to keep the price of the machine as low as possible for the majority of purchasers who will not need this more advanced *Guide*.

Both the *User's Guide* and the *Programmer's Guide* include an appendix that lists the ASCII codes returned by all the keys, including the eight (not four) 'special function' keys. No knowledge other than the ASCII values returned by these keys is needed to incorporate them into a program. The programmer simply writes code to do whatever special functions are required, and calls the appropriate section of it when a GET statement receives a function key.

The VIC 20 and the Commodore 64 are not completely incompatible. Any Basic program that does not use the USR, SYS, PEEK and POKE statements will run in both machines. The graphics are necessarily incompatible because the VIC 20 has a MOS 6561 video interface controller that is only capable of giving a

22 column × 23 line display, while the 64 has a MOS 6569 VIC chip that gives a 40 × 25 display and supports sprites.

The sound is also incompatible, because the enhanced video capabilities do not leave room in the VIC chip for sound facilities. The 64 uses a separate MOS 6581 sound interface device which gives it far more powerful sound synthesis facilities than are available in the VIC 20.

The VIC 1541 disk drive uses the same disk format as both the CBM 2031 and the CBM 4040 disk drives, so Mr Chadwick's statement that 'Software — or even data disks — from a 64 will not download into a Pet' is completely untrue. Provided it does not use the four statements referred to above, 64 software written in Basic will not only load into a Pet, but will also run in it. All that is needed is a direct command (POKE 41,8: POKE 2048,0) to adjust the Pet's start-of-Basic pointer to match the 64.

Subject to the same constraint on those Basic commands that enable direct interaction with the operating system, plus four minor changes in the Basic (detailed below) any Basic program that runs in an 8032 will run in the 700 series. The four differences are that TI\$ is now seven characters long (including tenths of a second), TI is no longer a reserved variable, ER and ER\$ are now reserved variables, and some screen control codes must be altered to ESCape sequences. Since the 700 uses all the same peripherals (including disk drives) as the 8032, it is nonsense to suggest that data files created with an 8032 cannot be used by a 700.

It is an absurdity to state that software made to run on the 8032 will not use the extra memory of the 8096, since the soft-loaded operating system sold by Commodore for the 8096 (LOS 96 — £99 plus VAT) makes the extra memory available to Basic programs. LOS 96 is sold separately because most users of the 8096 do not require it: they want the extra memory for larger Visicalc models (up to 73K), to run Silicon Office, or for word processing with more text held in RAM (Wordpro V Plus).

It is not Commodore that fails to provide upward compatibility, but Sinclair — as anyone who has tried to read their ZX81 tapes into their

Spectrum knows only too well. One should also remember that Commodore has had disk drives available for the 64 ever since the 64 itself was launched: Sinclair's Microdrive has taken 15 months to arrive, and turns out only to be a tape drive!

*John Collins,  
Technical Executive,  
Commodore Business  
Machines (UK).*

Oh dear! Poor Peter Chadwick. He can't cope with the CBM 64 because he is only used to a 1K black and white oversized matchbox!

I would not deny that the manual and version of Basic is not foolproof, but would say that a little thought and logic on the part of the user would go a long way.

If Peter wants to program I suggest he buys the programmer's manual, if he wants to play space invaders, which would not stretch his brain, he can sit back and enjoy the colour, sound and graphics of the CBM 64 — something the ZX81 can never match.

*Gary J Starling  
Stanford le Hope, Essex.*

**Commodore and the waiting game**

What have you got against the Commodore 64? As one of the founder subscribers to your magazine I am appalled with the lack of attention given to what I class as a superb machine.

I hope you don't take this as a standard my-computer's-better-than-yours letter because it isn't. I have absolutely nothing against any other machine on the market but I would like to see the odd review of a CBM 64 game in Gameplay. To date I think you have reviewed only one.

I know it could be said that the 64 is a new machine so there isn't much software for it. This may have been true a few months ago but now, well, there are dozens of games and programs on the market from various sources. There is even stuff coming over from the US, so please, please, please! A little more attention.

Apart from that I think your magazine is great.

*Kevin Tye  
Shirley, Southampton.  
Phew! Made it just in time.  
Check out Micropaedia next week. Pull it out, keep it safe. . . it's all about the 64! — Ed.*

**PCN £10 Star Letter**



**A custard pie for Oric**

Not being a whizz-kid and all that sort of thing, it is with some trepidation I write this note. Additionally, the point I make could well have been already put to you by many others; the advertisement in question has possibly appeared before I noticed it on page 60, PCN No. 20, and perhaps I ought to address my remarks to Oric.

Anyhow, here goes. The advert is for Oric's MCP40 Colour Printer, which is illustrated together with Sin and Cos curves. The x axis is marked 0 to  $2\pi$ , with division at  $\frac{1}{4}\pi$ ,  $\pi$ , and  $\frac{3}{4}\pi$ . To save this household going completely bananas, please confirm that the  $\frac{1}{4}\pi$  and  $\frac{3}{4}\pi$  should read  $\frac{1}{2}\pi$  and  $\frac{3}{2}\pi$ .



If I am right, three cheers to the Open University (which introduced me to Sin etc. . . if you know what I mean) and a slap on the wrist for Oric.

*J Nixon  
Pinner, Middlesex.  
Well, we think you're right. Don't go bananas, just accept our star letter prize while we wait for Oric to clear up the confusion. (Mind you, judging by past performances, waiting for Oric is not to be recommended. . . )  
— Ed.*

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Names	Points	Games	Points/Games
Ben	12	24	0.5
George	20	12	1.66
Henry	30	13	2.31
Paul	40	10	4

### Data access on the Oric

**Q** I have an Oric 1 and am working on a program which requires data to be selected from a large alphabetical DATA section at the end of the program. Unfortunately, time is lost when READING through to names a long way down the list and, as you know, arrays are lost when programs are CSAVED.

Is there any way to use the DATA pointer to perform a binary search to find an item in the DATA block quickly?

*Alan Hunne, Broughty Ferry, Angus*

**A** I'm not sure what you are looking for. There is no built-in way to manipulate the DATA pointer. Many Basics have a 'RESTORE line number' that lets you move the pointer to a specified DATA line. The Oric doesn't but it would be quite simple for an experienced 6502 programmer to patch in a small routine using the Oric's useful ! and & commands.

Are you sure you need it? If the data is the same each time it is used, can't you just READ it all into arrays after the program has loaded and access it as freely as you wish?

The problem with this is that you will duplicate some of the information you've stored as DATA in your variable space. But if you've got the memory, it makes sense to put it to use.

As it stands, you can't SAVE arrays on the Oric but there are two ways to do it if you need to. Slow, nasty and unpleasant is simply to figure out where in memory your data statements are and then POKE into them. CSAVE the program to store the new DATA.

The preferred method is to use the cassette file-handling patches freely available from dear old Oric. Have a look in Tangerine's beautiful *Oric Owner* issue 2, where they are described in detail. What a shame they weren't included with the machine!

### A shot at keeping the score

**Q** I bought a 16K Spectrum two months ago and am learning to program. I want to write a statistics program for a basketball team. Can you give me a hint how to input and store data as above?

*Marcel Op den Camp, Scharnerweg, The Netherlands*

**A** Whenever you have related information like this, you'll find it easiest to use arrays to store and process the data. Chapter 12 of the Spectrum manual is a pretty good introduction.

Arrays are like lists or tables of ordinary variables. To set them up, you use the DIM statement. DIM C(10) creates a list of 10 variables with the names C(1), C(2), C(3) and so on up to C(10). The crucial point is that the number in brackets (the subscript) doesn't have to be a number—it can be any numerical expression.

So to read ten values into the Spectrum you could use DIM C(10) followed by FOR i = 1 TO 10: INPUT i: NEXT i. You can print them out, just use FOR i = 1 TO 10: PRINT i: NEXT i and so on.

Your example is slightly more complicated in that it is a table. DIM will do this as well—DIM T(4,10) would create a

table (or matrix) of four columns by ten rows, for example.

The other complication is that you want to store the players' names. These must be in a string array separate from a numerical array.

The short program is just to give you an idea of how to go about your own program. It lets you type in the players' names, points and games and calculates the points/games figure for each player. Then it prints out the whole table.

It uses two arrays. A\$(p,10) is used to keep the names of the players. A(p,3) holds the other information. The first subscript is the player number and the second a column number where column 1 is for points, 2 is for games and column 3 is for points/games. Notice that if more than four people turn up for a game (!), all you have to do is alter p at the start of the program. The value of 4 isn't repeated as a constant every time the array is used.

### Back-street Atari upgrade

**Q** I own an Atari 400 and wondered if, like the 800, it has space behind the cartridge slot for memory modules. If so, where can they be purchased and how much do they cost?

*Gary Watkins, Sheerness, Kent*

**A** This is a slightly delicate situation. There aren't any modules and slots as on the 800 but memory upgrades are possible. Atari sensibly turns a blind eye to dealers who are prepared unofficially to fit memory directly to the 400.

Read a few ads and phone a few numbers. You shouldn't find it difficult to arrange a 'back street' memory upgrade. One obvious clue that you'll see advertised is the dealer who offers both 16K and 48K Atari 400s. That extra memory had to come from somewhere.

As for price, around £60 seems to be the rate for a 16K to 48K operation.

### Is the Vic right for learning?

**Q** I am 13 years old and own a Vic 20. Many of my school friends have ZX Spectrums and Texas 99s and claim that these machines are better than a Vic—even when it has been expanded.

I am trying to learn how to program and am concerned that the Vic is not the right machine for my needs. What do you advise?

*David Schilder, Clacton-on-sea, Essex*

**A** It's easy to become madly fond of your own machine. You'll even find that machines shape people. Those who learned on an Apple are a different bunch from those who learned on Tandy Model 1s, and so on. The best people tend to be those who overcome such prejudices and learn several machines.

The other point is that every micro has faults. You know the Vic 20 and will be aware of them, but it's as good as any other machine for learning on. Its standard 8K Microsoft Basic is much like that used on hundreds of other micros, so you'll easily learn those.

The Vic's crude language is actually 'good' for people. Commodore hasn't included any sound and graphics commands so you have to fiddle about with PEEK, POKE and so on to do it yourself. This means you'll learn a lot about the way computers work because you'll have to learn about bits, bytes, memory maps and so on before you would with other machines.

```

10 REM Array demo
20 DIM a$(4,10): REM names
30 LET p=4
40 DIM a(p,3): REM points etc
50 REM enter data
60 FOR n=1 TO p
70 CLS: PRINT "Enter data for
  Player ";n
80 INPUT "Name ";a$(n)
90 INPUT "Points ";a(n,1)
100 INPUT "Games ";a(n,2)
110 NEXT n
120 REM calculate p/g
130 FOR n=1 TO p
140 LET a(n,3)=a(n,1)/a(n,2)
150 NEXT n
160 REM Print results
165 CLS: PRINT "RESULTS:": PRI
NT
170 FOR n=1 TO p
180 PRINT a$(n);TAB 10;
190 FOR c=1 TO 3
200 PRINT a(n,c);" ";
210 NEXT c
220 PRINT
230 NEXT n
240 STOP

```

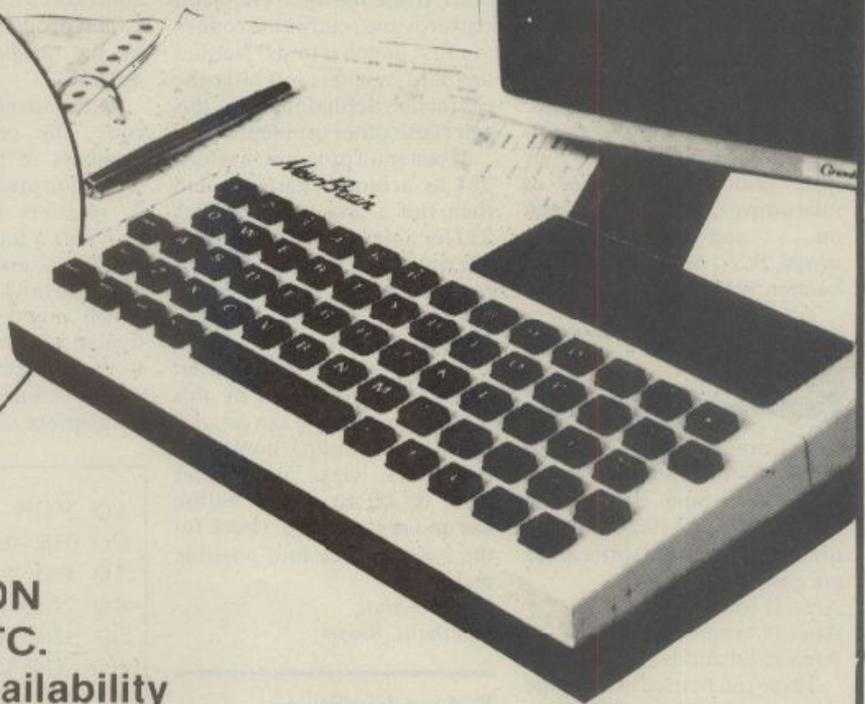
Program for creating a games league—see 'A shot at keeping the score'.

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K = Kuma, W = Watkiss Computers

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## Define the Commodore 64 sprite

The Commodore 64 manual shows how to define one type of sprite at a time using sprite memory area 13 (locations 832 to 894). Three other sprite areas are easily available:  
Area 11 locations 704-766  
Area 14 locations 896-958  
Area 15 locations 960-1022

These can be used in the same way as area 13 by POKEing 2040-2047 with the numbers 11, 14 or 15 and poking data into the corresponding locations. This will let you have four sprites on screen at once.

Two other useful locations are 56321 and 56320. These are joystick ports one and two and can be PEEKed to find their value.

*Simon Gardener,  
Newport, Gwent*

## Avoid the BBC bug

Using 'imploded' characters on the BBC can cause a difficult bug. When you boot the machine or execute \*FX 20,0, the character definitions are 'imploded', that is there is room for 32 user defined character definitions stored a &C00 onwards. Any user defined character (that's with a code greater than 128) will appear four times in the character set. For example, if you define ASCII &E0 (224), the same character will appear at codes &80, &A0, &60 as well as &E0.

All this is in the manual but it omits to say that if you print a character on the screen and then re-examine it, it is the lowest of the four codes that gets returned. So, if you print a 224 on the screen and then

re-examine it, the BBC returns 128!

This presumably happens because the BBC searches through the character definitions from the first character onwards and returns the code of the first match it finds. Neither the hard or soft resets alter the character definitions, so this can cause other problems.

If you run a program that uses 224 as a block character and then run a program that uses 230 for a similar block, without altering 224, any attempt to read back the code for the character will result in ASCII 224 and not 230.

Once you are aware of what happens, bugs caused by this are easy to spot. But as a general rule, if you are using 'imploded' characters, clear the buffer from &C00 to &CFF before use and remember to check for the lowest of the four possible codes.

*David Abbot,  
Horsham, Sussex*

## Take a break on the Epson HX20

Epson HX-20 programmers may find it useful to disable the break key during a program. This crude technique disables the whole keyboard by altering the keyboard interrupt vector to point to a 'Return from Interrupt' instruction.

These subroutines should suffice. Remember to enable the keys before an INPUT or ending the program. Or else, it's back to the reset key.

*Elizabeth Wald,  
Southampton*

```
10 POKE&H116,&H90:POKE&H117,&HEB:RETURN:"DISABLE KEYBOARD"
20 POKE&H116,&HEF:POKE&H117,&H49:RETURN:"ENABLE KEYBOARD"
```

## Dragon recollections

A useful editing feature is available on the Dragon that isn't listed in the manual. If you make a mistake while editing a line, just press Shift and ↑ together, then press the A and ENTER keys. This recalls the line as it was before you edited it.

*FR Ellahi,  
Halifax, West Yorks*

## Oric sounds fantastic

S Hammet, *PCN Microwaves issue 21*, gave some useful addresses for sound on the Oric 1. This program provides access to the useful subroutine at #FA6C.

After loading the machine code, the program asks for numbers in the range 0-255. These are loaded into the Y and X registers respectively and provides a total of over 65,000 possible sounds.

I have not found a coding for which numbers produce particular sounds so you will have to experiment yourself. Some of the sounds I've heard are helicopters, sirens, guns, explo-

sions, pure tones, all colours of noise and lots of others although some values produce no sound or just can't be heard.

Some of the better sounds I have found are:

Y register	X register
#FC	#0F
#FC	#2A
#FC	#2A
#FC	#82
#FC	#A9
#FC	#B9
#FC	#EC
#FC	#F7
#FD	#0B

I presume that ZAP, PING and SHOOT must have codes for this routine but have yet to find them. Happy hunting!

*Martin Wolff,  
Bromley, Kent*

```
10 FOR I=#A000 TO #A007
20 READ A$: A$="#"+A$:A=VAL(A$)
30 POKE I,A
40 NEXT I
50 DATA A0,00,A2,00,20,6C,FA,60
60 INPUT "Values for Y and X";Y,X
70 POKE #A001,Y:POKE #A003,X
80 CALL #A000
90 GOTO 60
```

## Dragon's key to continue

A 'PRESS ANY KEY TO CONTINUE' pause on the Dragon is usually handled using the INKEY\$ function. Unfortunately, this will halt the program if BREAK is pressed. A better method is to call the ROM routine at 41194. So you could use a line like: 1000 PRINT "PRESS ANY KEY TO CONTINUE": EXEC 41194.

This call will flash the cursor until a key is pressed.

*John Buckley,  
Salford, Manchester*

C=CA. With these patches and a simple build file, you could even have quite a presentable disk.

*DJ Owen,  
Henley-on-Thames*

## Newbrain shortcut

Location 43 on an unexpanded Newbrain contains KBMODE. POKEing 1 into this location will be just like Control & 1 from the keyboard. When a keyboard device is open (5 or 6), a much neater way is simply to PUT (device number), 1 to force CAPS LOCK.

*Dave Gunthorpe,  
Birmingham B16*

## Tandy logo banished

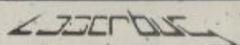
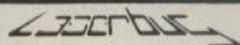
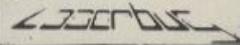
The Tandy logo can be a bit tiring everytime you boot up a Model II. To remove it, just type: PATCH SYSRES/SYS A=24D3, F=00, C=3B. Similarly, if you don't want to re-enter the time, use: PATCH SYSRES/SYS A=2390, F=0A, C=39. You can lose the time and date with: PATCH SYSRES/SYS A=2367, F=73,

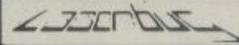
## Commodore DOS

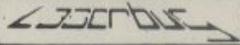
Commodore 64 owners with the 1541 disk drive will rapidly tire of having to use the demo disk every time they want to use the DOS wedge. The following sequence of commands allows the machine code to be saved: POKE 44,204: POKE 43,0 POKE 46,207: POKE 45,89 SAVE "DOS 5.1", 8, 1  
*Tim Arnott, Southsea, Hants*

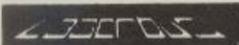
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This listing by Brian Cadge enables you to autorun a program and create a title page for it.

# Dragon takes a title

Last week we got you all excited at the idea of having Spectrum-style title screens while loading programs on your Dragon. This week we deliver our promise and let you do just that.

We'll launch into the program in a moment, but first a few brief words of explanation. Lines 30 to 480 of the assembly language listing are concerned with the screen editor and are relatively easy to follow, but lines 490 onwards may need some explanation.

Firstly, the name is stored in line 500. The filename used is AUTORUN, but this can easily be changed if using an assembler — see line 740. Then the section of machine code which will load and autorun a program is copied from lines 590 to 730 by line 520 into RAM starting at loc. 770.

This is normally used as a keyboard buffer. When this is loaded back into the machine it needs to be executed and the first thing the Dragon does after loading is to print OK.

When a character is printed, a call is made to loc. 359 which usually contains an RTS code, so by setting 359 to a jump to 770 instruction the program boots itself up. This is done in line 530. Subroutine @CSAVE starting at line 560 sets up the parameters and then makes a ROM call to the CSAVEM routine. This saves the memory from 256 to 1535 — the end of the text screen memory.

So, when the code is reloaded, your picture appears on the screen and the

```

5 'BASIC LOADER PROGRAM
10 CLEAR200,31999
20 FOR I=1 TO 506:READ#1,Z=VAL("&H"+R#):CS=CS+Z:POKE 31999+I,Z:NEXT
30 IF CS<50657 THEN STOP
40 DATA 8D,BA,77,0E,4,0,BF,1,37,86,80,B7,1,36,7F,1,3A,B6,FF,23,1F,89,94,FB,B7,FF
,23,86,FF,B7,FF,22,F7,FF,23,8E,1,37,A6,84
50 DATA B7,1,39,17,0,DC,FE,1,39,E7,84,81,8,26,C,BC,4,0,27,E7,30,1F,BF,1,37,20,E0
,81,9,26,C,8C,5,FF,24,D7,90,1,BF,1
60 DATA 37,20,00,81,A,26,D,3C,5,DF,22,C7,90,80,20,8F,1,37,20,BF,81,5E,26,D,8C,4,
,20,25,B6,30,89,E0,FF,1,37,23,AE,81,5F,26
70 DATA 5,73,1,3A,20,A5,81,3,10,27,0,A1,81,D,26,2C,8D,17,FD,8B,E5,81,30,23,F9,81
,3A,24,F5,90,31,C6,10,3D,CE,90,F7,1,36,20
80 DATA 82,C6,32,B6,FF,22,88,2,B7,FF,22,86,84,4A,26,FD,3A,26,FD,39,81,C,26,B,F6,
,1,36,CB,F,ED,BA,79,16,FF,60,81,13,26,1,39
90 DATA 7D,1,3A,26,19,B1,62,24,4,6A,40,20,2,80,60,A7,84,FC,5,FF,24,5,30,1,BF,1,3
,7,16,FF,3D,81,30,10,25,FF,37,81,3A,24,7
100 DATA 80,30,8B,1,36,20,E0,81,41,10,25,FF,26,31,47,10,24,FF,20,60,37,8B,1,36,2
,0,CD,A6,84,88,40,A7,84,8D,2,20,F6,10,8E,7,00
110 DATA 8D,88,E5,26,5,31,3F,26,F7,39,32,62,39,8E,1,D2,10,8E,7E,F2,A6,A0,A7,80,8
,C,1,DA,25,F7,8E,7E,7E,10,8E,3,2,A6,80,A7,80
120 DATA 8C,7E,F1,23,F7,86,7E,B7,1,67,8E,3,2,BF,1,68,8D,8,86,39,B7,1,67,16,FE,C9
,8E,1,0,BF,1,E7,34,10,8E,5,FF,34,10,8E
130 DATA 3,2,BF,1,E5,34,10,7E,99,18,39,12,7C,0,68,86,39,B7,1,67,B6,4,0,88,40,B7,
,4,0,AD,9F,A0,4,8E,1,DA,9F,7E,AD,9F,A0
140 DATA 6,26,39,B6,1,E2,26,2D,9E,19,9F,7E,34,10,AD,9F,A0,6,26,48,35,10,B6,0,7D,
,4C,27,6,30,89,0,FF,20,E9,8E,0,7E,30,1F,9F
150 DATA 18,5D,ED,DC,8D,34,1F,ED,89,ED,7E,84,9F,8E,1,E7,9F,7E,34,10,AD,9F,A0,6,2
,6,1A,35,10,86,0,7C,4C,27,6,30,99,0,FF,20,8E
160 DATA EE,1,E5,9F,9D,8D,8D,DC,6E,9F,0,9D,CG,2A,7E,89,44,12,41,55,54,4F,52,55,4
,E,20
    
```

```

7D4A 24D7 170 BHS @LOOP
7D4C 3001 170 LEAX 1,X
7D4E BF0137 170 STX @CURPOS
7D51 2000 170 BRA @LOOP
7D53 810A 180 @NORIG CMPA #10
7D55 2600 180 BNE @NODOW
7D57 8C05DF 190 CMPX #1535-32
7D5A 22C7 190 BHI @LOOP
7D5C 308820 190 LEAX 32,X
7D5F BF0137 190 STX @CURPOS
7D62 20BF 190 BRA @LOOP
7D64 815E 200 @NODOW CMPA #34
7D66 2600 200 BNE @NOUP
7D68 8C0420 210 CMPX #1024+32
7D6B 25B6 210 BLO @LOOP
7D6D 3088E0 210 LEAX -32,X
7D70 BF0137 210 STX @CURPOS
7D73 20AE 210 BRA @LOOP
7D75 815F 220 @NOLP CMPA #35
7D77 2605 220 BNE @NOTOG
7D79 73013A 230 COM @TOGGLE
7D7C 20A5 230 BRA @LOOP
7D7E 8103 240 @NOTOG CMPA #3
7D80 102700A1 240 LBED @SAVE
7D84 810D 250 CMPA #13
7D86 262C 250 BNE @NOCOL
7D88 8D17 260 BSR @BEEP
7D8A 8D8E5 270 @COLS JSR 48101
7D8D 8130 280 CMPA #48
7D8F 23F9 280 BLS @COLS
7D91 813A 280 CMPA #56
7D93 24F5 280 BHS @COLS
7D95 8031 280 SUBA #49
7D97 C610 280 LDB #16
7D99 3D 280 MUL
7D9A CB80 280 ADDB #128
7D9C F70136 280 STB @COL
7D9F 2082 280 BRA @LOOP
7DA1 C632 290 @BEEP LDB #50
7DA3 B6FF22 300 @BED LDA 65314
7DA6 8802 300 EORA #2
7DA8 B7FF22 300 STA 65314
7DAB 8664 300 LDA #100
7DAD 4A 310 @DEL DECA
7DAE 26FD 310 BNE @DEL
7DB0 5A 310 DECB
7DB1 26F0 310 BNE @BED
7DB3 39 310 RTS
7DB4 810C 320 @NOCOL CMPA #12
7DB6 260B 320 BNE @NOCLS
7DB8 F60136 330 LDB @COL
7DBB CB0F 330 ADDB #15
7DBD BDBA79 330 JSR 47737
7DC0 16FF60 330 LBRA @LOOP
7DC3 8113 340 @NOCLS CMPA #19
7DC5 2601 340 BNE @NORET
7DC7 39 340 RTS
7DC8 7D013A 350 @NORET TST @TOGGLE
7DCB 2619 350 BNE @GRAPHIC
    
```

```

7D00 20 PAT
7D00 30 @START EQU *
7D00 BDBA77 40 JSR 47735
0136 50 @COL EQU 310
0137 60 @CURPOS EQU 311
0139 70 @STORE EQU 313
013A 80 @TOGGLE EQU 314
7D03 8E0400 90 LDX #1024
7D06 BF0137 90 STX @CURPOS
7D09 8680 90 LDA #128
7D0B B70136 90 STA @COL
7D0E 7F013A 90 CLR @TOGGLE
7D11 B6FF23 100 LDA 65315
7D14 1F89 100 TFR A,B
7D16 84FB 100 ANDA #251
7D18 B7FF23 100 STA 65315
7D1B 86FF 100 LDA #255
7D1D B7FF22 100 STA 65314
7D20 F7FF23 100 STB 65315
7D23 BE0137 110 @LOOP LDX @CURPOS
7D26 A684 110 LCA ,X
7D28 B70139 110 STA @STORE
7D2B 1700DC 120 LESR @INKEY
7D2E F60139 130 LCB @STORE
7D31 E784 130 STB ,X
7D33 8108 140 CMPA #8
7D35 260C 140 BNE @NOTLEFT
7D37 8C0400 150 CMPX #1024
7D3A 27E7 150 BEQ @LOOP
7D3C 301F 150 LEAX -1,X
7D3E BF0137 150 STX @CURPOS
7D41 20E0 150 BRA @LOOP
7D43 8109 160 @NOTLEFT CMPA #9
7D45 260C 160 BNE @NORIG
7D47 8C05FF 170 CMPX #1535
    
```

## DRAGON MACHINE CODE PART 2

copied routine at loc. 770 starts executing. Notice that this had only relative jumps to make it relocatable.

The first thing to be done by this routine is to increment the line number loc. 104 to stop the flashing square in the top left corner. Loc. 359 is restored to an RTS instruction — otherwise the routine would keep running itself for ever! As an odd number of pages — five — have been loaded into RAM (a page is 256 bytes), the flashing square has inverted the first character on the screen, and it's restored by line 600.

In line 610 the routine starts searching for the next program on the tape — the one to be autorun. When one is found, it loads the header into the cassette buffer at loc. 474 — the header contains the filename and

type of program etc. Line 640 checks for a machine code program and branches if found, otherwise the Basic is loaded until loc. 124 contains an end-of-file flag.

The program then makes 4 ROM calls. First it turns off the motor, the next two set up Basic parameters for the new program — these routines are called by the normal CLOAD command — and finally it executes a RUN routine and thus the Basic program autoruns.

The machine code loader routine loads the code until an EOF flag is found, then it stores the entry address in the EXEC vector and jumps to that address.

If any errors are found, @ERROR is executed in line 720 — this produces an I/O ERROR message.

Finally, how to use the program:

ENTER n	Sets colour to n
CLEAR	Clears screen to current colour
BREAK	Saves design and autorun header
SHIFT	Toggle graphic/text mode
UPARROW	Return to Basic
SHIFT @	Return to Basic
SHIFT 0	Toggle reverse video on/off

Note: Basic programs to be autorun must be saved as normal.

Machine code programs must not be loaded above loc. 32500 unless a CLEAR command has been typed or the machine stack may be overwritten causing a crash.

The correct syntax for the CSAVEN command is: CSAVEN "PROGRAM", Start, End, Entry address.

7DCD 8160	360	CMPA #96	7E60 3410	560	PSHS X
7DCF 2404	360	BHS @INV	7E62 8E05FF	570	LDX #1535
7DD1 8A40	360	ORA #64	7E63 3410	570	PSHS X
7DD3 2002	360	BRA @FRT	7E67 8E0302	570	LDX #770
7DD5 8060	370	@INV SUBA #96	7E6A BF01E5	570	STX 485
7DD7 A784	380	@FRT STA ,X	7E6D 3410	570	PSHS X
7DD9 8C05FF	380	CMPX #1535	7E6F 7E991B	570	JMP 39195
7DDC 2405	380	BHS @NOINC	7E72 39	580	RTS
7DE0 3001	390	LEAX 1,X	7E73 12	590	@COPY NOP
7DE0 BF0137	390	STX @CURPOS	7E74 7C0060	600	INC 104
7DE3 16FF3D	390	@NOINC LBRA @LOOP	7E77 8639	600	LDA #57
7DE6 8130	400	@GRAPHIC CMPA #48	7E79 E70167	600	STA 359
7DE8 1025FF37	400	LBLO @LOOP	7E7C B60400	600	LDA 1024
7DEC 813A	410	CMPA #58	7E7F 8840	600	EORA #64
7DEE 2407	410	BHS @ALPHA	7E81 B70400	600	STA 1024
7DF0 8030	420	SUBA #48	7E84 AD9FA004	610	JSR (#A004)
7DF2 BB0136	420	ADDA @COL	7E88 8E01DA	620	LDX #474
7DF5 20E0	420	BRA @PRT	7E8B 9F7E	620	STX >126
7DF7 8141	430	@ALPHA CMPA #65	7E8D AD9FA006	630	JSR (#A006)
7DF9 1025FF26	430	LBLO @LOOP	7E91 2659	630	BNE @ERROR
7DFD 8147	440	CMPA #71	7E93 B601E2	640	LDA 474+8
7DFE 1024FF20	440	LBHS @LOOP	7E96 262D	640	BNE @MCODE
7E03 8037	440	SUBA #55	7E98 9E19	650	LDX >25
7E05 BE0136	440	ADDA @COL	7E9A 9F7E	660	@CLOAD STX >126
7E08 20CD	440	BRA @PRT	7E9C 3410	660	PSHS X
7E0A A684	450	@INKEY LDA ,X	7E9E AD9FA006	660	JSR (#A006)
7E0C 8640	450	EORA #54	7EA2 2648	660	BNE @ERROR
7E0E A784	450	STA ,X	7EA4 3510	660	PULS X
7E10 8D82	450	BSR @KEY	7EA6 B6007C	660	LDA 124
7E12 20F6	450	BRA @INKEY	7EA9 4C	660	INCA
7E14 108E07D0	460	@KEY LDY #2000	7EAA 2706	660	BEQ @EOF
7E18 BDBBE5	470	@KEY2 JSR 48101	7EAC 308903FF	660	LEAX 255,X
7E1B 2605	470	BNE @PRESS	7EB0 20E8	660	BRA @CLOAD
7E1D 313F	470	LEAY -1,Y	7EB2 8E007C	670	@EOF LDX 126
7E1F 26F7	470	BNE @KEY2	7EB5 301F	670	LEAX -1,X
7E21 39	470	RTS	7EB7 9F1B	670	STX >27
7E22 3262	480	@PRESS LEAS 2,S	7EB9 8DBDDC	670	JSR 48604
7E24 39	480	RTS	7EBC B0841F	670	JSR 33923
7E25 8E01D2	490	@SAVE LDX #474+8	7EBF B083ED	670	JSR 33773
7E28 108E7EF2	490	LDY #@TEXT	7EC2 7E849F	680	JMP 33951
7E2C A6A0	500	@NAME LDA ,Y+	7EC5 BE01E7	690	@MCODE LDX 487
7E2E A780	500	STA ,X+	7EC8 9F7E	700	@CLM STX >126
7E30 8C01DA	500	CMPX #474	7ECA 3410	700	FSHS X
7E33 25F7	500	BLO @NAME	7ECC AD9FA006	700	JSR (#A006)
7E35 8E7E73	510	LDX #@COPY	7ED0 261A	700	BNE @ERROR
7E38 108E0302	510	LDY #770	7ED2 3510	700	PULS X
7E3C A680	520	@COPY LDA ,X+	7ED4 B6007C	700	LDA 124
7E3E A7A0	520	STA ,Y+	7ED7 4C	700	INCA
7E40 8C7EF1	520	CMPX #@ENDCOPY	7ED8 2706	700	BEQ @EOF2
7E43 23F7	520	BLS @COPY	7EDA 308900FF	700	LEAX 255,X
7E45 867E	530	LDA #136	7EDE 20E8	700	BRA @CLM
7E47 B70167	530	STA 359	7EE0 8E01E5	710	@EOF2 LDX 485
7E4A 8E0302	530	LDX #770	7EE3 9F9D	710	STX >157
7E4D BF0168	530	STX 360	7EE5 BDBDDC	710	JSR 48604
7E50 8D0B	540	BSR @CSAVE	7EE8 8E9F003D	710	JMP (<157)
7E52 8639	550	LDA #57	7EEC C62A	720	@ERROR LDB #42
7E54 B70167	550	STA 359	7EE8 7E8344	720	JMP 33604
7E57 16FEC9	550	LBRA @LOOP	7EF1 12	730	@ENDCOPY NOP
7E5A 8E0100	560	@CSAVE LDX #256	7EF2 4155544F52554E20	740	@TEXT FCC "AUTORUN"
7E5D BF01E7	560	STX 487	7EFA	750	END @START

When the game's over, says Richard Hawes, press your Atari controller into programming service.

# The working joystick

There are two main controllers in use on the Atari system — joysticks and paddles. The most obvious and frequently used application for them is as games controllers. Any game is so much easier to play with a joystick and therefore much more fun — and at around £7 each, they are cheap.

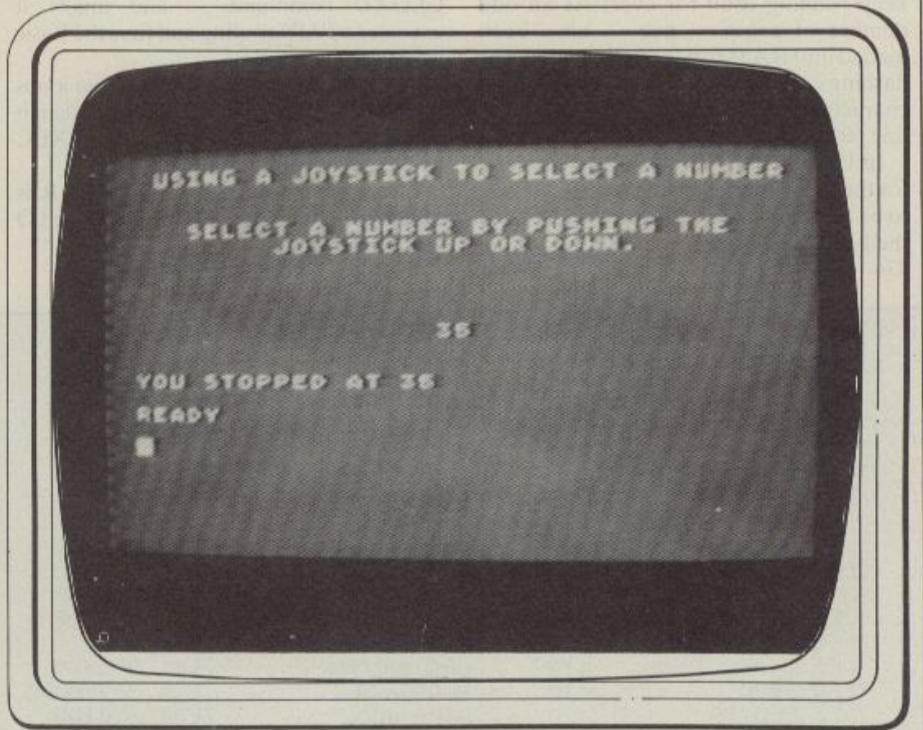
But why limit the use of joysticks to games? Surely their ease and simplicity of use make them suitable for a much wider range of applications.

The Atari 400 and 800 computers have four controller ports on the front, accessed through the PIA chip. Data can be sent to or read from the ports for controlling printers, robots etc, and of course games.

The joystick has nine positions including the resting place (see Figure 1, page 23) as well as a fire button. There is just one controller per lead, allowing a minimum of four joysticks to be connected at one time. Each joystick position has a corresponding number (Figure 1). This number is the one that will be returned when you use the basic command STICK. The following Basic line will tell you which position the joystick 0, the leftmost joystick, is in.

```
10 ?STICK(0):GOTO 10
```

The paddle consists of a knob on a base and a fire button. The knob can be rotated almost a full circle. There are two paddles to each port allowing up to eight paddles to be connected simultaneously. The paddle will return a number from 0 (far right), to 228 (two thirds to the left and onwards).



The number in the centre of the screen is generated by the joystick using Program 1.

The command for the paddle is similar to that of the joystick but they are numbered from 0 to 7 (left to right).

```
10 ?PADDLE(6):GOTO 10
```

In most applications programs it would be easier to move a control cursor around the screen with a joystick than with arrow

keys or special control functions.

Most utility programs are now menu-driven. They give you a list of options to choose from and ask you to select one. Some only require you to answer a number of questions with yes or no answers.

This sort of program could ideally use joysticks to make all the selection processes easier.

The programs presented here show a couple of ways in which joysticks can be used for applications programs. The first simply increases and decreases a number that is displayed on the screen just by pushing the joystick up or down. This sort of routine could be used to set up parameters within a range of numbers.

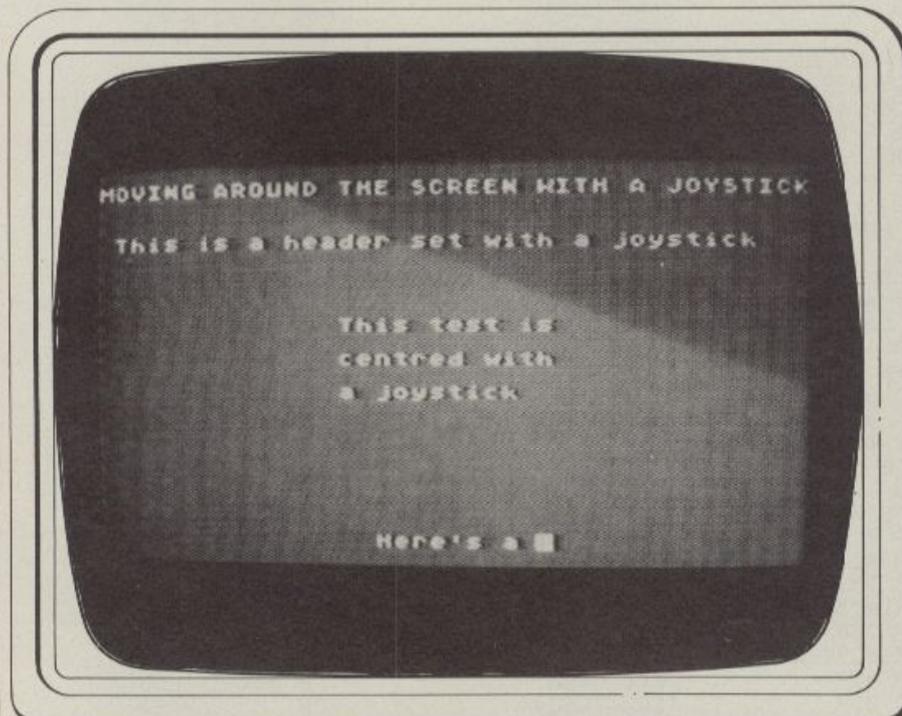
The second program uses the joystick to move a cursor around the screen, at any point pressing the button on the joystick will allow you to type in a string of characters at that point. This sort of cursor movement could be put to good use in programs such as word processors and other text editors.

Of course, the possibilities do not end there. There are many other uses for joysticks within applications programs but these options have yet to be exploited.

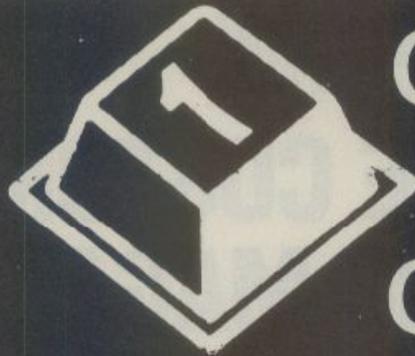
## Program descriptions

### PROGRAM 1

This program simply displays a number on the screen which you can increase or decrease with the joystick. Pushing the button will result in the program stopping and displaying the final number on the



The text on this screen has been generated using the joystick to position it. The joystick control was generated by Program 2.



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screen. In a proper program that number would then be used for another purpose.

**Lines 10-30** — Selects display mode zero, switches off the cursor and displays the program title.

**Line 40** — Place number on screen (including a couple of spaces to blank out any figures when the number gets smaller again).

**Line 50** — Place position of joystick in a variable Y.

**Line 60** — If the button is pressed go to the end of the program.

**Lines 70-80** — Add or subtract 1 to the number, X, depending on which way the joystick was pushed.

**Line 90** — Delay to slow down the changing of the number.

**Line 100** — Sends computer round and round the program until the button is pressed.

**Lines 110-120** — Display final number and turn cursor back on before the program ends.

### PROGRAM 2

**Line 9** — Opens a file to the keyboard so that keys can be read in without INPUT.

**Line 10** — Sets up mode zero, make left margin set at zero, turn off the cursor and display program title.

**Line 20** — Store a joystick position in a variable S.

**Lines 30-40** — These lines of logic make DX = 1 if the joystick is in any of the downward positions and -1 if the joystick is in any of the upward positions (upper left, top and upper right) and the same for DY in the left and right positions.

**Line 50** — Changes the X and Y co-ordinates that are used to position the cursor on the screen.

**Line 55** — Checks to see if the joystick button is pressed. If it is, then the program jumps to a routine which allows you to put text on the screen.

**Lines 60-90** — Make sure that the border limits of the screen are not exceeded.

**Line 95** — Find out what is the current screen location so it can be put back there after the flashing cursor routine has finished.

**Line 100** — Because we have turned off the cursor in line 10 to clean up the display we must create our own. This line does this. Place an inverse space at the current position (CHR\$(160)), pause for a short while so that the white flashes on for longer than the background, making it easier to see. Then backspace one place (CHR\$(126)) and place the original character back in its starting position.

**Line 110** — Completes the program loop.

**Line 120** — Turns the proper cursor back on and makes sure that there is no rubbish left where the cursor was stopped.

**Line 130** — Waits for a key to be pressed.

**Line 140** — If the key that is pressed was the RETURN key then switch off the cursor, clear any garbage and return to joystick movement routine.

**Line 150** — Prints whatever character was pressed and goes around again.

### PROGRAM 1

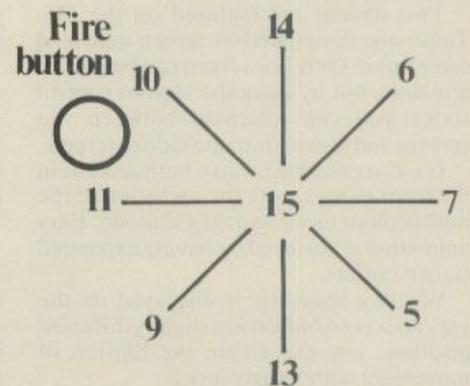
```
2 REM ** JOYSTICK DEMO TO SELECT A **
4 REM *** NUMBER AND THEN USE IT. ***
6 REM **COPYRIGHT R.A.HAWES JUL '83**
```

```
10 GRAPHICS 0:POKE 752,1:?:? " USING A
    JOYSTICK TO SELECT A NUMBER"
20 ? :? :? " SELECT A NUMBER BY PUSHING THE"
30 ? " JOYSTICK UP OR DOWN."
40 POSITION 19,10:?:? X: " "
50 Y=STICK(0)
60 IF STRIG(0)=0 THEN 110
70 IF Y=14 THEN X=X+1
80 IF Y=13 THEN X=X-1
90 FOR T=1 TO 50:NEXT T
100 GOTO 40
110 ? :? :? "YOU STOPPED AT ";X
120 POKE 752,0
```

### PROGRAM 2

```
2 REM ** JOYSTICK DEMO TO POSITION **
4 REM ** TEXT ON A SCREEN **
6 REM **COPYRIGHT R.A.HAWES JUL '83**
```

```
9 OPEN #1,4,0,"K:"
10 GRAPHICS 0:POKE 82,0:POKE 752,1:?:? "MOVING
    AROUND THE SCREEN WITH A JOYSTICK"
20 S=STICK(0)
30 DX=(S=5 OR S=6 OR S=7)-(S=9 OR S=10 OR S=11)
40 DY=(S=5 OR S=9 OR S=13)-(S=6 OR S=10 OR S=14)
50 X=X+DX:Y=Y+DY
55 IF STRIG(0)=0 THEN GOSUB 120
60 IF X>39 THEN X=0
70 IF X<0 THEN X=39
80 IF Y>23 THEN Y=0
90 IF Y<0 THEN Y=23
95 LOCATE X,Y,Z
100 POSITION X,Y:?:? CHR$(160):?:? FOR G=1 TO 10:NEXT
    G:?:? CHR$(126):CHR$(Z):
110 GOTO 20
120 POKE 752,0:?:? CHR$(32):CHR$(126):
130 GET #1,A
140 IF A=155 THEN POKE 752,1:?:? " ":RETURN
150 ? CHR$(A):?:? GOTO 130
```



**FIGURE 1:** These are the nine positions of the Atari joystick and the fire button. A number is returned when you use the Basic command STICK. Program 2 also relies on these positions but uses POSITION X,Y to aid in allowing the joystick to control the position of text.

Before Basic-G the Sord M5's true abilities were hidden. Trevor Jones looks at the new language

# Basic-G sharpens Sord's capabilities

The Sord M5 has an impressive range of abilities, but the Microsoft-like Basic-I that comes with the machine doesn't really allow you to get to grips with them. Now, the Basic that Sord has designed to do the job is here, in the shape of Basic-G.

Basic-G is a ROM-based language which has all the facilities offered in the Basic I that comes as standard with the Sord. But it also contains plenty of graphics-handling features, so Sord describes it as 'an easy Basic for games creation'.

## Features

With the Basic-G cartridge installed you can scroll the screen in four directions, and insert and delete characters. In addition, you can control the position of the cursor by using the various control codes.

Four screen modes are available, two of which are for graphics — G1 and G2. G1 and G2 give 24 lines by 32 columns with each character being defined by an eight by eight matrix.

In the G1 mode you can access the graphics characters available on the keyboard. The G2 mode allows full accessibility to the 32 movable sprites which are user defined characters.

While using the G2 mode the screen can be split into three separate areas — top, middle and bottom. Both G1 and G2 modes allow the characters to be coloured with one of 16 colours, and also set the background and foreground colour.

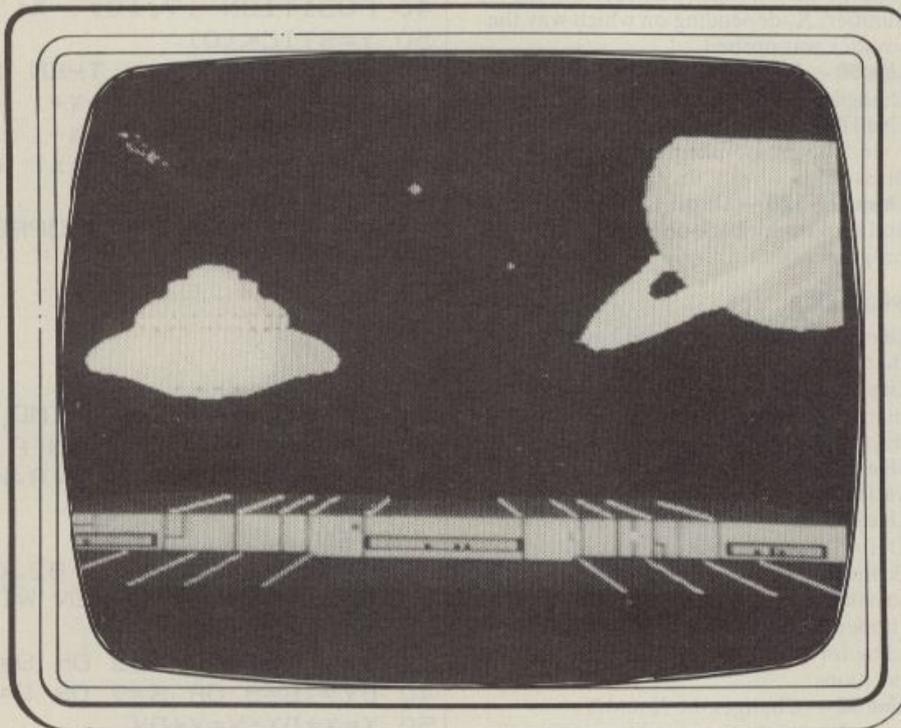
The multi-coloured mode allows mosaic graphics to be produced using an eight by eight matrix, but the graphics are somewhat limited.

The final mode is the text mode, which consist of 24 lines by 40 columns, where the characters are defined by an eight by six dot matrix. Graphics capability is poor, but this mode contains more characters than any other mode.

Two screens are featured on the M5. These are designated as screen zero and screen one. Only one screen can be seen at any time, but by using the various control codes you can alternate between the screens and also write to the hidden screen.

It's also possible to have both screens in different modes, with the exclusion of the multi-colour mode and the G2 mode. Easy animation is achieved by having expanded screen buffers.

Where a character is displayed on the various screen buffers in a slightly different position, you can create the illusion of movement without any jerks.



A demonstration of the impressive graphics displays available under Basic-G.

Basic-G is strong on sound facilities. The language allows you to use normal music notation — so all the usual symbols such as sharps, flats, dotted notes, rest triplets and tempo are available to be used over the Sord sound generator's three-channel, six-octave range.

Arcade-style sound effects can also be produced using the tone generators and the noise generator.

The Sord M5 has powerful interrupt handling abilities, and Basic-G allows six different interrupt statements to handle various types of interrupts, which are external events that cause the CPU to pause in whatever task it is executing and attend to the event, then resume its previous task.

The machine also has a built-in timer that can be used in a Basic-G program to produce a set delay or to suspend a task for a specific amount of time. But one feature sadly missing from this language is floating point mathematics.

## Presentation

Basic-G comes as a ROM cartridge, securely held in an A4 size plastic case. The 284 page manual sits on top of the cartridge, making the weight of the package quite substantial.

## Documentation

The instruction manual is well written, clear and concise. It provides a good comprehensive index which makes information finding very straightforward. The appendix is also useful, giving such details as error codes and their meanings.

No memory map is given. The manual briefly mentions the use of the call statement, but provides no further information. Therefore, machine code addicts don't have any way of finding out where routines start, and what those routines are.

## Getting started

Getting hooked up is a one-minute job — after that, Basic-G is fairly easy to learn, and the use of the commands is reasonably obvious. In addition, the manual is a good hand holder, providing good but simple examples with some diagrams.

## In use

**Graphics** One of the exercises the manual leads you through is to create a flying saucer, colour it and move it across the screen. This can be done in just seven lines of code:-  
10 print "USL"

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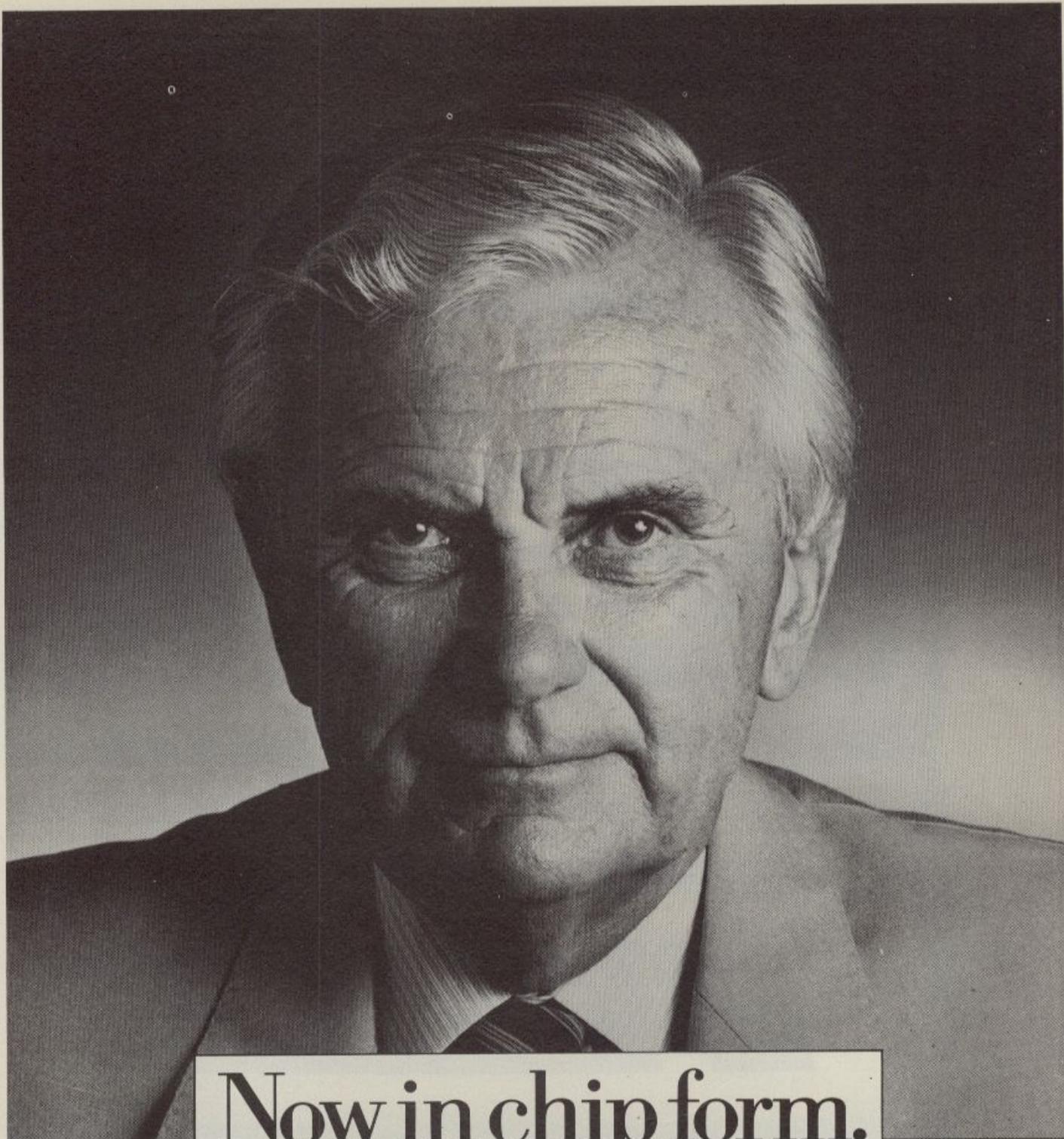
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Priced £55, Speech Synthesis is available from your local BBC/Acorn dealer. (To find out where that is, simply call 01-200 0200.)



If you'd like more information, he'll complete the story. In plain English, of course.

```
20 stchr "00183c66db7e2400" to &7F,0
30 scod 0,&7F
40 scol 0,&C
50 loc 0 to 0, 100
60 move on
70 move 0 in 0 220, :36, 2
```

You use a plot statement to display pixels, followed by the co-ordinates of where you want the pixels to appear.

Circles are produced using a circle statement followed by the radius of the circle, which is the number of dots. Drawing an ellipse is done in a similar way, using the circle statement, but this time both the radii in the x and y directions have to be specified.

Drawing squares and rectangles is done by using the box or bar statement. The box statement is followed by four parameters, each separated by a comma. The first two parameters refer to the upper left corner of the rectangle, and the remaining two refer to the lower right corner rectangle.

You can also paint or colour an enclosed area by specifying a set of co-ordinates within the area you wish to colour. Here are a few lines of code to do this:

```
10 print "URL"
20 ginit
30 gmove 130,110
40 circle 70
50 fcol 8
60 paint 130,100
70 fcol 5
80 paint 10,10
```

**Sound** It took me five minutes to transcribe a piece of sheet music for a popular song using the normal musical notation that's found in the Basic-G language. If you're not very good at music, that's no problem since you can use numbers instead to denote the musical notes.

**Verdict**

This package has a lot to offer; it's easy to use, and provides the user with the means

**Sample Basic-G graphics, sound and interrupt handling commands**

<b>MAG</b>	MAG ((sprite-modifier))(CR:)
	Change the sprite size and format.
<b>SCOL</b>	SCOL(sprite-number),(colour)(CR:)
	Colour sprite-number using colour code.
<b>STCHRE</b>	STCHRE ((character-set-selection))(CR:)
	Select character set to be used as specified by character-set-selection.
<b>LOC</b>	LOC(sprite-number)TO(GR-coordinates)(CR:)
	Move sprite-number to the specified GR-coordinates.
<b>JOINT</b>	JOINT((sprite-number-1)TO(sprite-number-2)),(link-position))(CR:)

of handling graphics simply and easily, without too much sweat. The graphics offered are very good and the overall performance of the software is fine.

However, my main reservation is its price. At around £35, Basic-G is not sufficiently keenly priced to make much impact on the market.

I'm also disappointed to see that there's no floating point maths provided — this is a serious drawback for many users. Indeed, it's essential for serious games writers. All in all, anyone buying this package should find plenty of scope for entertainment, as well as a good Basic for serious applications. But until Sord brings out a version with that vital floating point ability thrown in, Basic-G doesn't get top marks.

- RATING**
- Features**
- Documentation**
- Performance**
- Reliability**
- Value for money**



<b>EVENT</b>	EVENT (interrupt-interval),(delay-time)(CR:)	Join sprites together. If no parameters, all joints are released.
<b>ON ALARM</b>	ON ALARM GOSUB (line-number)(CR:)	Call subroutine beginning at line-number when the alarm is set off. (Interrupt priority 1).
<b>PLAY</b>	PLAY ((melody-1))((melody-2))((melody-3))(CR:)	Play melodies 1, 2 and 3 concurrently to create harmony.
<b>SG</b>	SG (channel-number),(((frequency)) (noise))((volume))(CR:)	Turn the three tone generators and noise generator on and off, and produce sound effects.

**Name** Basic-G Application Programming language **System** Sord M5 **Price** £34.95  
**Publisher** Sord Computer **Format** Cartridge  
**Language** Basic **Outlets** Sord, and Computer Games Ltd

**SECOND OPINION**

**B**asic-G will do a lot for people's ambitions. Not content with having both an easily-learned language (like slow old Basic) and fast games in the shops, users will always want to write their own arcade hits.

Basic-G gives them a chance by providing an easy way to access the sophisticated hardware features on the Sord M5. Similar products have existed before . . . Texas Instruments' extended Basic cartridge for the 99/4A, for example — although it isn't such a 'polished' version. Basic-G has everything built in. TI extended Basic works through sensible but cumbersome CALL subroutines.

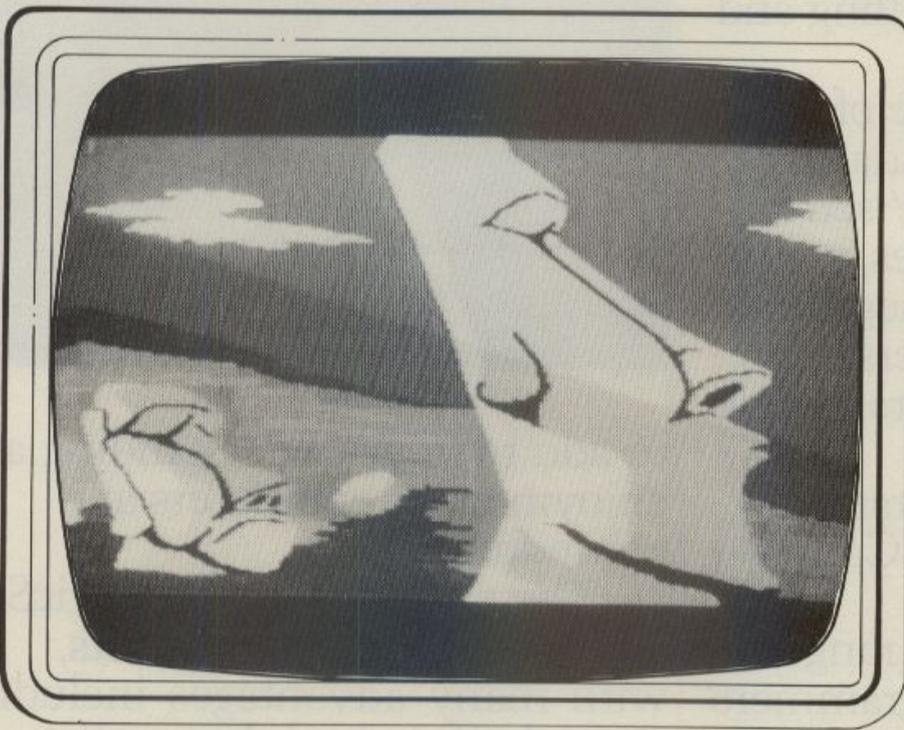
So Basic-G isn't particularly new or startling. It is just plain sensible. And it is nice to use. Sprite graphics are very different from the ordinary way most micros force you to do animation. Basic-G simplifies things because you can just try out commands in 'immediate mode' and see what happens. Coupled with the effective screen editor for repeating and copying commands, sprite graphics should be easy to pick up.

The absence of floating point maths is a real letdown. You can get round it in games programming, but this is supposed to be a luxury Basic. Everything else — sound support, interrupt support and a workable manual — suggest it is.

The M5 with Basic-G is a great way to learn about sprite graphics. And it is possible to write some effective arcade style games and totally revamp even the most mundane oldies using it. Alone, it may ensure that there is enough software available to make the machine a success.

The problem? There's only one major complaint. Basic-G should come with the M5. You can't disguise the price of the machine just by packaging it with a crude Basic and hoping people won't notice the extra £35.

**Max Phillips**



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Ted Ball tests the Tasword Two word processor and finds it something to write home about.

**T**asword Two is a word processor for the Spectrum that has been designed to work with interfaces that allow you to use a full-width printer on the Spectrum. It was tested on a 48K Spectrum with a Kempston Microelectronics parallel printer interface and an Epson MX80 printer.

### Features

Because it has been designed to work with full-width printers, Tasword Two gives you 64 characters to a line, by redefining the Spectrum character set so that all the letters are half the usual width. Most of the half-width characters are easily recognisable, but some, like capital N and capital O, look a bit odd and take a while to get used to.

Tasword Two is basically a full-screen editor with some additional formatting and other features. To enter text into the computer you just type from the keyboard in the usual way. You get automatic 'word wrap' and right justification, so that when you type a word that is split between the end of one line and the beginning of the next the whole word is moved to the second line, and extra spaces are put in between the words to give a neat right-hand margin.

You can, however, switch off these features.

To make changes in your text you move the cursor to where you want to make the changes, using the normal cursor keys to move up, down, left and right through the text, or additional commands to move left or right one word at a time.

Typing in new text will overwrite what was there before, but there are commands that allow you to insert or delete lines or characters.

After you have edited your text you are likely to end up with an unjustified right hand edge where you have deleted words or inserted a short line, so there is a command that will re-format a whole paragraph, closing up gaps and justifying the lines.

Other features allow you to scroll through your text backwards or forwards, one line or a whole screen at a time, find or replace text, move or copy a block of text, load and save text files on tape, and print text on the ZX Printer or on an ordinary printer.

There are also two Help screens you can call that give a summary of all the commands, and a text file containing a tutorial to help you get started on Tasword Two.

### Presentation

Tasword Two comes on a clearly labelled cassette, containing the word processor program and the 'Tasword Tutor' text file. There is also an instruction booklet that was copied from text prepared with Tasword Two and printed on an Epson FX80 printer.

The instructions are fairly concise and intended mainly for reference, since the Tasword Tutor tape file is provided to teach you how to use the program.



Eric Pateman

# Spectrum text

However, there are some additional hints and tips, and you need to read part of the booklet before you start using Tasword Two.

### Getting started

If you are using Tasword Two with a ZX Printer all you need to do is load the tape and start typing. With other printers you have to start by configuring Tasword Two for your printer interface and printer, by incorporating into Tasword Two a customised version of the printer driver software that comes with your printer interface.

There is a separate leaflet with the instruction booklet that gives instructions for configuring the printer software for the Cobra, Euroelectronics, Kempston, and Hilderbay interfaces.

Tasword Two will automatically provide the control codes you need to run an Epson FX80, but for other printers you have to look up the control codes in the printer manual and put them in yourself, following the prompts given by the program. You only need to configure Tasword Two once; after you have set it up you can save a copy with the printer software included.

### In use

Tasword Two is fairly easy to use, and it constantly displays some useful information in the bottom two lines of the screen, telling you whether features like word-wrap, line justification, CAPS LOCK, etc, are on or off. Some of the features, like load, save and print a text file, and search or replace, give you prompts for the information needed to operate them.

The search and replace, and the block copy and block move are fairly slow, and there is no message to tell you that anything is happening.

### Reliability

Tasword Two is very reliable in normal use, but you have to be careful when using a

printer. There is no problem with the ZX Printer as all you can do is print the whole text file, but with other printers you can specify the line-spacing, and a start and end line to be printed. If you put in silly values like a line spacing of 0 you will find that the computer hangs up, or the printer does odd things. You can also find strange things happening if you have not set up the printer control codes properly.

### Verdict

On the whole, Tasword Two is a fairly good word processor with excellent editing features, but rather limited in the amount of formatting that it allows. The fact that it has been designed to work with the printer interfaces that are currently available for the Spectrum gives Tasword Two a distinct advantage over other word processors available.

With Tasword Two, a full width plain paper printer, and an add-on moving-key keyboard the Spectrum can be turned into a useful system for small-scale word processing, although the add-on keyboards I have seen for the Spectrum are not good enough for touch-typing, and the limitation in Tasword Two to 64 characters to a line may make it unsuitable for some applications.

### RATING

Features  
Documentation  
Performance  
User interface  
Reliability  
Overall value



**Name** Tasword Two **Application** Word processor **System** 48K ZX Spectrum **Price** £13.90 **Publisher** Tasman Software, 17 Hartley Crescent, Leeds LS6 2LL **Format** Cassette **Language** Basic and machine code **Outlets** Mail order, some retail shops and printer interface manufacturers

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For big BBC storage in a small package, Geof Wheelwright spins the 3in microflops from AMS.

# Shrinking disks



The technology behind Advanced Memory Systems 3-inch disk drives doesn't bear much relation to the new low-cost storage medium from Sinclair, except that both can store about 100K and represent significant shrinkages in the physical size of storage on popular micros. The AMS drives use the new Hitachi 3-inch disk drive with disks encased in goof-proof plastic containers.

## Features

The AMS drives can hold 100K per side (the disks are dual-sided, but they have to be turned over like audio records — you can't write to the second side without turning them over). The drives come in two configurations: a £225 single drive or a £399 dual drive unit with both drives boxed together. We tested the dual drive version.

The drives are 40-track, with average speeds of 300 rpm and an average data transfer rate of 125 kilobytes per second for single density disks, and 250K per second for the double density. AMS claims an average access time of 55 milliseconds for the drives (which are actually made by Hitachi as the the Compact Floppy Disk Drive HFD 305S).

The drives have a minimal power consumption and plug into the disk drive power points underneath the machine. You don't need extra power to run them — unlike some of the large dual drives such as Torch's Z80 Disk Pack.

The disks themselves can be write protected using a switch on the outside of the plastic casing — a great relief for traditional disk users who have the little sticky tabs needed to protect ordinary floppies.

## Documentation

The documentation for these drives does the job, but the 80-page size of the manual is a little misleading — the whole of Chapter 4 (or 30 pages) probably looks a little familiar. It's lifted almost word for word from Acorn's DFS manual. But don't blame AMS for this — Acorn won't sell the DFS manual with their £95 disk interface upgrade. You don't get it unless you buy Acorn drives. So everybody who makes drives for the BBC and uses Acorn's interface has to reproduce all the DFS documentation and commands.

The manual gives a good — if all too brief — explanation of the Hitachi microfloppy disk drive standard and a comprehensive

The 3-inch floppy (left) comes in a hard plastic case and features an automatically retracting steel shutter to protect the disk surface. The microdrives themselves (right) are small enough to stand on the BBC Micro. No extra power supply is needed but a DFS chip and utility EPROM need to be installed.



chapter on setting up the drives. There's also a nice, useful chapter on machine code handling and the DFS with the Hitachi drives. It even documents entry points for OSGBPB and OSWORD(A=7F) that aren't included in the BBC Micro User Guide.

Chapter Six is full of technical information including formatting, 18-bit addressing, background on the 8271 disk controller chip, the keyboard links and the drive specifications.

## In use

The drives were easy enough to hook up to the BBC, allowing for the usual tense moments when you have to install a sideways ROM chip on the Beeb. The drives are connected via a standard cable to the disk connector beneath the machine and the power plug goes into the standard disk drive power socket. But the system also requires the installation of a utility EPROM containing the \*FORMAT and \*VERIFY programs. If you've never plugged an EPROM in your machine, take care not to bend the pins and make sure the notched end of the chip is facing away from you.

In operation, the disks proved as fast and reliable as either the 40- or 80-track Acorn disks I've used. Although they didn't respond too well to the 90 degree weather during one of the weeks of my test, this is hardly normal weather for the UK, so I'd give the drives the benefit of the doubt.

The cables that come with the drive are long enough to allow it to sit either on top of or beside the BBC, but only to one side. A longer cable would provide a little more flexibility in this respect.

As to the new media and whether the 3-inch Hitachi disks will win the battle of standards with the Sony 3½-inch microfloppies, Sony looks to be a strong contender in this respect, as it has the backing of Shugart and several other big industry names. Shugart produces the SA300 3½-inch microfloppy, offering 80 tracks per surface and the same rotating speed as Hitachi's drives — 300 rpm.

However, the fact that big media manufacturers such as TDK are backing both horses in this standards race indicates that there won't be a clear winner for some time to come. TDK recently announced plans to produce disks for both the 3-inch and 3½-inch drive systems — and Hitachi's own not insubstantial facilities are also producing disks, so you aren't likely to be left with an obsolete drive system anytime soon.

My big question about the drives was one that couldn't really be answered by using them: once you spend the £399 for the dual drives, the £30 for the ROM and utilities disk, £30 for the cables and documentation — are you going to be left without a large software base?

Acorn and other third party software houses seem to have enough trouble supplying 5¼-inch disk software without having to worry when they're going to have 3-inch microfloppy software ready.

Only a few major software houses — including Gemini — have so far announced plans to produce microfloppy software, with the balance obviously waiting to gauge the public's reaction to the drives.

## Verdict

The AMS drives certainly don't represent any kind of price breakthrough — they still fit roughly in the £1 per K of storage formula that seems to be the norm for drives these days. But the microfloppies' design makes them far more durable and easy to handle than normal drives — without any appreciable loss in speed.

Given that there's not much of a price difference between the AMS-Hitachi drives and most 5¼-inch drives for the Beeb, your own criteria will have to depend on how much you value the space around your machine and how pioneering your spirit towards new technologies.

Convenience of use and ease of handling might also prove a winning point for these drives, as the protective sleeve and hard plastic exterior provide far greater protection for your disks than any conventional floppy systems.

In the first of a two-part examination, Ian Scales opens up the long-awaited Microdrives.

# Driving the ZX Spectrum

**M**ass storage has always been the weak link in the sub-£200 micro range. Until now there has been no useful alternative to cassette recorders except disk drives — and as these take the cost of your system well above the £200 mark they can hardly be termed an alternative in any case.

Sinclair's ZX Microdrive has been designed to provide an intermediate technology between the two, providing rather better access speed and file handling capabilities than the pedestrian cassette recorder, while keeping the price in line with the micro it serves.

## The drives

The Microdrive itself is about the size of an average fist. The real surprise is the Interface 1, cleverly designed to sit under and slightly behind the Spectrum. As well as connecting the Microdrive through a short length of ribbon cable, the Interface 1 enables you to set up a network of computers and send information from one to the other.

Sinclair has thoughtfully prevented the Interface 1 and Microdrives being wobbly and unreliable appendages by providing screws so that the interface can be fastened securely to the body of the Spectrum, preventing periodic system-crash. You will have problems, however, if your Spectrum is cased in a 'real' keyboard.

The drives, too, can be fastened together. You can have up to eight drives chained: each

drive, however, can only be used alone, and the drive must be identified by a rather tortuous set of commands to get it going.

The drives and the interface are very light — you can envisage someone producing a small carry case to transport the system around. Indeed, with the potential of the Interface 1 I wouldn't mind betting that we are likely to be deluged with a host of interactive games. It may become the vogue for game players to get together with their respective Spectrum systems for an evening's entertainment.

## The cartridges

The Microdrives use endless loop cartridges (see illustration) with a tape width of five millimetres. The cartridge is about the size of an average ROM chip and contains about 16 feet of tape which is dragged past the magnetic head in the drive at about 30 inches per second. Our timings indicated about 10 seconds for the tape to run through.

Sinclair says the access time to load a 48K file can be as little as 3.5 seconds. This assumes that it's right at the beginning of the tape. Even if it's at the end, 10 seconds is a vast improvement over the ordinary cassette.

The 100K cartridges come unformatted. The formatting routine takes about 30 seconds, because it involves several tape circuits to first write the block header and lay down the check-sums, then go back to read them over a couple of times, and finally identify suspect tape areas and 'rope them off' from the system.

Sinclair says there should never be less than 85K available — the actual amount is displayed at the end of the routine.

Once formatted each car-



The cartridges use a 20-foot loop of very thin tape. The tape lives on a single spindle enclosed in the cartridge. As the tape is driven over the magnetic read/write head it unwinds from the middle of the coil of tape and is wound back onto the outside.

The system has been designed to sit loosely on the spindle so the tape can escape easily — even so, logic suggests that the flimsy tape undergoes considerable stress at the speed with which it is run, especially as it has to turn at right-angles as it passes over the coil. Sinclair claims it will last 5,000 accesses, but also recommends that important data be backed-up on a second cartridge.

At this stage of testing we have experienced no physical tape failure but only time will tell how reliable the cartridges actually are — we're keeping our fingers crossed.

The tape is driven from the side by a mechanism inside the Microdrive.

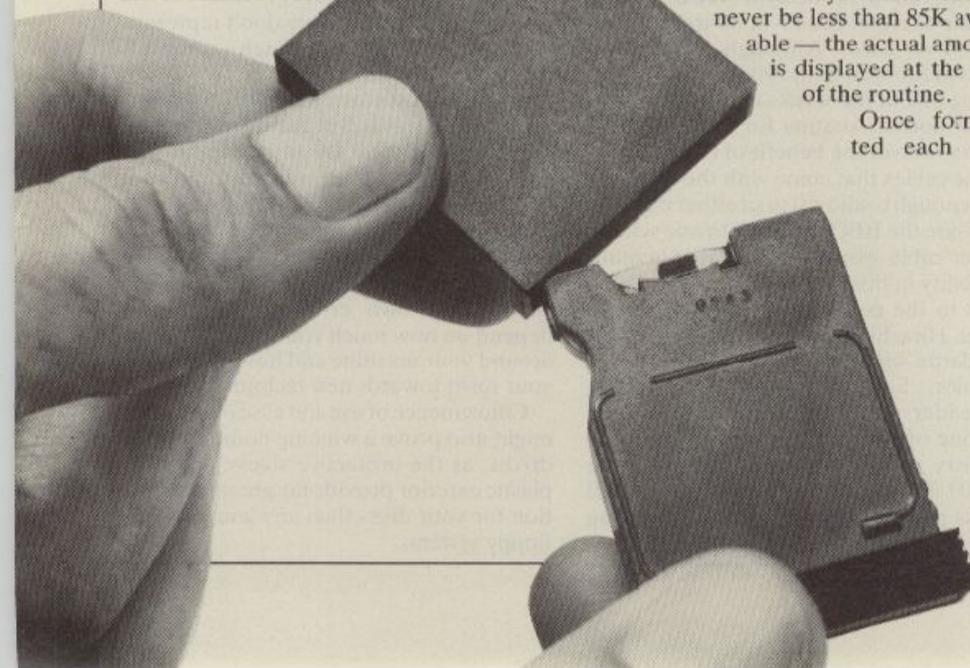
At present, the cartridges are priced at a rather expensive £4.95, but at least you can buy as many of them as you like. This endless-loop cartridge system is no remarkable breakthrough in a technical sense. The concept has been around for some time as the 'stringy floppy'. But presumably Sinclair has refined the technology to the point where it is reliable and cheap to manufacture.

tridge can contain up to 50 files. Syntactically, the easiest procedure is to catalogue a cartridge. This only requires a couple of keystrokes and a seven to 10 second wait (see chart, page 38).

The operating environment for the networking system and drives is understood by the user as a series of channels and streams. Put simply, the channels and streams are conceptual ways of moving data around the system.

The channels consist of the screen, ZX Printer, Microdrive files, another ZX Spectrum (using the interface network) and the RS232 interface to a standard printer or modem. These are the output channels. Input channels are then obviously the keyboard, Microdrive file, another Spectrum and the RS232 interface.

The 'streams' are the routes to these channels: there are 16 of these numbered 0 to 15. The first four are linked to various channels, but the remaining 12 can be



# Microdrive delusions

**W**hen Sinclair's Spectrum was launched in April 1982, there was much hoopla about the 'soon-to-be-available' cheap disk drive for the machines.

As it turns out, the Microdrive was neither available soon nor a real disk drive. It was launched last month and turned out to be a floppy tape with limited serial access — not the random access disk pack everyone had put their sights on. But it's probably not Sinclair's fault — after producing the ZX81 and the Spectrum, many people expected the impossible; random access drives for under £100.

Another expectation was that the operating system in the Spectrum was already set up to support the CAT, CLOSE, DELETE, ERASE, FORMAT, MOVE and OPEN commands on the Microdrives. Again the original impression was wrong — the Microdrive interface module that you have to buy to run the drives actually contains the operating system.

Sinclair Research itself has always been

slightly more modest (read realistic) in its claims about the Microdrives, largely because the drives had been undergoing slight design changes all the way along.

Sinclair claimed that: 'Each Microdrive is capable of holding up to 100K using a single interchangeable microfloppy... All the Basic commands required for the Microdrives are included in the Spectrum.'

The big question was: What did they mean by microfloppy? The answer was oft-speculated, many people reaching the correct conclusions about the impossibility of a 'real' disk drive and surmising that it would have to be a floppy tape or stringy floppy instead.

The real surprise is not in the drive itself but in the expansion module developed to interface the drive with the Spectrum. The £30 expansion module also gives you motor drive control over cassette-tape storage, a plug-in for local area networking and an RS232 interface.

The communications facility lets you

network as many as 64 other Spectrums at baud rates as high as 9600 and as low as 50.

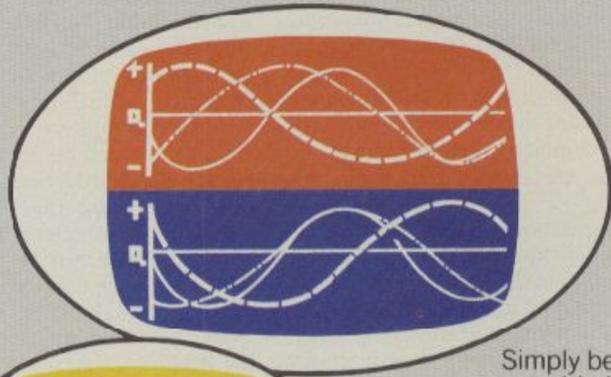
The inside word from a prototype Microdrive user is that the RS232 interface had some development problems, but if it proves to be reliable in the long-term it will be a great complement to the Microdrive. Imagine a small business using the Spectrum with a wordprocessor or spreadsheet in ROM (using the cartridge software Sinclair plans to release for the Spectrum) combined with two Microdrives for storage, a network connecting perhaps other desks in a small office, and dot-matrix or even daisywheel printers running through the RS232.

Sinclair has also said it soon plans to release software on Microdrives, in addition to the existing base of cassette software and the planned release of ROM software. Cassettes will likely remain the cheapest storage alternative for the Spectrum, but smaller programs can reside in the plug-in cartridges and big programs can take advantage of the Microdrive's 100K.

38 ►



# For those that do,



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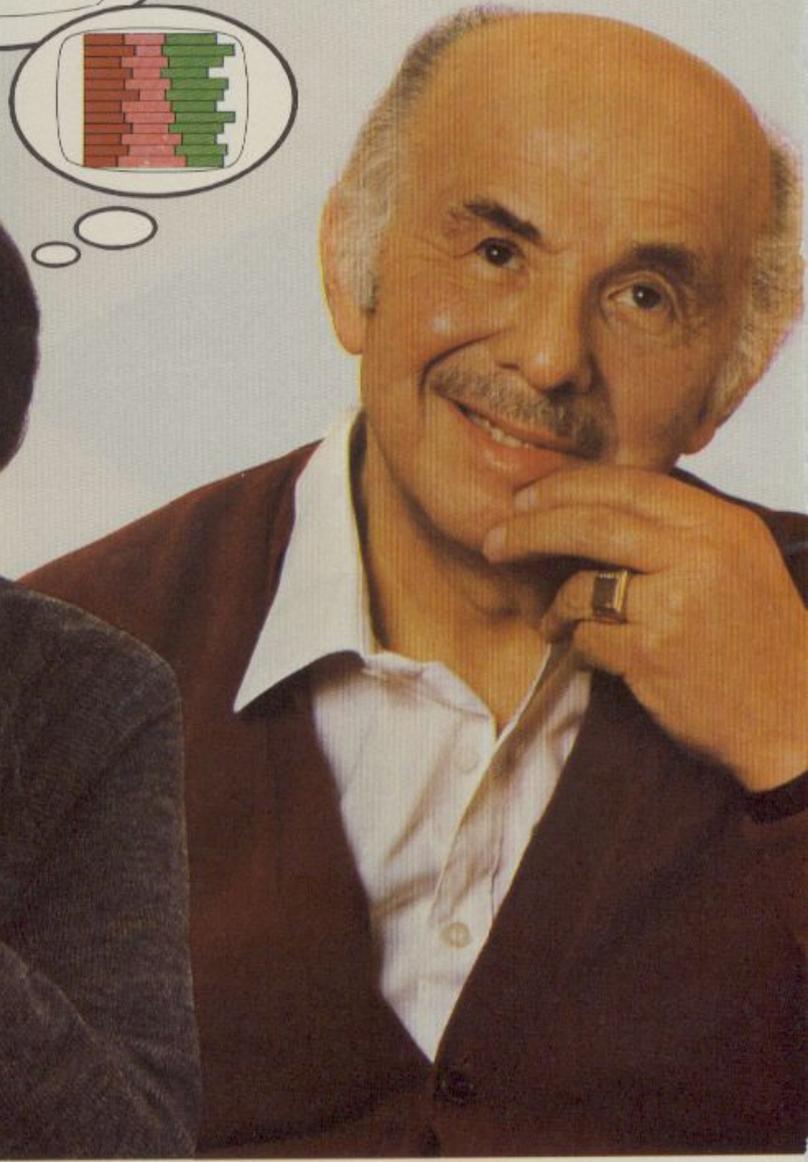
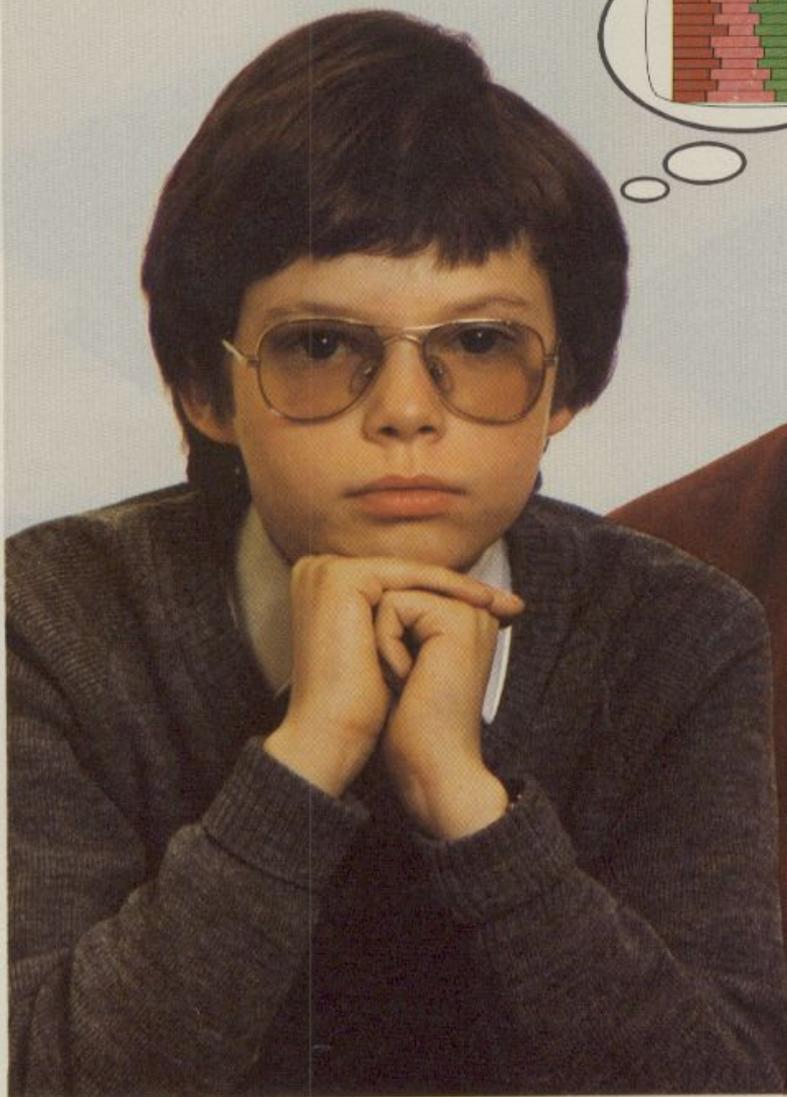
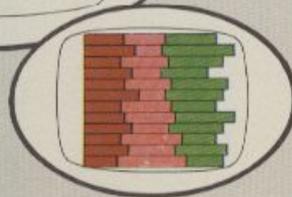
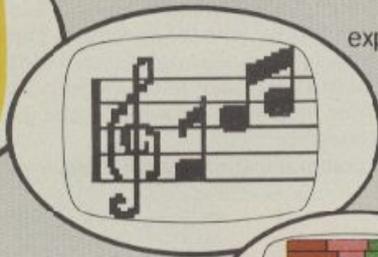
Alternatively for those that don't want to become so involved in programming the M5 couldn't be more fun.

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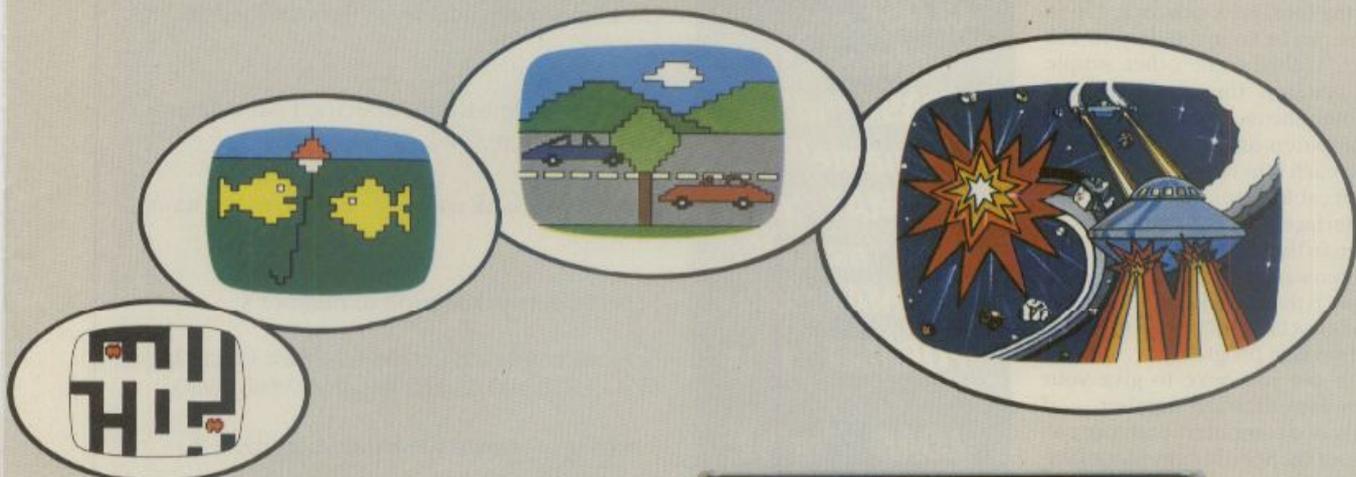
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$$a \frac{dy^2}{dx^2} - b \frac{dy}{dx} cy = f(x)$$



# those that don't



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◀ 34 specified in the command syntax for greater programming flexibility.

We will take a closer look at how and how well this all works in issue 25.

### The network

The biggest surprise of the Microdrive release was the local area network. Up to 64 Spectrums can be connected up to 100 metres apart. Unlike some other simple networking systems, this one does not require its components to be linked into a loop. The computers on either end can't be connected to each other.

A length of cable for netting is supplied with each Interface 1 and Sinclair claims all the Spectrums in the net need not be turned on for communication to take place. The only limitation is that individual Spectrums on the net may not be turned on or off while communication is in progress.

To use the net you have to give your computer an identification number — if there are only two computers each can call itself 1, without the need for any identification commands.

Sending and receiving data involves a fairly simple series of commands. A program is sent by loading it into your own computer and SAVEing it to its destination.

To send a program or some data requires a fairly high level of interaction among the participants. Unless you are within shouting distance, some form of telepathy would appear to be necessary to get things working. For instance, there is no way of breaking into a game or application on another computer to warn of an impending transaction. Participants should ideally be facing one another.

To send down a program requires the sender entering:  
SAVE \*"n";2

The receiver has to prepare his station by entering:  
FORMAT "n";2  
LOAD \*"n";1.

The receiver then has to verify the correct reception of the transaction by another command.

There is also a broadcasting facility so every computer on the net can pick up a transaction — this feature is obviously particularly useful in the classroom network.

The crowning feature of the Interface 1 is the D-plug RS232 connector which gives the user access to peripherals like quality dot-matrix printers or modems. Using a printer, for instance, would seem to be a fairly straightforward procedure and we can probably soon expect a deluge of wordprocessing packages to take advantage of the situation.

### Verdict

The Microdrive doesn't represent any technological quantum jump — 'stringy floppy' products of this type have been around for some time. Its importance lies in Sinclair's backing.

To be really useful, a storage medium must be tied in to software — it has, in effect, to be perceived by the industry as a

### CAT 1

CAT#z;1

CLOSE#  
stream

ERASE "m";1;  
"name"

FORMAT "m";  
1;"name"

FORMAT "n";x

FORMAT "t";x

LOAD \*"m";1;  
"name"

SAVE \*"M";1;  
"name"

Lists all the files in a cartridge in a given drive (1,2,3 and so on).

Sends the catalogue in drive 1 (or 2,3 etc) to stream z.

Unlinks any channel from the specified stream.

Erases the file with the specified name from the cartridge in drive 1.

Prepares a blank cartridge and gives it a name.

Sets the network station to number x.

Sets the baud rate for the interface (x can be 50,110,300,600,1200,2400,4800,9600,19200).

Loads up a named file from Microdrive 1.

Saves file to Microdrive 1.

The commands to control the Microdrives and the networking system are tied to the Basic keywords. As can be seen from the sub-set of the commands above, this aspect complicates the syntax necessary to do quite simple operations. For instance, it takes 11 to 21 keystrokes to accomplish the oft-needed loading of a file — most of the syntax also requires continual shift changes.

## 'The crowning feature of Interface 1 is the D-plug RS232 connector which gives the user access to peripherals like quality dot-matrix printers or modems'

likely 'standard' with a substantial market available for software products making use of it before it will be supported.

Once the ball is rolling, however, it becomes very difficult to replace it with something else — so the Microdrives are likely (all being well) to follow-through on Sinclair products for some years.

The average Spectrum owner wants to be able to run commercial games and applications on the chosen method of storage, not just load and save his own listings. The bugbear with third-party products of this type was that users found that the built-in protection, of the games programs especially, prevented them from listing and resaving on an alternative storage system.

With Sinclair's backing, the software producers are likely to market several protected programs at a time on a Microdrive cartridge. Perhaps even more

importantly, it should be possible to write significantly more flexible personal/business applications programs for the system than have hitherto been practical given the limitations of the cassette recorder.

Item Sinclair ZLX Interface £29.95 (with drive), £49.95 by itself. ZX Microdrive £49.95 per drive. Cartridges £4.95. Available Mail order, 2 drives and 1 Interface per customer until further notice. (Order forms are being sent to those who bought Spectrums first as supply permits.)

The PCN Pro-Test of the ZX Microdrives will continue in issue 25 when we'll report on the capabilities of the system with a closer look at the file handling and the operation of the network.



# DUPLEX

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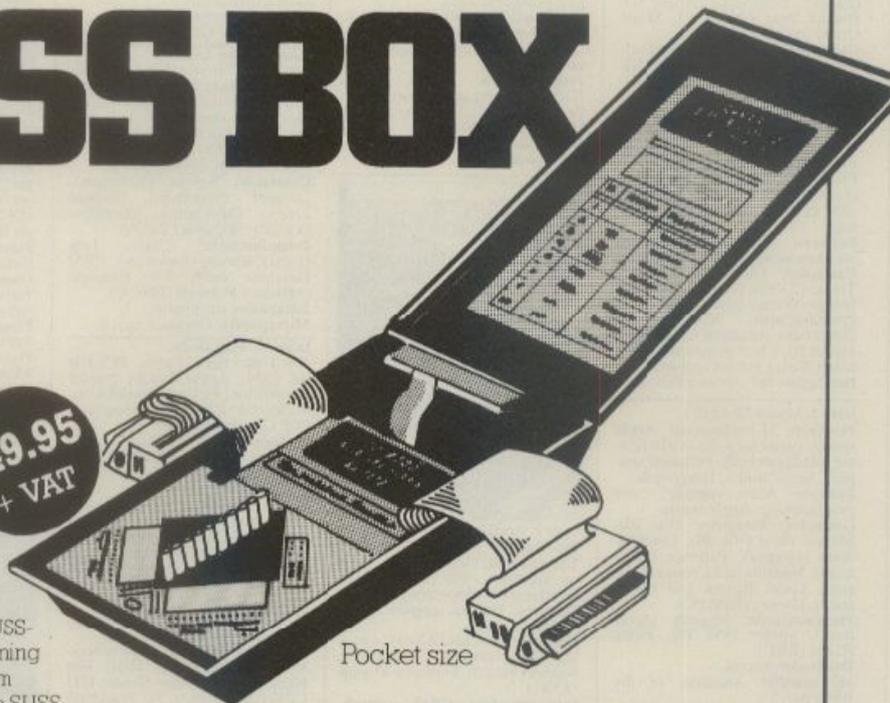
On each connector, pins—2, 3, 4, 5, 6, 8 & 20. All remaining pins are wired through.

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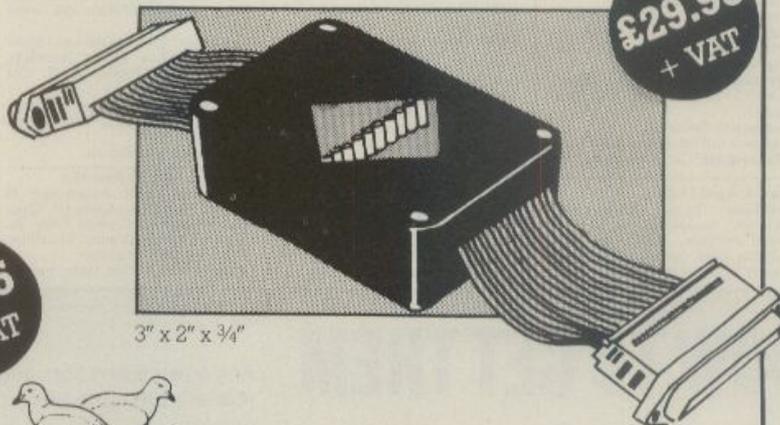
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# BACK ISSUES

**Issue 1, March 11-18.**

**Pro-Tests:** Apple's Lisa, Text TX8000; Spectrum speech synthesiser, Apple printer, Commodore network; 3D on Spectrum, graphics package for Apple and IBM, BBC graphics system.

**Features:** computer chess, Ocam parallel processing language, Victor/Sirius function keys.

**ProgramCards:** Towers of Braham (Pascal), Biohythm (Apple II), Roman Year (Apple II), Shape Utility (Apple II).

**Gameplay:** Darts, Soccer (Atari); Castle of Riddles (BBC Model B); Pimania (Spectrum); Flight Simulator (IBM PC).

**Databasics:** micros and peripherals.

**Issue 2, March 18-25.**

**Pro-Tests:** Toshiba T100, Casio PB100, ZX81/Basicare, Vic speech synthesiser, Spectrum spreadsheets, IBM graphics, BBC word processing.

**Features:** Colecovision, micro backgammon, nursery computing.

**Gameplay:** Ultima II (Apple), Trader (ZX81), Starquest (Vic 20), Hungry Horace (Spectrum).

**ProgramCards:** String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.

**Databasics:** full software listings.

**Issue 3, March 25-April 1.**

**Pro-Tests:** TI Professional, Apple speech synthesiser, Facit 410 printer, IBM keyboards, Petspeed compiler, Sirius toolkit, Dragonclic.

**Features:** Atom upgrade, Lynx programming, Apple music.

**Gameplay:** Mangrove (Vic 20), Mutant Herd (Vic 20), Conpendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).

**ProgramCards:** Magnify (Spectrum), Spider (Vic 20), Firing Range (BBC).

**Databasics:** micros.

**Micropaedia:** Anatomy of the BBC, part 3.

**Issue 4, April 1-8.**

**Pro-Tests:** Pied Piper Communicator, Olympia ESW3000 printer, Namal Supertalker, Commodore Calesult, Spectrum Pascal, Cashbook (BBC).

**Gameplay:** Dark Crystal (Apple II), St George (Dragon), Wizard War (Dragon).

**ProgramCards:** Fruit Machine (C64), Tunessmith (Oric), Array Editor.

**Databasics:** peripherals.

**Clubnet:** Clubs and user groups.

**Micropaedia:** Go Forth, part 1.

**Issue 5, April 8-15.**

**Pro-Tests:** Commodore 700, Ikon Hobbit, 1-2-3 (IBM), ZX81 machine code.

**Features:** speech packs, monitors.

**Gameplay:** Grand Prix (Dragon), Derby Day (Spectrum), Deadline (Apple).

**ProgramCards:** Wacky Racers (Oric), Fruit Machine (C64), Parse Integer.

**Databasics:** Software.

**Clubnet:** full list of user groups.

**Micropaedia:** Go Forth, part 2.

**Issue 6, April 15-22.**

**Pro-Tests:** Tycom Micro:ame, IBM PC, Scorpio Disks, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CP/M), PaperClip word processor.

**Features:** IBM PC DOS, BBC word processing, PC-1251.

**Gameplay:** Mined Out (Spectrum), Transylvanian Tower (Spectrum), Lunar Leeper (Apple II), Evolution (Apple II).

**ProgramCards:** Wacky Racers (Oric), Mortgage Comparison (Sharp MZ80K), Computer Set Up (BBC), Day of Week.

**Databasics:** micros.

**Micropaedia:** Graphics, part 1.



**Issue 7, April 22-29.**

**Pro-Tests:** Mattel Aquarius, Epson FX80, Olivetti JP101, Lisp on Spectrum, Vic 20 assembler, Supergraf on Victor/Sirius.

**Features:** Dealer support, Atari graphics.

**Gameplay:** Krakit (ZX81), Cruising On Broadway (Spectrum), Kakuts (Vic 20), Fantastic Voyage (ZX81).

**ProgramCards:** CBM controls, Computer Set Up (BBC), Wacky Racers (Oric), Julian Dates.

**Databasics:** Peripherals.

**Micropaedia:** Graphics part 2.

**Issue 8, April 29-May 6.**

**Pro-Tests:** Atari Home Files Manager, Kobra's Vic Stat for the Vic 20, Hestacrest's Accounts for the Spectrum; Epson RX80 printer, NCR's Decision Mate V, Future Computer's FX20.

**Features:** Micronet, Compact programming on the TI99/4A.

**Gameplay:** Harvester (Vic 20), Strategic Command (Dragon 32), A first Book of Micro Rhymes (BBC), Telling the Time/Money (Spectrum).

**ProgramCards:** Program Indexer (BBCB), CBM Database cards 1-4, Sort/Extract.

**Databasics:** software.

**Issue 9, May 6-13.**

**Pro-Tests:** Structured Basic on the Apple, Pixel Power on the Vic 20; Star DP510 printer, Dams and Interpod interfaces for Commodore 64; Micro-Professor.

**Features:** BBC function keys, Atari word-processing part 1.

**Gameplay:** Dungeons of Intrigue (Oric), The Castle (Oric), Starship Command (BBC B), Dragon Trek, Nowotnik Puzzle (Spectrum).

**ProgramCards:** Lower case (Dragon 32), CBM database cards 5-6,

Monster (Spectrum), Wildcard Search (MBasic).

**Databasics:** hardware.

**Micropaedia:** Graphics, part 4.

**Issue 10, May 13-20.**

**Pro-Tests:** Infomast on Commodore 64, Dragon Maze; MC202 and CMU800 music synthesizers (Apple), Prism directly coupled modem; Epson QX10.

**Features:** ZX81 graphics part 1; Atari word-processing part 2.

**Gameplay:** Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choplifter (Vic 20), Skyhawk (Vic 20).

**ProgramCards:** Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (MBasic), Formula (BBC B).

**Databasics:** peripherals.

**Micropaedia:** Graphics, part 5.

**Issue 11, May 20-26.**

**Pro-Tests:** BBC Vufile, PFS:File for IBM, Apple Pascal; printer comparison, Pickard Joystick Controller for ZX81 and Spectrum; C9E Computer Board.

**Features:** ZX81 graphics part 2, Basic on the Sharp MZ80K.

**Gameplay:** Motor Mania (Commodore 64), Oric Flight, BBC Music Synthesiser, Music Maker (Spectrum), Embassy Assault (Spectrum), Tobor (Spectrum).

**ProgramCards:** Homeward Bound (ZX81), Connect Four (Dragon 32), CBM Database, cards 10—end.

**Micropaedia:** Keyboards.

**Issue 12, May 27-June 2.**

**Pro-Tests:** Spectrum word processor, PFS:Report on IBM, File Handling for Colour Genie; CTI CP80 type 1 printer, TG Trackball; Sord MS.

**Features:** Epson Basic, Oric sound part 1, Tandy Colour graphics.

**Gameplay:** Mad Martha (Spectrum), Frenzy (Spectrum), Headbanger (Spectrum), Oric roundup.

**ProgramCards:** Election Barchart (Commodore 64), Memory Utility (BBC B), Munch (Spectrum).

**Databasics:** Hardware.

**Clubnet:** clubs (Cambridge Micro-computer Club special).

**Micropaedia:** Disk Drives, part 1.

**Issue 13, June 3-9.**

**Pro-Tests:** Telexwriter for Dragon 32, Abersoft Forth for Spectrum, GPS graphics/processing system for Apple II+; joysticks, rulers; Ajile.

**Features:** Dragon meets Tandy, Oric music part 2, transferring Basic for Colour Genie and Genie 1.

**Gameplay:** Everest Ascent (Spectrum), Colour Genie roundup, Micro Maze (Jupiter Ace), Oix (Atari).

**ProgramCards:** Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).

**Databasics:** peripherals.

**Issue 14, June 10-June 15.**

**Pro-Tests:** Apple Accelerator II board, Modula-2 (Apple II), Oric-Basic, Joystick Control Unit J6, Kensington Centronics Interface, BBC Speech Synthesiser.

**Features:** Newbrain Basic part 1,

Sirius designing.

**Gameplay:** Ah Diddums (Spectrum), Monopole (Commodore 64), Automonopoli (Spectrum), Dragon dramatics.

**ProgramCards:** Time Bomb (Atari, cont), Sheep Drive (BBC B).

**Databasics:** Software.

**Micropaedia:** Spectrum, Part 1.

**Issue 15, June 16-June 22.**

**Pro-Test:** Comx 35, Address Manager (Spectrum), Sysres (Commodore 64), MST Database (Epson HX-20), Voice Input Module (Apple II).

**Features:** Newbrain Basic part 2, Genie scene.

**Gameplay:** Cleared for Landing, Playing the Ace (Apple II), Vultures, Star Jammer (Dragon 32).

**ProgramCards:** Mover (BBC B), Sprite Clock (Commodore 64), Pirate Island (Atari, 3 of 9), Micro-mind (Colour Genie), Brickbat (Dragon 32).

**Databasics:** Hardware.

**Micropaedia:** Spectrum, part 2.

**Issue 16, June 23-June 29.**

**Pro-Tests:** Atari v Acorn, word processing for the Commodore 64, Simplifile (CP/M), MPF-II printer, Z80 Pack for BBC.

**Features:** ZX81 Maths, US mail order, Atari graphics.

**Gameplay:** Computer Scrabble (Spectrum), Education (BBC), Horace and Spiders (Spectrum), Catcha Snatcha (Vic 20).

**ProgramCards:** Video Titrer (TI99/4A 3 of 6), Bowling (Spectrum), Pirate Island (Atari cont).

**Micropaedia:** Spectrum, part 3.

**Issue 17, June 30-July 6.**

**Pro-Tests:** Duet-16, The Organizer (CP/M), Trace and ZX Text (Spectrum), Juki 6100 daisywheel, Videx Ultra Term (Apple II).

**Features:** Leasing part 1, Atari screen action.

**Gameplay:** Oric chess, Grand Master (Commodore 64), Escape from Orion (BBC), Jet Pac (Spectrum), The Ring of Darkness (Dragon 32), Spectrum spectacle.

**ProgramCards:** Video Titrer (TI99/4A cont), Pirate Island (Atari cont) Word processor (BBC).

**Micropaedia: Sound, part 1.**

**Issue 18, July 7-July 13**

**Pro-Tests:** Tandy 100, RS232 interface (ZX81), ROM pager (Commodore), Interface printer buffer, IBM Personal Basic, Spectrum assembler, Newbrain WP.

**Features:** Leasing Part 2, Lynx music.

**Gameplay:** Spectrum Backgammon, BBC Snooker, Commodore 64 round-up, Serpentine (Vic 20), Psst (Spectrum), Spectrum Safari.

**ProgramCards:** Word Processor (BBC), Fruit Machine (Spectrum).

**Micropaedia:** Sound Part 2.



**Issue 19, July 14-July 20**

**Pro-Tests:** 16-bit chips, Stock control (Epson HX20), Mailplus (Torch), Smith-Corona daisywheel, ZX81 word processing.

**Features:** insurance, buying second-hand.

**Gameplay:** Escape MCP (C64), Escape from Perilous (Atari), Apple round-up, Temple of Apsai (C64), Airline (Spectrum), Heathrow (Spectrum).

**ProgramCards:** Colour Code (Atari), Wreck (Dragon).

**Micropaedia:** Sound, part 3.



**Issue 20, July 21-July 27**

**Pro-Tests:** Rade bareboard, Vic digital tape drive, Seikosha colour printer, Toolkit (Spectrum), Bonus (Pet payroll), Newbrain monitor.

**Features:** Computer art, Dragon scrolling.

**Gameplay:** Rabbit Trail (TI99/4A), Aztec Challenge (Atari, Vic 20, TI99/4A), BBC round-up, Joust (Spectrum), Molar Maul (Spectrum), Print Shop (Spectrum), Time-Lords (BBC).

**ProgramCards:** Tumbler (Oric), Wreck (Dragon), Atari Errors, Speed Race (Vic 20).

**Micropaedia:** Sound, part 4.

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Nigel Cross gets to grips with the Tandy Model 4 and asks: Is it sufficiently different?

# Family resemblance

New micros are rolling out of factories at a ridiculous speed. New companies spring up out of nowhere and launch a new computer on an unsuspecting public. If the product works, the company can suddenly find itself a market leader.

So it has been for companies such as Commodore, Apple and Tandy. Once such companies are established, you can expect them to try and retain their dominance. So they will launch new machines that improve on previous models

and beat the new competition.

With this in mind, I expected great things of Tandy's latest offering, the TRS80 Model 4.

## Presentation

The Model 4 arrived in the ubiquitous sturdy cardboard box full of styrofoam packing. Moving it produced numerous problems and getting it in and out of a taxi was reminiscent of a Laurel and Hardy sketch. I recommend you persuade your

dealer to deliver the machine.

Why do manufacturers spend so much time developing a neat, compact computer and then stick it in to a great unwieldy box?

## Documentation

Documentation starts with a weighty tome in a brown leatherette-like binder. This is the system manual and contains a system master disk tucked firmly into its front cover.

There's the standard awkwardly shaped

42 ▶

## BASIC RESERVED WORDS

@	CLOCK	DATA	ELSE	FOR	INPUT	LLIST	MKIS	PEEK	RENAME	SET	TAN
ABS	CLOSE	DEFDBL	END	FORMAT	INSTR	LPRINT	MKSS	POINT	RESET	SGN	THEN
AND	CLS	DEFFN	EOF	FRE	INT	LOAD	NAME	POKE	RESTORE	SIN	TIMES
ASC	CMD	DEFINT	ERL	FREE	KILL	LOC	NEW	POS	RESUME	SQR	TO
ATN	CONT	DEFSNG	ERR	GET	LEFT\$	LOF	NEXT	POSN	RETURN	STEP	TROFF
AUTO	COS	DEFUSR	ERROR	GOSUB	LET	LOG	NOT	PRINT	RIGHT\$	STOP	TRON
CDBL	CSNG	DEFSTR	EXP	GOTO	LSET	MEM	ON	PUT	RND	STRING\$	USING
CHRS	CVD	DELETE	FIELD	IF	LEN	MERGE	OPEN	RANDOM	RSET	STR\$	USR
CINT	CVI	DIM	FIX	INKEY\$	LINE	MIDS	OR	READ	RUN	SYSTEM	VAL
CLEAR	CVS	EDIT	FN	INP	LIST	MKDS	OUT	REM	SAVE	TAB	VARPTR
											VERIFY



◀ 41 Tandy Basic manual. An extra page is included, highlighting the differences between the Model 4 and its predecessor the Model III. Finally, there's an introductory booklet describing the hardware and software features of the machine.

This is a precisely-written document showing each aspect of the machine in clear, simple words. It's just right for the first time user. The Basic manual is both a tutorial and a reference guide and is again very explicit.

Even so, I'm sure that a professional organisation like Tandy doesn't need to pack a document like this with trite, superfluous cartoon-like illustrations — a trait so common these days. Be that as it may, if you want to learn Basic on this machine, you can't really fault it.

The system manual is a totally different kettle-of-fish. Very heavy going but packed full of exact descriptions of available functions. To understand all of the facilities available within the operating system would take a great deal of time and effort for the user.

### Construction

The first thing you notice about the Model 4 is Tandy's radical departure from its standard yucky cheapo silvery finish. The pristine Model 4 has an almost-white sturdy finish. It actually looks like a real computer in this style.

The on/off switch is to the right of the keyboard on the underside of the machine. Being a rocker style switch, it is quite likely to be knocked should you move the machine about your home or office. Similarly, the screen controls are hidden under the left side of the machine and are vulnerable to knocks. These are only small points but they tend to be annoying if problems occur regularly.

Fitting a printer cable revealed that connections for peripherals reside underneath the machine at the back. So making any connections involves tipping the machine on its side. Not a nice technique. The small selection of slots and holes allows various interfaces to be fitted to facilitate such things as extra disks, communications and serial I/O.

### Keyboard

This is a standard Tandy keyboard. I would have preferred more feel to it; interaction with any computer involves a fair amount of keyboard use and it is apparently an area that manufacturers care little about.

Why can't manufacturers contrive to provide keyboards that feel comfortable, and have easy-to-use convenience keys such as cursor controls? Admittedly, the Model 4 has four cursor keys, a numeric keypad and three function keys but I failed to find any way of using the function keys from within a user program.

### Screen

The Model 4 is the first Tandy to be blessed with an 80-column display. This is a radical departure for Tandy, a company that has been adamant that 64 columns was perfectly adequate. Obviously, the plethora of



competitors offering 80 columns has forced Tandy's hand somewhat.

Although the Model 4 has an 80-column display, facilities exist to run existing Model III software using the screen in the same old fashion.

However, I was not impressed by the woefully limited graphics capability. It provides 160 × 72 graphics using pixel characters. You could be more adventurous with a Spectrum!

Tandy could even have used some of its Color Computer circuitry in this machine.

### Operation

The Model 4 runs under an upgrade of Tandy's well-used TRSDOS known as

Version 6. There is nothing startling about TRSDOS 6 as the changes are pertinent only to the hardware changes on the new machine.

As it is, the Model 4 is essentially a business machine and should be compared to machines of a similar ilk such as the Apple IIe and larger Commodore systems. The Tandy is not overpriced with its 64K RAM, twin 184K floppies, screen, keyboard and printer interface costing about £1,500.

I was particularly impressed by the data communications facilities available in TRSDOS 6. I've spent many years working in comms and if some of the mainframe manufacturers had included only half of

Left: The Model 4 with twin 184K floppies. The lowest-level option, cassette-based, features a blank panel here. Further disk drives can be added externally.  
Bottom: Expansion connectors with at bottom right, the parallel printer connection, floppy disk expansion connector, and bottom left, the RS232C connector and I/O bus jack.

Left: the power plug and cassette connection at the rear of the unit.  
Below: The 70-key keyboard with function keys, numeric keypad and cursor controls.



## TRSDOS commands

### Initialisation

FORMAT AUTO BOOT DATE  
FORMS SETCOM SETKI  
SYSGEN SYSTEM TIME

### Auxiliary

DEVICE DIR DO FREE LIB  
LIST LOG SPOOL VERIFY

### File handling

APPEND ATTRIB BACKUP  
BUILD COMM CONV COPY  
CREATE DEBUG PATCH  
PURGE REMOVE RENAME  
REPAIR TAPE100 DUMP LOAD  
MEMORY RUN

### Device handling

FILTER LINK MEMDISK  
RESET ROUTE SET

simple to see why the Model 4 has been designed as it has. It can use existing software now and new software can take advantage of the larger screen. I'd also expect many existing packages to be adapted to use the larger display.

As it is, the Model 4 boasts the new TRSDOS version 6, TRSDOS 1.3, LDOS and CP/M plus. No doubt that Newdos +, Newdos 80, Dosplus and so on will all make their way onto the machine... even if only in Model III emulation.

Besides the standard TRSDOS utilities, the Model 4 has MEMDISK which allows you to use memory as a fast RAM disk. TAPE 100 will read and write tapes for the relatively revolutionary Model 100. Finally, there's MAILLIST, a crudely written mailing list package in Tandy Basic.

## Verdict

To be fair, I expected much more from a new Tandy machine — especially with the obvious success of its portable Model 100. But the Model 4 does fit the philosophy of business orientated hardware that runs all current Model III software.

This is a selling point but the business person looking to replace an old Model III shouldn't fall for this. It's like trading in an old but reliable and trusted car for a new one that's a different colour and has a couple of bells and whistles. But for the prospective first time buyer, the Model 4 is well worth adding to your shortlist.

what Tandy claims to have available then my past efforts would have been much less arduous.

Tandy Basic is a Microsoft commissioned product and is typically rugged. By now, it's a well known and used version of the language. But I didn't like the long delay in loading the interpreter from disk each time I called it from TRSDOS.

But the real advantage of the Model 4 is access to existing software. Compatibility with earlier machines was a must as it would have been self-defeating to preclude the Model 4 from the Model III's huge software base.

It is interesting to note that Tandy is reported in the US press as being the

largest vendor of business software for micros — by a considerable margin. So it's

### SPECIFICATION

**Price** 16K cassette £749, 64K 1 drive £1,299, 64K 2 drives £1,499

**Processor** Z80 4MHz

**RAM** 16K (cassette) 64K-128K (disk)

**ROM** 14K (cassette)

**Text screen** 80 × 24, 40 × 24, 64 × 16 and 32 × 16

**Graphics screen** 160 × 72

**Keyboard** 70 keys, built-in, 3 function keys, numeric keypad

**Storage** Twin 184K floppies

**Interfaces** Parallel, Expansion bus, optional RS232

**OS/Language** TRSDOS level 6, Basic

**Distributor** Tandy, Tameway Tower, Bridge St, Walsall, West Midlands

**Software supplied** Demonstration

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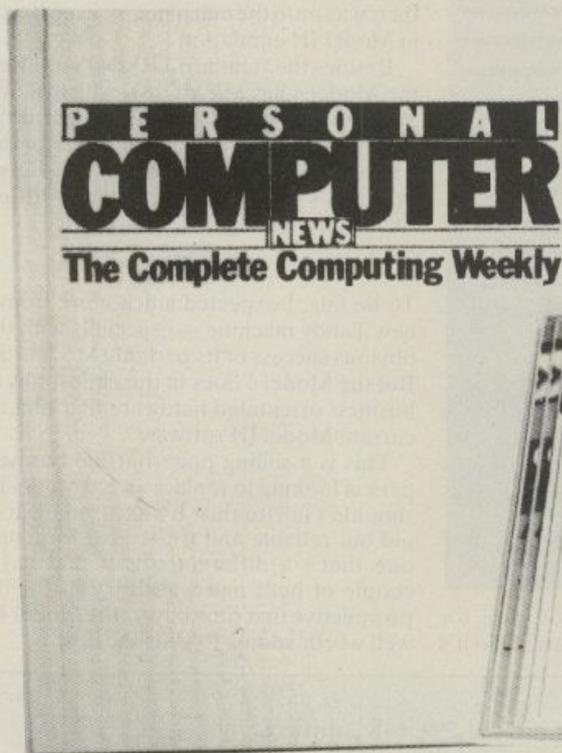
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## CARD GAMES

SPECTRUM

# Bridge that gap

**Name** Bridge Master **System** ZX Spectrum, 16K or 48K **Price** £24.95 **Publisher** Bridgemaster, PO Box 163, Slough, SL2 3YY **Format** Cassette **Language** Basic **Other versions** ZX81 (versions for other computers will be available soon) **Outlets** Mail order

Bridge is a very popular game, but there is a lot to learn before you can start to play, and even more to learn after you have started playing. To learn bridge properly you need good teaching and opportunities for regular practice, and these can be difficult to find.

Bridge Master has been designed for the complete beginner, and uses the Spectrum to help with the teaching and to give you playing practice.

### First impressions

Bridge Master comes in a sturdy box which contains two computer tapes, two commentary tapes, an instruction booklet, and a Penguin paperback, *Begin Bridge With Reese* by Terence Reese.

The instruction booklet explains how to load the computer tapes and use the commentary, and gives information about using the program.

Full instructions and all of the bridge teaching are on the commentary tapes. The commentary is spoken clearly and at an even speed.

The Terence Reese book is not used directly in the Bridge Master teaching, but is included for reference and supplementary reading.

### In play

The commentary begins right at the beginning, explaining the mechanics of playing bridge, and then takes you on to the first practice deal on the computer tape. On the first deal the commentary explains how to use the program and takes you through the play of the cards step by step, illustrating the basic information on how to play bridge that was given in the first section of the commentary.

The computer tapes contain between them 55 bridge deals which you use to practise playing bridge. On most of the hands the commentary gives you an introduction and some hints, and you are then expected to play the hand for yourself before continuing with the commentary, which goes on to explain the play of the hand in detail with emphasis on the new ideas introduced in the hand.

There is an 'autoplay' option where the computer plays through the hand for you and you are expected to use this when following the explanatory part of the commentary.

The program will only allow you to play each hand in one way and gives a beep if you try to play any card except the one it is programmed to accept. Often, there are several cards you could play without affecting the outcome of the hand, so when you get a beep you have to stop and think about whether you



have actually made a mistake.

However, this is a minor point and does not really affect the use of Bridge Master. It would probably be impractical to include the amount of data that would be needed to handle even minor variations in the play.

Bridge Master introduces the various features of the game in easy stages, beginning with playing the hand and taking tricks, then moving on to contracts and bidding, and later introducing the scoring.

This is just the mechanics of the game, and most of the teaching is devoted to helping you to reach a good standard of play. Bridge Master concentrates on the important fundamentals, such as planning the play in order to make your contract, and keeping track of the cards that have been played. All of the basic strategies in the play of the cards are covered, and the 55 deals give you plenty of practice in the most important plays.

The bidding is based on the widely used Acol system, but Acol, or any other bidding system, contains much more than can be covered in any introductory course. Bridge Master deals with the most important and most commonly used parts of the Acol system, which is fairly easy to learn as at this level it is almost entirely 'natural' bidding. The only completely artificial bidding

mentioned is the widely used Blackwood convention.

The program is very reliable and will stand up to any errors. The main menu, which you use to select the deal and playing option you want, will ignore anything except a valid choice, and as mentioned before the program gives a warning beep during the play of the cards if you type in anything except the card that is expected.

### Verdict

Bridge Master is an excellent introduction to bridge, and makes very good use of the computer in its teaching. If you follow the course faithfully you should soon reach a level where you can play with friends without disgracing yourself.

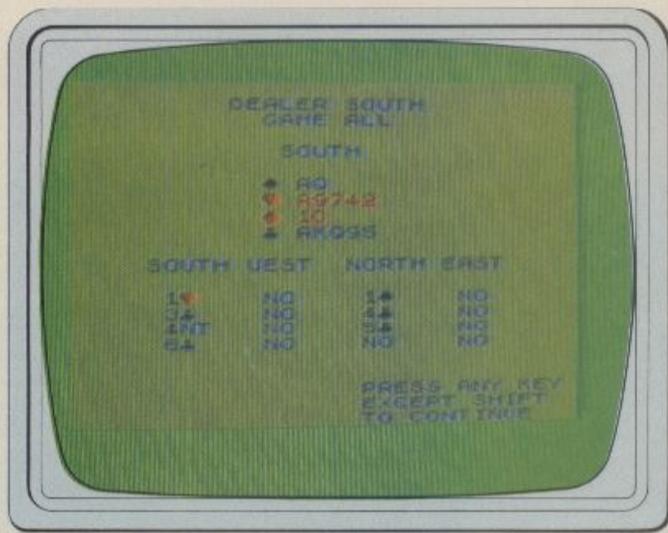
All the fundamentals are dealt with thoroughly and many of the less elementary features of the game are introduced.

The weakest part of Bridge Master is its treatment of defensive play. In all the practice deals you play the declarer's hand and although you learn something about defence from the explanation of the play in the commentary, you do not get any practice defending a hand.

Ted Ball

### RATING

<b>Lasting appeal</b>	☆☆☆☆
<b>Playability</b>	☆☆☆☆
<b>Use of machine</b>	☆☆☆☆
<b>Value for money</b>	☆☆☆☆



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/ Spectrum software needs...

## CAVERNS CLUB

### SPECTRUM

# Styx and bones

**Name** Styx **System** 16/48K  
**Spectrum Price** £5.95 **Publisher** Bug-Byte, Mulberry House, Canning Place, Liverpool 051 709 7071 **Format** Cassette **Language** Machine code **Other versions** None  
**Outlets** High street dealers

This game is based on that cheerful belief that on dying we must cross the River Styx to reach Hades. But first you must negotiate a maze full of spiders before plunging into the river, swimming across, and finally facing an encounter with the Grim Reaper himself.

To help you in all this you have a laser gun, which is conveniently waterproof but only has a limited amount of ammunition. This is fired using any key on the bottom row, with Q, A, O and P controlling the little man.

Styx is a game for one player, and the fact that you're provided with three lives does seem to be rather cheating under the circumstances.

### In play

Although Styx is in three phases, they all lead into one another. The top third of the screen is the maze, which has an exit leading down into the river that flows across the middle, and this in turn has an exit into the underworld at the bottom.

The maze is filled with spiders which emanate from a mother-spider who sits in the

top right-hand corner. They're not intelligent enough to come after you, but they do get in the way. Shooting the mother spider seems rather cruel to me, but doing so will recharge your laser (don't ask me how).

It took only about half a dozen attempts to master this section and get to the river below.

You have to swim the length of this to get to the beaching point. The piranha fish are harder to get past as they move up and down as well, and you also have to avoid getting caught in the weeds at the bottom of the river.

Why anyone should go to so much trouble to meet the man in the black hood I don't know.

The final part of the journey provides no challenge, as long as there are bullets in your gun, because there's a recess where you can hide until the four Spirits of the Dead pass in front of you. Then it's across to the man in black, and provided you can avoid his outstretched hand you can then send him off to meet his own maker, whoever that might be.

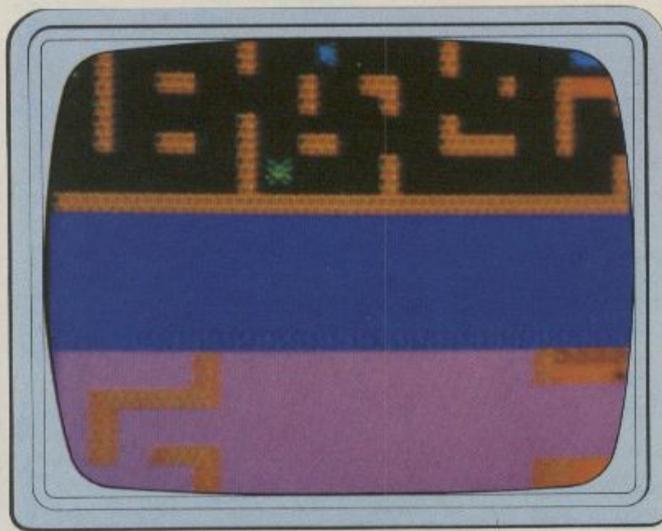
### Verdict

Although the idea and the graphics are quite good, and the responses are quick, the game itself doesn't really come off. While getting through the entire sequence is by no means easy, once you've done it a few times there's nothing much left.

Mike Gerrard

#### RATING

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



### SPECTRUM

# Of pits and penguins

**Name** Manic Miner **System** 48K  
**Spectrum Price** £5.95 **Publisher** Bug-Byte, Mulberry House, Canning Place, Liverpool 051-709 7071 **Format** Cassette **Language** Machine code **Other versions** None  
**Outlets** High street dealers

If you've ever had the uncontrollable urge to jump over a penguin while it's humming *Hall of the Mountain King* then this is definitely the game for you.

### Objectives

The idea is to manoeuvre Miner Willy through the various caverns of a long-forgotten mine-shaft near Surbiton, collecting all the keys in each cave before being able to move on to the next, and eventually up to the surface and untold riches. It's a game for one player with keyboard control, or joystick.

### In play

The game opens with simply the best title screen I've ever seen, with the waving palm trees of sultry Surbiton behind a piano keyboard whose keys are moving up and down to the tune, more or less, of *The Skater's Waltz*.

Pressing ENTER starts the game, but if you don't you're given a chance to see the assorted caverns you'll be travelling through, and if you're anything like me this is the only way you'll get to see them.

The first in the proper game is the Central Cavern, and while

every one is different, the general idea is that Willy goes walkabout, jumping over obstacles and slowly climbing up the platforms that lead to the top of the screen, grabbing the keys he needs as he goes. When the last key is taken, the portal leading into the next cave will start flashing and Willy must make his way back to that.

The game requires a lot of thought, practice and timing to get through each screen, especially as they are all being patrolled by robots, ducks and a dozen other creatures — which is where an ability to leap over a penguin comes in handy.

Complications also arise with the platforms, some of which crumble under you as you pass, meaning that you only get one chance to jump from them to the next level. Others are conveyor belts, and once on those you can't change direction, so you have to know well in advance exactly where you're going to jump next. Coming down is even more hazardous than going up.

The graphics and sound are both superb, and if the constant playing of *Hall of the Mountain King* starts to annoy you the writer has thoughtfully provided an on-off switch in the program.

### Verdict

Manic Miner is original and amusing as well as hard to master, and I haven't enjoyed a game so much since I first encountered Donkey Kong.

Mike Gerrard

#### RATING

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



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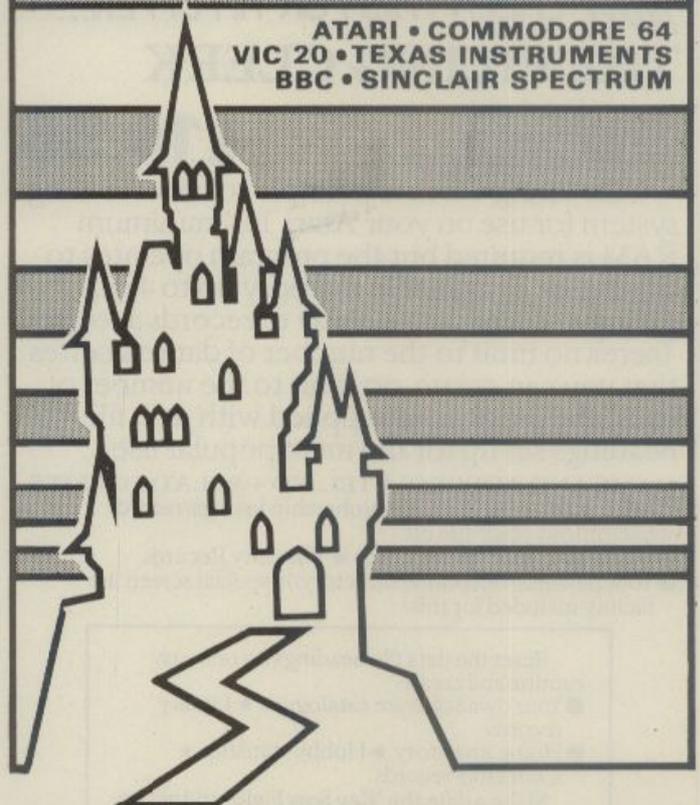
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John Lettice and Shirley Fawcett take the line of most resistance. Here's their front-line report.

# Atari on the attack

Day by day the quest for original games concepts becomes more and more fraught, and as new titles are released, the problems for gibbering programmers ('Hey Mel, you dribbled on my disk') can only get worse. The Atari is probably one of the machines that is furthest down the road in these terms so, for those of you who pine for the rattle of gunfire and the throb of alien invasions, we present a review of how the software houses are coping.

## WALLI WAR



This one is living proof that Atari games are often much happier playing themselves than boring old human beings. Two extremely classy-looking Microbots slog it out with 'Balls of Death' on either side of a wall of moving lights. Once the lights are knocked out, the objective is to attack the Microbot on the other side by disabling its plasma field, which consists of more moving lights.

The instructions explain the scenario in glowing Atari-speak: 'You have been accidentally compuported into a glittering world where life, especially for humans, depends on plasma fields — the stuff of life. It is inhabited by fighting Microbots who spar constantly until aggressive humans take them over.'

Got it? So when you run the game the Microbots are already at it, and you take over by pressing START or SELECT. When you do take over you find it isn't the most skilful of games, and knocking out the light before you get to the main business can be fairly tedious, but it's almost worth having the game just to watch the computer play itself. The graphics really are stunning.

## XENON RAID



Well, there I was, protecting the Earth's most advanced military equipment from destruction by the infamous galactic pirates, the Xenons — scout for a convoy

driving through Death Valley, it looks like — when I noticed something really strange. I was obviously moving along the road, as the white line was going backwards, but the cacti on either side seemed to be following me...

But on reflection I decided leaving the cacti stationary and moving the road was just a programming shortcut. They certainly don't show any sign of leaping on you and spining you to death.

Graphics aside, which are good, *pace* the peripatetic pricklers, this is a well-implemented version of 'aliens dive out of the sun, you shoot them, you refuel, then more aliens dive out of the sun'... Good bang-a-microsecond stuff.

## REAR GUARD



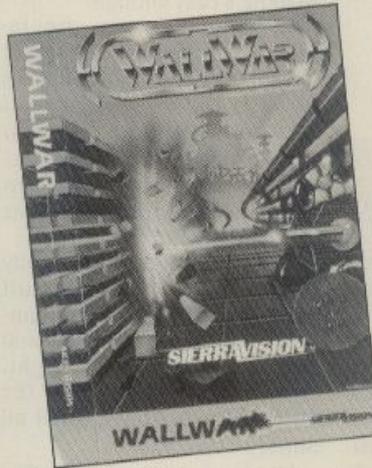
Which is more than you say for Rear Guard. It took me a few minutes to find out how to get out of the attached commercial for the Stone of Sisyphus adventure game, and I'm still not sure how I got into it in the first place. Once you get going, it turns out to be a fairly standard implementation of Defender, where you must shoot down alien attackers who are overtaking you (why am I running away from them?) in order to protect your mothership.

Besides shooting the blighers down — a selection of arrows, *SS Enterprise* clones and the like — you can also bang into them, but as this drains your shields, it isn't to be recommended.

## CENTIPEDE



There are advantages to playing a game before reading the instruction leaflet. There I was under the impression that I was trying to kill a conga line in a graveyard while being attacked by a malevolent wig, only to discover later that you're actually attacking a centipede (the title is a dead giveaway) in a mushroom patch while a giant



spider jumps at you.

All inhuman life is here. The centipede marches down the screen banging into mushrooms — don't be too hard on it, it must be like trying to turn a supertanker — the jumping spider can make mushrooms disappear, the poisonous scorpion poisons mushrooms which then, if the centipede bumps into it, makes the beast go crazy and run straight at you... To cap this, the frenzied flea creates mushrooms whenever he lands.

You, by the way, are a blaster, and you tackle the local predators with what appears to be considerably heavier weaponry than your average aerosol. Atari fans, of course, won't settle, for anything less than heavy weaponry.

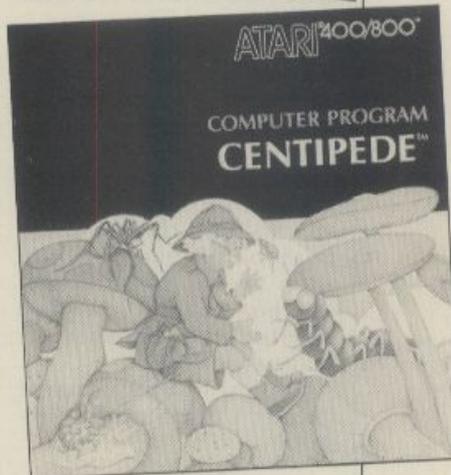
## MARAUDER



This one features two games for the price of... well, at current disk software prices, the price of two. Still, each one is a respectable version of familiar arcade favourites, good enough to keep you trigger-happy into the wee small hours.

Game One is a Bomber/Blitz/Mindlessly Violent Game of your choice, where you pilot a bomber at the top of the screen, flattening the planet below you so you can land in the ruins. You get shot at by lasers and torpedoes and indestructible fireballs, and there's also a force field to wreck before you can land.

Don't bother with landing, though — the explosion sequ-



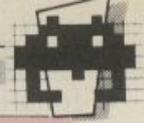
ences when you fail to do so is far better value. Worth losing quite a few lives for.

Game Two is a Berzerk look-alike, in which you have to race around the maze of an alien city, heavily guarded by robots taking pot-shots at you.

Your aim is to find the power source hidden somewhere in the maze and — what else? — blow it to smithereens. Before you can do so, you'll need to dispose of umpteen robots — but you can only spot them when they are in your direct line of vision. Since they tend to lurk in doorways, that can be tricky.

Both games feature plenty of skill levels, to cater for even the most ham-listed as well as the shooting superstars.

**Centipede** £29.99 — English Software, 50 Newton Street, Manchester M1 2EA, 061-236 7259; **Xenon Raid**, £14.95 — Adventure International, Box 3435, Longwood, FL 32750, USA; **Rear Guard** £17.95 — Sierra On-Line, 36575 Mudge Ranch Road, Coarsegold, CA 93614; **Marauder** £22 — Sierra On-Line, available from SBD Software, 01-870 9275.



## MANAGEMENT ROLES

### ORIC

## A sticky situation

**Name** Candy Floss/ Hangman  
**System** Oric, 48K **Price** £7.50  
**Publisher** IJK Software, 9 King St, Blackpool, Lancs, (0253) 21555  
**Format** Cassette **Language** Basic  
**Other versions** BBC **Outlets** Mail order, various dealers.

Oh, I do like to be beside the seaside . . . Pardon me, but the combination of a hot summer and a game called Candyfloss is more than a mortal journalist can bear.

### Objectives

This is fairly serious business training, as you, proprietor of a Blackpool candyfloss stall, decide how many candyflosses to manufacture, using sugar at such-and-such a price, and how much you will charge for them, given the expected weather, and how much you should advertise, given any other prevailing conditions.

In short, it's a microcosm of Life, the Universe, and Everything.

### In play

Candyfloss comes on a cassette together with a pretty slick version of Hangman, rolling-eyed victim and all, which will let you add your own category of words to its Birds, Football Teams, Animals and so forth. Unfortunately, there's no hint in the loading instructions as to how you are supposed to load Hangman.

Still, assuming it's Candyfloss you want to play — and it is the clear star on this cassette — loading's easy enough.

'It is sunny', you are informed, to the tune of a rather off-beat version of *The Sun Has Got His Hat On*. 'Sugar costs .02p per candyfloss'. So you must decide how many adverts to buy, and how much to charge, bearing in mind that you set out with a mere £2.

I planned everything really carefully, set my price just right, made just the right number, advertised just enough and not too much — or so I thought. But, 'Oh dear!' chortled the Oric. 'Donkeys have eaten all Shirley's candyfloss'.

Donkeys apart, though this game is a good way of experimenting with the law of diminishing returns by testing out different strategies on apparently similar days. As long as you don't get wildly carried away, you'll make a small profit most days.

### Verdict

A fun educational game, for adults almost as much as for younger players, but one that won't get played more than a few times, since the hazards come at you in the same order each time. Knowing that donkeys are about to attack your stockpile of flosses does reduce the element of surprise.

Shirley Fawcett

### RATING

**Lasting appeal**



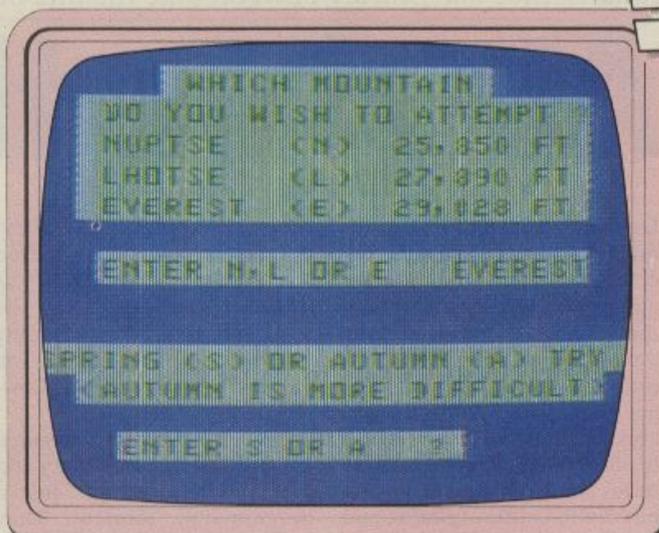
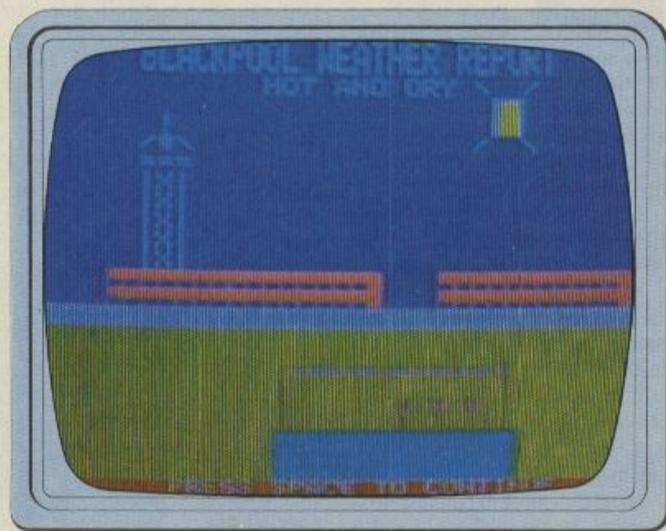
**Playability**



**Use of machine**



**Value for money**



### DRAGON 32

## Room at the top

**Name** Everest **System** Dragon 32  
**Price** £7.95 **Publisher** Salamander, 17 Norfolk Road, Brighton, East Sussex  
**Format** Cassette **Language** Basic  
**Other versions** None **Outlets** Mail order, Spectrum shops, other dealers

How nice to encounter a game which doesn't demand a great deal of you — all you have to do here is climb Mount Everest.

### Objectives

You scale Everest, or one of the two other lesser peaks also on offer, in a role-playing game that mixes text with high-resolution graphics and gives you the chance to take charge of a six-strong team and its supplies.

### In play

Your first decision is which of the three Himalayan peaks you're going to attempt, and then you choose whether to mount your expedition in the spring or autumn, with spring being the easier time of the year.

You're told that you only have three or four weeks to complete the climb before the weather's too bad to continue.

Your next task is to split the 1800 lbs of supplies between food, tents, oxygen, ropes and ladders, though the program offers you a suggested split which you can opt for with the 'A' key. Each climber can carry up to 60 lbs at a time, and the supplies must be ferried slowly upwards to the various base

camps that are established on the mountains.

There is an information service provided, and this can be examined at any time, enabling you to check the weather forecast, the strength of your climbers, what each man is carrying, and the positions of both the climbers and the assorted supplies.

The graphics, which are not wonderful but amusing enough, come into effect when the climbers tramp between camps, and during these you must watch for bad weather, crevasses, avalanches or falls, some of which you can attempt to rectify by furious pressing of various keys.

My own climbers had an unfortunate habit of dying on me before I even approached the final climb to the peak, but after several attempts I was eventually able to mount a successful expedition on Nuptse, the smallest of the mountains.

At the end of this you're given a percentage rating to show how well (or otherwise) you've coped with that particular climb at that particular season.

### Verdict

I'm not sure that this is the type of game you would want to carry on playing forever, but it is well done and it gave me several entertaining hours while I tried it out. Not as exhausting as the real thing, and rather cheaper than a trip to Tibet.

Mike Gerrard

### RATING

**Lasting appeal**



**Playability**



**Use of machine**



**Overall value**



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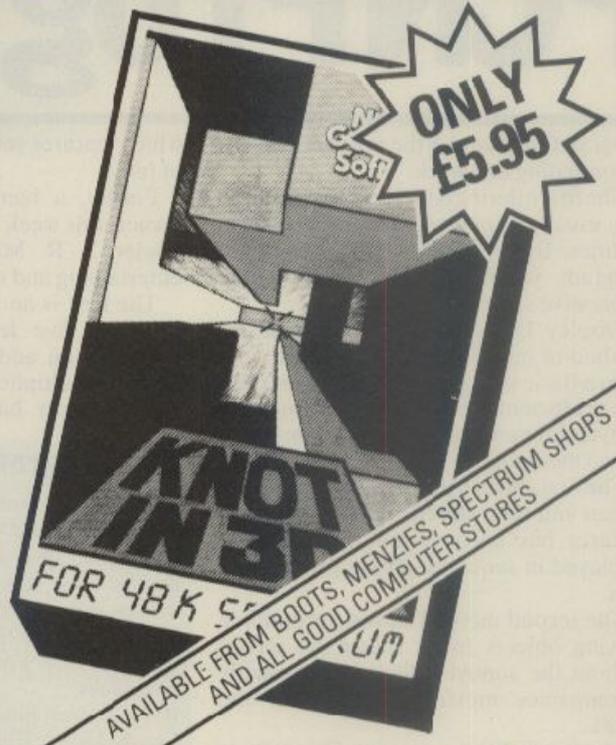
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For 48K Spectrum and compatible with Kempston, AGF and Mikrogen joysticks.

'It is the most astounding thing you'll see for a long time' — Popular Computing Weekly.

**New  
Generation  
Software**



New Generation Software FREEPOST Bath BA2 4TD

# PCN ProgramCards

ProgramCards covers the range of personal computing this week.

The first offering is for the ZX81, a micro not usually renowned for its graphical abilities. But with M J Plummer's utility program, you'll be able to create some impressive screen displays.

Display Dump is a very fast transfer method of moving the display file to and from a Basic string. The speed comes from a very efficient machine code routine only 34 bytes long and the whole program works in two methods.

The first allows a picture to be created on screen and then stored. When a series of pictures has been stored, they can be displayed in sequence giving true animation.

The second method allows for multiple moving objects to be shown on screen without the annoying flicker that usually accompanies moving graphics on the ZX81.

Moving slightly up-market, Oric owners will find the first of four cards for an enjoyable pastime called Meteor Shower

which features sound, graphics and a hall of fame.

Finally, a bonus for Commodore 64 owners this week with two programs from reader J R Mace. Both will prove entertaining and useful.

The first is an arithmetic test program featuring five levels of difficulty with questions on addition, subtraction, division and multiplication. The second might come in very handy for newcomers to

computing, or old hands finding that typing in listings can be a chore. This is a keyboard test and a few sessions with it should speed up your typing fingers considerably.

## A RUN for our money

We pay for published programs on a sliding scale which take into account length, complexity, originality and the programming skill demonstrated in the program. So why not give us a RUN for our money?

As well as the cash, you receive the satisfaction of seeing your byline on the ProgramCard — which will, of course, be snipped out and filed away in the libraries of thousands of micro enthusiasts throughout the country.

Send your contribution, on disk or cassette, together with a plain paper listing and brief summary notes to:

The Programs Editor, *Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG.

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

## PCN Programs Editor

PCN wants you. That is, if you can understand and explain other people's programs, spot a bug in the heart of a listing, have done time on a number of micros running different dialects of Basic and have more than a passing familiarity with Pascal, Forth and other popular languages.

If this sounds like you, write with CV to: Cyndy Miles, Editor, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

## PCN ProgramCards

### Display Dump Card 1 of 2

8323DD1/2

A technique for the very rapid dumping and updating of the display file to and from a Basic string. Uses a 34-byte machine code routine.

### ZX81 (16K) ZX Basic

Application: Graphics utility  
Author: MJ Plummer

```

1 REM 123456789 123456789 123456
789 1234
2 DIM D$(792)
3 DIM P$(6,72)
4 LET AD=16514
5 GOSUB 9000
6 FAST
10 FOR I=1 TO 6
20 CLS
30 FOR A=0 TO 2*PI STEP .1
40 PLOT I*2.5*COS A+32,I*2.5*SIN
A+21
50 NEXT A
60 RAND USR 16531
70 LET D$(765+I*2 TO)="BIG BANG"

```

```

80 LET P$(I)=D$
90 NEXT I
95 SLOW
98 FOR J=1 TO 10
100 FOR I=1 TO 6
110 LET D$=P$(I)
120 RAND USR 16514
130 NEXT I
140 FOR I=6 TO 1 STEP -1
150 LET D$=P$(I)
160 RAND USR 16514
170 NEXT I
180 NEXT J
200 CLEAR
210 DIM D$(792)

```

1	REM for machine code (34 characters)	60	Allows printing on bottom lines
2	Display buffer <i>must</i> be first variable	70	Dump picture into D\$
3	Store for various pictures	80	Store picture in P\$array
4	Point to REM for machine code	98	Repeat demo 10 times
5	Load machine code	110	Recall selected picture to buffer
30-50	Draw circles with increasing diameter	120	Move buffer to display file
		140-180	Repeat loop with contracting circles

# EARLY LEARNING SPECTRUM SOFTWARE

4-8  
year  
olds

Announcing an exciting range of early learning software for the Sinclair ZX Spectrum - 16K and 48K. Specially produced for 4 to 8 year olds by the largest educational

**publisher in the UK.**

Colourful, action-packed games to teach those vital word and number skills.

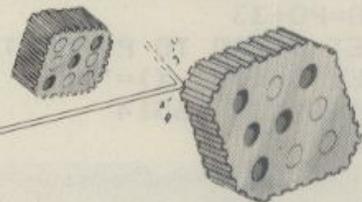


**Countabout** - Teaches simple addition and subtraction. Help our micro chimp reach the bananas at the top of the tree by getting the sums right.

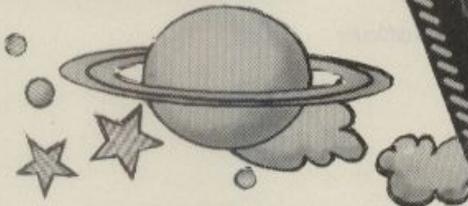


**a,b,c... Lift-off!** - an exciting introduction to the alphabet that teaches the letters in correct order. Page through the alphabet picture book and help load our spaceship to Venus by matching pictures and words. See lift-off with full sound effects!

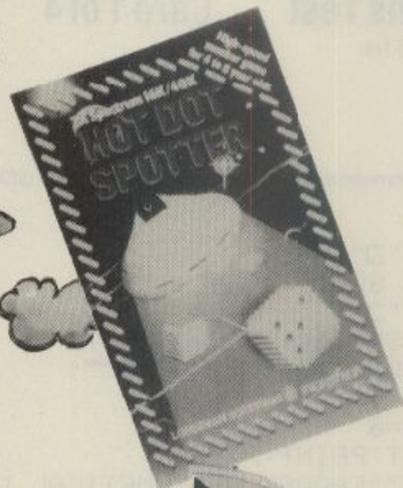
All programs come with 6 pages of Parents' Notes providing complete instructions for use.



**Hot Dot Spotter** - a game of speed and skill that teaches number recognition. Count the dots (between 1 and 9) and watch the laser beam bounce the ball up the screen. Build up speed and score lots of points.



Longman Software can be used by children on their own or with initial help from mum or dad.



Available from W. H. Smith, Boots, Menzies, Martins and other leading chain stores, as well as from computer shops and through Websters, Software Directory.

Trade availability through Prism Microproducts. In case of difficulty, or for a full colour brochure, write to: Division GS3 (Software) Longman Group Ltd, Longman House, Burnt Mill, Harlow Essex CM20 2JE

**LONGMAN SOFTWARE**

**Longman Software -  
The Key to Early Learning**

£7.95  
each  
inc. VAT

# PCN Program Cards

## Display Dump Card 2 of 2

8323DD2/2

```

220 DIM B$(792)
230 DIM T$(3,5)
240 CLS
250 RAND USR 16531
260 LET B$=D$
270 LET T$(1)=" <+> "
280 LET T$(2)=" <===> "
290 LET T$(3)=" T T "
300 FOR J=1 TO 10
310 FOR Z=-16 TO 10
320 LET X=Z+16
330 LET Y=INT(Z*Z*0.08)
340 LET D$=B$
350 LET PO=X+2+33*Y
360 LET D$(PO TO PO+5)=T$(1)
370 PO=PO+33
380 LET D$(PO TO PO+5)=T$(2)
390 PO=PO+33
400 LET D$(PO TO PO+5)=T$(3)
405 LET D$(792-X)="*"
410 RAND USR 16514
420 NEXT Z

430 NEXT J
8999 STOP
9000 LET A$="2A 10 40 11 06 00
19 ED 5B 0C 40 01 18 03 ED B0 C9
9010 GOSUB 9500
9020 LET A$="2A 10 40 11 06 00
19 EB 2A 0C 40 01 18 03 ED B0 C9
"
9030 GOSUB 9500
9040 RETURN
9500 PRINT AD
9510 IF A$="" THEN RETURN
9520 LET C=16*(CODE(A$)-28)
9530 LET A$=A$(2 TO)
9540 LET C=C+CODE(A$)-28
9550 LET A$=A$(3 TO)
9560 POKE AD,C
9570 LET AD=AD+1
9580 GOTO 9510
9997 CLEAR
9998 SAVE "DISPDEMO"
9999 GOTO 1
    
```

210-240	Reset all variables. Stores a blank screen		parts of spaceship on consecutive lines	9020	Machine code to move display to buffer. There must be a space at the end of A\$
270-290	Setup space ship	410	Move updated buffer to display file	9500	Show start address of routine
300	Repeat ten times			9520-9540	Convert machine code to binary
310	Parabolic equation of motion			9550	Jump past hex digit and space
340	Blank the buffer	9000	Machine to move buffer to display	9560	Load binary to address
350-405	Calculate buffer index. The 2 allows for NEWLINE. Store	9010	Load machine code	9570	Point to next address

# PCN Program Cards

## Maths Test Card 1 of 4

8323MT1/4

### Commodore 64 Commodore Basic

Application: Quiz  
Author: JR Mace

A simple arithmetic test program offering five levels of difficulty

```

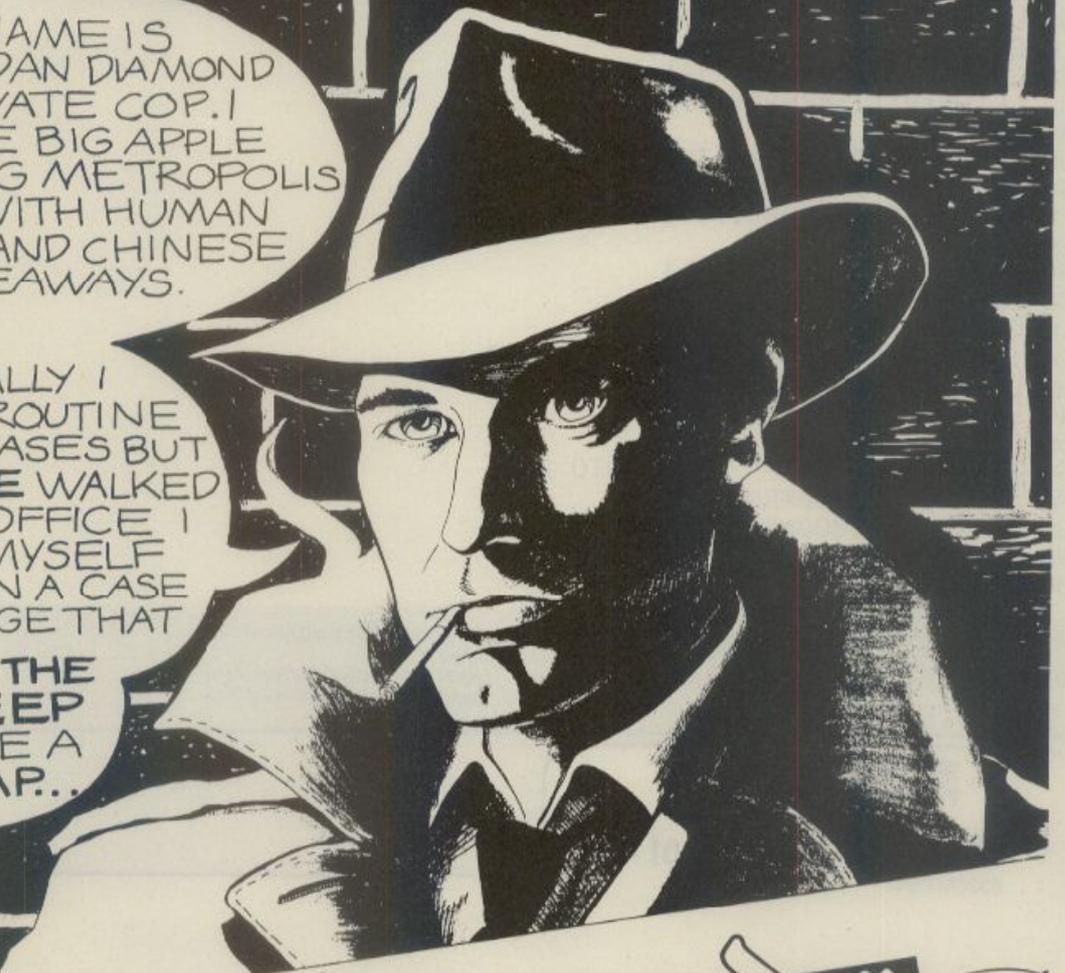
1 PRINT "J"
2 GOSUB 800
4 PRINT "J"
5 PRINT SPC(14) "MATHS TEST"
6 PRINT SPC(14) "-----"
10 LET J=1
20 LET K=0
25 PRINT:PRINT:PRINT
30 PRINT "CHOOSE ARITHMETICAL OPERATION" SPC(25) "(+,-,*,/)"
40 INPUT A$
45 PRINT:PRINT:PRINT
50 PRINT "SELECT YOUR SKILL LEVEL" SPC(25) "(1,2,3,4,5)":INPUT A
51 PRINT "J"
90 IFA=1 THEN GOTO 150
100 IFA=2 THEN GOTO 180
110 IF A=3 THEN GOTO 250
120 IFA=4 THEN GOTO 320
130 IF A=5 THEN GOTO 360
135 IFA>5 GOTO 50
140 END
    
```

1-6	Print instructions and title	25-50	Routine to select function
10	Register for total answered	90-140	Call appropriate test routine
20	Register for total correct		

MY NAME IS **DIAMOND**, DAN DIAMOND I'M A PRIVATE COP. I WORK THE BIG APPLE A SEETHING METROPOLIS FILLED WITH HUMAN MISERY AND CHINESE TAKEAWAYS.

NORMALLY I ONLY DO ROUTINE DIVORCE CASES BUT WHEN **SHE** WALKED INTO MY OFFICE I FOUND MYSELF INVOLVED IN A CASE SO STRANGE THAT

IT MADE THE **BIG SLEEP** LOOK LIKE A CAT NAP...



CE NEWS

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rship officer  
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ER arrives at

roids invade  
All Gridrun-  
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WINS  
ERBY

HUNT WINS GRAND PRIX

At yesterday's Monaco Grand Prix, a hunting party strayed onto the track at the climax of the race. Cars were halted as the hounds rampaged around the circuit. "The whole place has gone to the dogs," one driver was reported as saying. The race was restarted; riders and drivers battled bitterly around the course before the Hunt thundered past the finishing line to take the chequered flag (it hasn't been seen since).

PLAYER WINS OPEN

Eagle eyed spectators were privileged to see player score a birdie at fifteenh. The



**Salamander**  
SOFTWARE



17 NORFOLK ROAD - BRIGHTON - BN1 4AA - SAE FOR FULL CATALOGUE

**PRIVATE DETECTIVE  
DISAPPEARS**

Police are baffled by the disappearance of Dan Diamond. He was last seen approaching the eerie edifice known as Franklin's Tomb, but the authorities are completely unable to find any trace of him. Citizens are asked to report any information relating to his disappearance immediately. For further details, buy FRANKLINS TOMB, a new adventure game for the DRAGON 32 and

**BANANA  
DICTATOR  
SLIPS UP**

... Toró, dictator of ...

48k ORIC-1. This adventure comes complete with a 24-page illustrated Case File. £9.95 from BOOTS, SPECTRUM, COMPUTERS FOR ALL, WEBSTERS and all other purveyors of quality software. Don't miss it!

**2 DEAD IN  
EVEREST  
TRAGEDY**

The Everest Expedition ended in tragedy yesterday as Carl and Fred plunged down a crevice to a grisly death. Han the expedition lead was quoted as saying "Yuk". *Continued on page*

**COLD WAR ON  
XARG ESCALA?**

Thousands dead in Ice Storm Muduras the Mur said yesterday wished I never star

**PCNProgramCards****Maths Test Card 2 of 4**

8323MT2/4

```

150 LETX=INT(9*RND(1))+1
160 LETY=INT(9*RND(1))+1
170 GOTO390
180 IF A$="*" OR A$="/" THEN GOTO 220
190 LETX=INT(50*RND(1))+1
200 LETY=INT(50*RND(1))+1
210 GOTO390
220 LETX=INT(15*RND(1))+1
230 LETY=INT(15*RND(1))+1
240 GOTO390
250 IF A$="*"OR A$="/" THEN GOTO 290
260 LETX=INT(99*RND(1))+1
270 LETY=INT(99*RND(1))+1
280 GOTO 390
290 LETX=INT(30*RND(1))+1
300 LETY=INT(30*RND(1))+1
310 GOTO390
320 IF A$="*"OR A$="/" THEN GOTO 190
330 LETX=INT(500*RND(1))+1
340 LETY=INT(500*RND(1))+1
350 GOTO390
360 IFA$="*"OR A$="/" THEN GOTO 260
370 LETX=INT(1000*RND(1))+1
380 LETY=INT(1000*RND(1))+1
390 IF A$="-" AND X<Y THEN GOTO 90
400 IF A$="/" THEN GOTO 640

```

150-170	Skill level one and loop to arithmetic operation	250-310	Level and loop for skill level three
180-240	Level and loop for skill level two	320-350	Level and loop for skill level four
		360-400	Level and loop for skill level five

**PCNProgramCards****Maths Test Card 3 of 4**

8323MT3/4

```

410 IF J=11 THEN GOTO 710
420 LETJ=J+1
430 IFA$="+" THEN GOTO480
440 IF A$="-" THEN GOTO 580
450 IFA$ ="*" THEN GOTO 610
460 IF A$="/" THEN GOTO 670
480 LET Z=X+Y
490 PRINTX;"+";Y;"="
500 INPUT B
520 IFB=Z THEN GOTO 550
530 PRINT SPC(9) "NO,ANSWER=";Z
540 GOTO 90
550 LETK=K+1
560 PRINT SPC(9)"YES, THAT WAS CORRECT"
570 GOTO 90
580 LET Z=X-Y
590 PRINTX;"-";Y;"="
600 GOTO 500
610 LETZ=X*Y
620 PRINTX;"*";Y;"="
630 GOTO500

```

410-420	Sets max number of sums at ten	530-570	Prints if correct or prints answer. Get next sum
430-460	Loop to arithmetic operation	580-600	Prints random subtraction sum and checking routine
480-520	Prints random addition sum, loop and check answer	610-630	As above but for multiplication

# sinclair special

3



*Inside...  
The New ZX Microdrive!  
Latest software...  
Latest prices...*

# The ZX Microdrive- and more!

For some time now, the new ZX Microdrive has been the subject of much discussion. Which is only to be expected, when the object of everyone's anticipation is *completely* new to the world of computing.

Microdrive provides high-speed access to truly massive storage. With just one Microdrive, you'll have at least 85K bytes of storage, and the ability to LOAD and SAVE in mere seconds. Yet the ZX Microdrive is about the size of a Spectrum mains adaptor, and costs less than £50!

First stocks are now in. Microdrives will be released on an order of priority basis. Spectrum owners who purchased by mail order, direct from us, will be sent full details including how to order, in a series of mailings that begins with the earliest names on our list.

## And if you didn't buy by mail order?

Don't worry — for a colour brochure with full information on Microdrives, including how to order, just send us your name and address (use the coupon at the back of this issue of Sinclair Special). But remember, the sooner you send us your name, the sooner you'll get on the list.

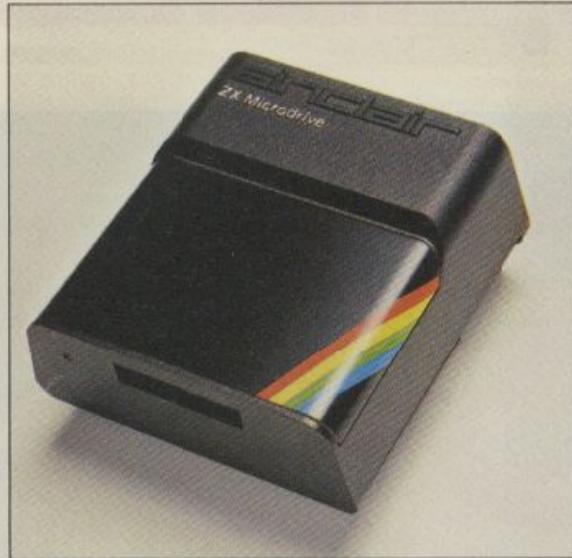
Of course, there's much more to Sinclair than Microdrives, as you'll see on these pages. The latest releases of Spectrum and ZX81 software have been amongst the most successful ever. Prices of most established Sinclair products are at their lowest ever. To buy what you want, just use the Order Form.

Until the next issue of Sinclair Special, and more good news ...

Nigel Searle, Managing Director,  
Sinclair Research Ltd.

PS: Come and see us — and all that's new at Sinclair — at the PCW Show, Barbican Centre, from Sept 28th to Oct. 2nd. We'll be pleased to see you!

# ZX Microdrive System preview!



## ZX MICRODRIVE

At least 85K bytes storage, loads a typical 48K program in as little as 9 seconds: £49.95.



## ZX MICRODRIVE CARTRIDGE

Compact, erasable, revolutionary. Complete with its own storage sleeve. Contains up to 50 files, with a typical access time of 3.5 seconds: £4.95.



## ZX INTERFACE 1

Necessary for sending and receiving data from ZX Microdrive. Includes RS232 interface, enables creation of local area network of 2 to 64 Spectrums. Attaches to the underside of your Spectrum. Purchased with ZX Microdrive, just £29.95. As separate item, £49.95.



# Six new ways to make more of your Spectrum

Take a look at these brand-new titles. Each is an outstanding new program using the full potential of the Spectrum, for games with stunningly animated graphics, for strategies of fiendish cunning, for masterly applications of computing capability...

**Cyrus-IS-Chess** Based on the Cyrus Program, which won the 2nd European Microcomputer Chess Championship and trounced the previously unbeaten Cray Blitz machine. With 8 playing levels, cursor piece-movement, replay and 'take-back' facilities, plus two-player option. The 48K version has many additional features including an extensive library of chess openings. For 16K or 48K RAM Spectrum.

**Horace and the Spiders** Make your way with Horace to the House of Spiders, armed only with a limited supply of anti-spider-bite serum. In the house, destroy the webs before the spiders can repair them. Then destroy the spiders, before they destroy Horace! Undoubtedly the creepiest Horace program ever produced! For 16K or 48K RAM Spectrum.

**Computer Scrabble** The famous board game, on-screen - with the whole board on view! A huge vocabulary of over 11,000 words. Full-size letter tiles, four skill levels - the highest of which is virtually unbeatable. For 1 to 4 players. For 48K RAM Spectrum.  
(SCRABBLE trademark and copyright licensed by Scrabble Schutzrechte und Handels GmbH - a J.W. Spear and Sons PLC subsidiary.)

**Backgammon** A fast, exciting program, with traditional board display, rolling dice and doubling cube. Four skill levels. For experts - or beginners. (Rules are included - it's the quickest way to learn the game.) For 16K or 48K RAM Spectrum.

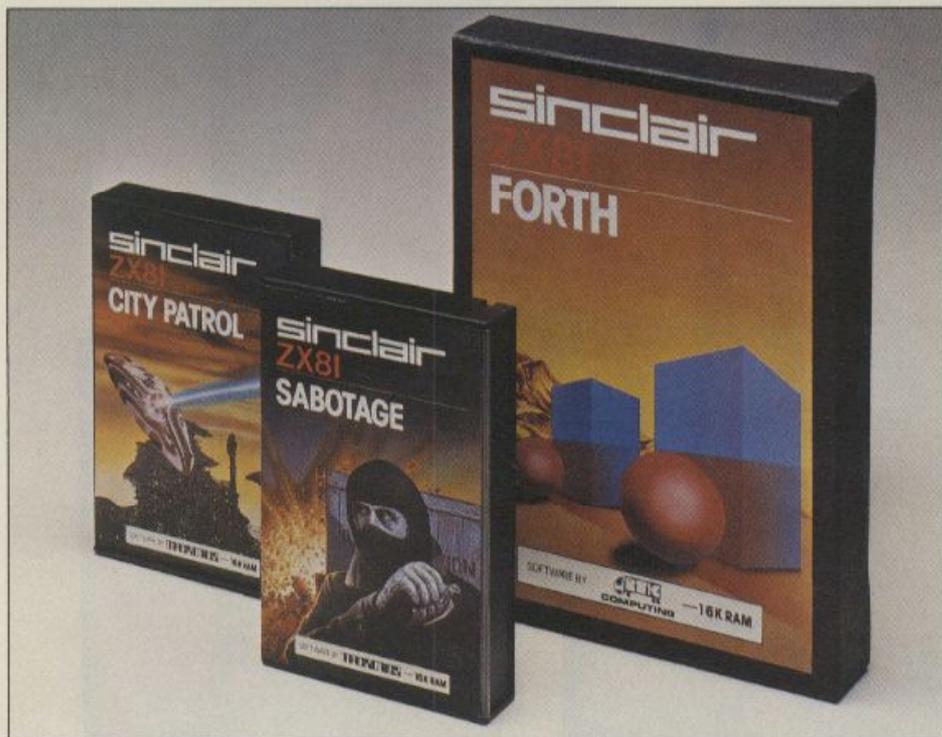
**FORTH** Learn a new programming language, as simple as BASIC, but with the speed of machine code. Complete with Editor and User manual. For 48K RAM Spectrum.

**Small Business Accounts** Speeds and simplifies accounting work, produces Balance Sheets, Profit and Loss information and VAT returns. Complete with User manual. For 48K RAM Spectrum.

**Overleaf - your Sinclair order form.**

# Latest ZX81 software

# Prices round-up



These three new cassettes offer two totally different challenges to you and your ZX81. The games — like so many ZX81 games today — really do use the ZX81's capability. The FORTH program is a fascinating extension of your own computer understanding.

**Sabotage.** Defender or attacker? The choice is yours in this exciting game.

Be the guard and defend the ammunition in the compound — or be the Saboteur and attack it!

Written by Macronics for a ZX81 with 16K RAM. Cassette price: £4.95.

**City Patrol.** You are the Commander of a

laser-firing ship. Your task is to intercept and destroy alien suicide ships descending on your city.

Written by Macronics for a ZX81 with 16K RAM. Cassette price: £4.95.

**FORTH.** Discover a new programming language which combines the simplicity of BASIC with the speed of machine code. FORTH's compiled code occupies less than a quarter of the equivalent BASIC program and runs ten times as fast. Free User-Manual and Editor Manual with each cassette.

Written by Artic for a ZX81 with 16K RAM. Cassette price: £14.95.

ZX Spectrum 48K  
now just **£129.95.**

ZX Spectrum 16K  
now just **£99.95.**

ZX81 now just **£39.95.**

16K RAM Pack for ZX81  
**£29.95.**

ZX Printer now just **£39.95.**

1.2A ZX Mains Adaptor  
**£7.95.**

Printer Paper (5 rolls)  
**£11.95.**

## How to order

Simply fill in the relevant section(s) on the order-form below. Note that there is no postage or packing payable on Section B. Please allow 28 days for delivery. Orders may be sent FREEPOST (no stamp required). Credit-card holders may order by phone, calling 01-200 0200, 24 hours a day. 14-day money-back option.

# sinclair

Sinclair Research Ltd,  
Stanhope Road, Camberley,  
Surrey GU15 3 PS.  
Telephone: (0276) 685311.

To: Sinclair Research Ltd, FREEPOST, Camberley, Surrey, GU15 3BR.

### Section A: hardware purchase

Qty	Item	Code	Item Price £	Total £
	ZX Spectrum — 48K	3000	129.95	
	ZX Spectrum — 16K	3002	99.95	
	ZX 81 (including 1.2A Mains Adaptor)	1003	39.95	
	16K RAM pack for ZX81	1010	29.95	
	ZX Printer	1014	39.95	
	1.2A Mains Adaptor, for use with ZX81 computer/ZX Printer combination (only required if you have an early ZX81 with 0.7A Adaptor)	1002	7.95	
	Printer paper (pack of 5 rolls)	1008	11.95	
	Postage and packing: orders under £90	0028	2.95	
	orders over £90	0029	4.95	
			<b>TOTAL £</b>	

\*Delete/complete as applicable.

\*I enclose a cheque/postal order made payable to Sinclair Research Ltd for £

Signature

Address

### Section B: software purchase

Qty	Cassette	Code	Item Price £	Total £
<b>FOR SPECTRUM</b>				
	G22/S.Backgammon	4021	5.95	
	G23/S.Cyrus-IS-Chess	4023	9.95	
	G24/S.Horace & the Spiders	4022	5.95	
	G25/S.Scrabble	4024	15.95	
	L1 /S:FORTH	4400	14.95	
	B6 /S.Small Business Accounts	4605	12.95	
<b>FOR ZX81</b>				
	G25: Sabotage	2124	4.95	
	G24: City Patrol	2123	4.95	
	L1: FORTH	2400	14.95	
			<b>TOTAL £</b>	

\*Please charge to my Access/Barclaycard/Trustcard account no:

Mr/Mrs/Miss

PCN 908  
(Please print)

## ZX Microdrive information request

Please send me a colour brochure with full specifications of ZX Microdrive/Interface 1, and add my name to the Microdrive Mailing List! (tick here)  (Remember to include your name and address on the form above).

Maths Test Card 4 of 4

8323MT4/4

```

640 LETZ=INT(X/Y)
650 IFNOT X=Z*Y THEN GOTO 90
660 GOTO 410
670 LETL=INT(11*RND(1))+1
680 LETX=(A*L)*X
685 LETZ=X/Y
690 PRINTX;" / ";Y;" ="
700 GOTO 500
710 PRINT:PRINT: PRINTSPC(20) "SCORE= ";K :PRINT:PRINT
711 IFK<5THENPRINTSPC(24)"*** POOR ***"
712 IFK<8ANDK>5THENPRINTSPC(24)"*** FAIR ***"
713 IFK<10ANDK>7THENPRINTSPC(24)"*** GOOD ***"
714 IFK=10THENPRINTSPC(24)"*** EXCELLENT ***"
715 V=54296:W=54276:A=54277:H=54273:L=54272
716 FORX=15 TO 0STEP-1:POKEY,X:POKEW,129:POKEA,15:POKEH,40:POKEL,200:NEXT
717 POKEW,0:POKEA,0
720 PRINT:PRINT" DO YOU WANT ANOTHER MATHS TEST ? PRESS ANY KEY TO START"
721 INPUTP$
725 GETP$:IFP$=""GOTO4
800 PRINT"XXXXXXXX"
805 PRINT" THERE ARE 4 ARITHMETICAL OPERATIONS EACH WITH 5 LEVELS OF DIFFICULTY."
810 PRINT:PRINT" THIS PROGRAMME WILL RANDOMISE 10 SUMS AT YOUR SELECTED LEVEL."
815 PRINT:PRINT" CAN YOU GET A MAXIMUM 10 SUMS CORRECT ?"
820 PRINT"XXXXXXXX REMEMBER- PRESS RETURN AFTER EACH ANSWER"
825 FORX=1TO10000:NEXTX
830 RETURN
    
```

640-700	As above but for division	720-725	Loop for another test
710	Print final score	800-820	Instructions
711-714	Grade final score	825-830	Time loop
715-717	Initialise noise registers and playtone		

Key Test Card 1 of 2

8323KT1/2

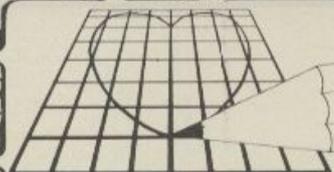
Commodore 64  
Commodore Basic

Application: Utility/game  
Author: J R Mace

```

1 PRINT" "
5 GOSUB310
7 POKE53280,6:POKE53281,3
8 PRINT" "
10 PRINT SPC(7) "**** KEYBOARD SKILLS ****"
11 PRINTSPC(7)"-----"
12 PRINT:PRINT:PRINT
15 PRINT" TYPE THE KEY .....MAX SCORE 25"
16 FOR T=1 TO 5000
17 NEXT T
20 LETH=0
30 FORT=1TO25
40 FORI=1TO INT(RND(1)*300+1000)
50 NEXTI
60 LETA=INT(RND(1)*40)
70 LETD=INT(RND(1)*25)
80 LETP$=CHR$(INT(RND(1)*26)+65)
90 PRINT" "
100 FORJ=0TOD
110 PRINT
120 NEXTJ
130 PRINTTAB(A);" "P$
140 FORI=1TO500
150 GETR$
    
```

1-7	Initialise	60-70	Select random co-ordinates for screen
8-17	Title and time loop	80	Select random letter
20	Set score to zero	90-140	Print letter
30	Set maximum number of letters for test	150	Scan keyboard
40-50	Time loop for screen display		



# Xaversine Software Store

Coombeend, Radstock, Bath, Avon. BA3 3AN  
Telephone: (0761) 36509

## SPECTRUM

<b>SEVERN SOFTWARE</b>	
MORIA .....	4.95
GRAIL .....	4.95
<b>NEW GENERATION SOFTWARE</b>	
*KNOT IN 3D .....	5.95
ESCAPE .....	4.95
<b>RICHARD SHEPHERD</b>	
PRIVATEER .....	5.50
SUPERSPY .....	6.50
<b>IMAGINE</b>	
JUMPING JACK .....	5.50
AH DIDDUMS .....	5.50
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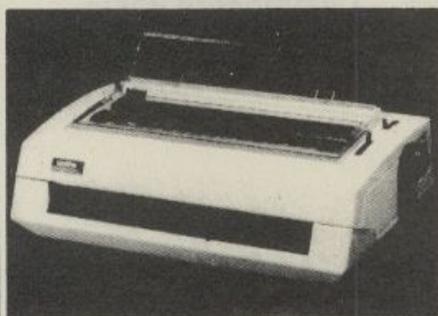


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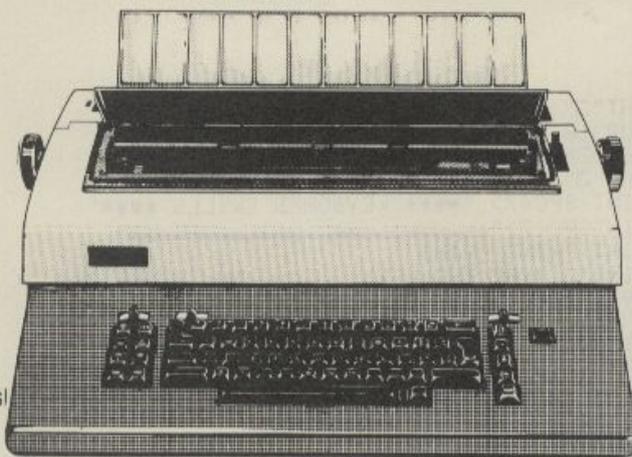
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**Key Test Card 2 of 2**

8323KT2/2

```

160 IFR$=P$THEN GOTO 210
170 IFR$<>" THEN GOTO190
180 NEXT I
190 PRINT" MISSED":GOSUB500
200 GOTO230
210 PRINT" A HIT":GOSUB400
220 LETH=H+1
230 NEXT T
240 PRINT"J"
250 PRINT"XXXXXXXXXXXXXXXXXXYOU SCORED ";H;"/25"
260 PRINT"XXXXDO YOU WANT ANOTHER GO? Y / N"
270 INPUTB$
280 IFB$="Y"GOTO8
290 IFB$="N" GOTO300
300 END
310 PRINT"XXXXTHE PROGRAMME DISPLAYS A RANDOM ALPHABET LETTER ONTO THE SCREEN."
320 PRINT"XXXTYPE THE LETTER BEFORE IT DISAPPEARS,BUT DO NOT TYPE AFTER THE TONE."
"
330 PRINT"XXONLY ONE ATTEMPT AT EACH LETTER."
340 PRINT"XXXXXXXXXXXXXXXX**PRESS ANY KEY TO CONTINUE**"
350 GETK$:IFK$=""GOTO350
360 RETURN
400 S=54272:POKES+24,15:POKES+5,100:POKES+1,25:POKES+0,177:POKES+4,17
410 FORP=1TO100:NEXT
420 POKES+4,0:POKES+5,0:POKES+6,0
430 RETURN
500 S=54272:POKES+24,15:POKES+5,100:POKES+1,12:POKES+0,216:POKES+4,17
510 FORP=1TO100:NEXT
520 POKES+4,0:POKES+5,0:POKES+6,0
530 RETURN
    
```

160	Check for correct answer	240-250	Print final score
170	Check for wrong answer	260-300	Check for another test
180-230	Print result and loop to next letter	310-360 360-530	Instructions Sound effects

**Meteor Shower Card 1 of 4**

8323MS1/4

An arcade-type game. Note the use of the shorthand form of Print @,!

```

1 REM
2 REM METEOR SHOWER
7 TEXT:POKE623,27:CLS:POKE46419,62
8 HS=100:HS$="ORIC"
9 PRINTCHR$(6):PRINTCHR$(17):PRINTCHR$(20)
10 GOSUB700
20 S=0:F=500:LI=3
25 X=20
26 POKE623,25
30 F=500
35 PRINTCHR$(30);CHR$(11)
40 !RND(1)*38,2;"*":IFRND(1)>.7THEN!RND(1)*38,2;"*"
45 IFRND(1)>.87THEN!RND(1)*36+2,2;CHR$(129)"&"CHR$(128)
50 V=DEEK(783)
55 IFV=48255ANDX<37THENX=X+1
60 IFV=48351ANDX>1THENX=X-1
70 !X,24;"@"
72 F=F-5
80 C=SCRN(X+1,23)
85 IFC=42THENEXPLODE:GOTO200
90 IFC=38THENZAP:F=F+70:S=S+15;!X,23;" "
95 !7,26;CHR$(147);"SCORE:"S,"FUEL:"F" *CHR$(150)
96 IFF<1THENPING:WAIT50:PING:GOTO200
    
```

**Oric 1 (48K)  
Oric Basic**

Application:Game  
Authors:Craig Bartlett  
& Robert Davies

7	Set screen attributes	55-70	Check movement of player
8	Set high score value and name		left/right
10	Call sub-routine for set up and instructions	72 80	Decrease fuel Scroll down one line
20-30	Initialise variables	90	If fuel cell hit, update score and fuel
35-50	Print random meteors on screen with occasional fuel units	95 96	Display score and fuel Run out of fuel, lose a life

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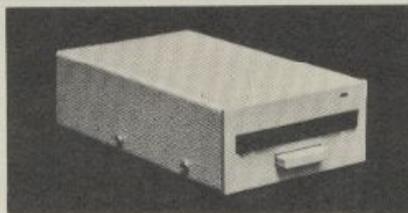
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**'Kids and the Vic' by Edward H Carlson, published by Prentice Hall at £16.95 (spiral-bound paperback, 210 pages).**

You don't read this, you use it. And if you can you'll do so along with somebody else who is either as knowledgeable as yourself or more so.

Each of the 33 lessons is preceded by notes for the instructor and is rounded off with one or two assignments. So this straight-from-scratch manual, aimed at 10 to 14-year-olds, has that familiar feel of the school textbook.

It explains what you are aiming for in each lesson, tells you how to do it on your Vic, and then gives you a test that makes sure you've got it sussed. The idea is not to get ahead of yourself and get confused, but you may take best advantage of this if there are at least two of you to check the work in progress.

As any textbook should, it has answers to assignments at the back, plus glossaries, including one of error messages.

It encourages thoroughness in learning and approach and does get the reader onto more than a competent knowledge of core commands in Basic. But at times the attitude towards the young reader is patronising, and towards adults, pompous.

The drawings are not illustrations as such, since they shed little light on the text and in some cases could be a hindrance. *Kids and the Vic* is written for 10 to 14 year olds — why? Is there a *Grown-ups and the Vic*?

**'The World Connection' by Timothy Orr Knight, published in the UK by Prentice/Hall for Howard W Sams at £8.45 (paperback, 140 pages).**

*The World Connection* is about computer-to-computer communication via the telephone network. It's half overview and half handbook of equipment

and services for the budding micro communicator.

In the US there have been a number of installations such as the Source for several years now. The Source started life in 1979 providing a diverse range of services, including financial information, news, mailbox facilities, computer shopping and travel information. It has since been joined by others, including Compuserve.

Compuserve offers a service called CB which, as the name suggests, enables users to download jargon call-signs to each other (*calling Rubber Ducky* — you know the sort of thing).

This, then, is the background to this book. It's been written by a 16-year-old who has spent the past three years manipulating his way through information services. He knows his stuff. The book is well-written and has a wealth of background information.

It is, however, decorated with rather facetious cartoons which are only occasionally helpful, and black and white photographs which have lost much in the translation to the printed page.

The product section is obviously based on American products — modems, software, terminals and so. It tells you what to look for, what you need and where you can get it in the US. He even includes prices (a risky decision in such a fast-moving field, price wise) and this reduces its attraction to UK enthusiasts. Its mediocre standard of production makes its £8.45 price-tag seem a bit high.

Even so, with services like Micronet beginning to make themselves felt here *The World Connection* should be good reading for the communications enthusiast. **IS**



**'Get More from the Vic 20' by Owen Bishop, published by Granada at £5.95 (paperback, 185 pages).**

One of the problems for the Vic owner with some computing experience and looking for a good guide to extend that knowledge is that while there are many books for the beginner, there are few that go beyond the basics.

Unfortunately Owen Bishop has produced a volume that repeats a great deal of information previously published. While there are tidbits of advanced programming technique, he has aimed his book largely at the beginner to computing, or the new Vic owner.

It covers all the usual aspects of learning Basic, starting off with background information on computing, using the language gradually working up to the intricacies of PEEK and POKE.

There are illustrative programs along the way and these are accompanied by explanations.

The other chapters follow a similar format of introducing new commands with short programs and explanations, finishing with a summary of what has been learned.

Sound and graphics are covered in depth. If you're interested in the latter, user-defined graphics are explained better here than in the user's manual and programmer's reference guides for the Vic, while the sound section includes an excellent program that will allow you to experiment with different sound effects without having to enter line after line of POKES.

In addition, there are useful advanced sections on sorting, including sample string and variable sorts, and a commendable chapter on better program-

ming techniques. The latter covers documenting programs, and programming for helpful input and output.

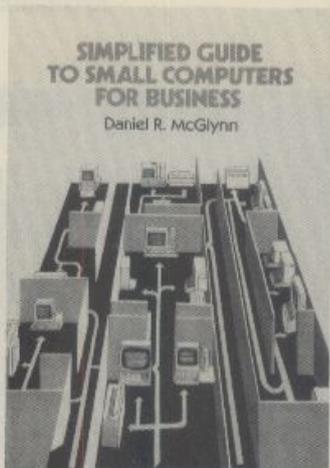
To round off the book there are a dozen helpful tables, although most of the material is already available in the user's manual. **TJ**

**'Simplified Guide to Small Computers for Business' by Daniel R McGlynn. Published by John Wiley & Sons at £14.20 (paperback, 240 pages).**

This is yet another effort to introduce businessmen to the ins and outs of small business computers. Explaining the benefits and pitfalls of microcomputing to a novice is no easy task because all the terms of reference must be defined. But it is usually a proud boast in books of this kind that the technicalities of the subject are avoided. In practice, however, these two objectives are rather difficult to reconcile — you have to explain the technicalities to a certain extent if everything is to fall into place for the reader.

For the businessman or professional who wants to acquaint himself with microcomputers, the only advice is to read and ask questions. One book and one approach won't be enough, but my feeling is that this book could provide one of the building blocks.

It's an American book (prices are in dollars) but the background material is obviously applicable to UK readers. It explains the hardware, peripherals, software, applications and how to go about buying and installing. It's all very thorough and useful stuff, though obviously some of the more specific detail — leasing, vendors and so on — will have to be mentally adapted by the reader to the UK market. **IS**



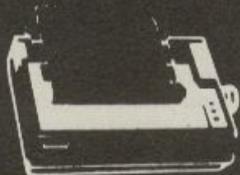
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Clubnet keeps you in touch with enthusiasts throughout the UK. It is divided into clubs and user groups. We publish a list of these groups on alternate weeks. This week clubs are listed alphabetically by county and town. Each week we focus on an individual club or group with a fly-on-the-wall report. If your

association has something special on the agenda or if you've just started a new one, contact us at Clubnet, Personal Computer News, VNU, 62 Oxford Street, London W1A 2HG.

The clubs listing is based on that of the Association of Computer Clubs.

# Commodore in common

Many are faced with problems when they first get a computer. 'Our group is there to help', said Brian Grainger, one of the organisers of the North Hertfordshire Independent Commodore Products User Group.

'I must emphasise that we are in no way sponsored — we are independent as our name suggests. However, Commodore supplies equipment for us to test and technical people to answer our queries,' added Mr Grainger.

He himself has a Commodore 64 which he is using to develop Comal. 'At the moment software for this language is available free through the user group.'

Another member, Richard Lewsey, has programmed his Commodore 4032 to connect with Prestel and also to provide hard copy of the pages via a printer. 'The software has to be modified to allow the print facility,' he said, 'but it only took a few evenings and a couple of lunchtimes to do. The character set had to be changed because of the use of graphics, so some hardware alteration was needed as well.'

Machines used range from the hobbyists' Vic 20s employing programs with titles like O'Riley's Mine, to a Commodore Pet 8032 business machine being used by antique dealer Arthur Bexford for accounts work.

The user group has been in its present



Brian Grainger at the North Herts Independent Commodore User Group meeting. He is currently using his Commodore 64 to develop Comal.

form for about two years. It is an informal one and runs no organised activities such as talks or courses. It meets on the last Wednesday of every month and attracts a healthy thirty to forty enthusiasts of all ages on each occasion.

Janice McKenzie

**Name** The North Hertfordshire Independent Commodore User Group **Venue** Office premises, Purwell Lane, Hitchin **Meetings** Last Wednesday in the month **Contact** Brian Grainger, 73 Minchhead Way, Stevenage, Herts.

## USER GROUPS

### Acorn

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

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

**Manchester Acorn User Group.** Meets at AMC, Crescent Road, Crussall, Manchester 8 on Tuesday except school holidays. John Ashurst, 192 Vendure Close, Failssworth, Manchester, 061-681 4962.

### Apple

**Ashtead Appler User Group.** Meets first Monday of every month. Contact M Lawrence, 15 Petters Road, Ashtead, Surrey.

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

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

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

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

Hill, Bristol BS1 6TB, 0272 213427.

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

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

**Croydon Apple User Group.** Meets at Sidda House, 350 Lower Addiscombe Road, Croydon, on second Monday of month. Paul Vernon, 60 Flawkhurst Way, West Wickham, Kent, 01-777 5478.

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

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

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

### Atari

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

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

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

month.

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

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

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

**Norwich Atari User Group.** Ken Ward, Norwich 661149.

**Preston Atari Computer Enthusiasts.** Meets at KSC Club, Merrion House, Beach Grove, Ashton, Preston, or third Thursday of month at 7.30pm. Foger Taylor, 0253 738192.

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

### Atom

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

### BBC

**Laserbug** is an international user group for the BBC micro. Paul Barbour, 10 Dawley Ride, Coinbrook, Slough, Berks, 02812 30614.

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

**Bournemouth BBC User Group.** Meets at

Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth on first and fourth Wednesday of month at 7.30pm. Norman Carey, 0202 749612.

**Brent/Barnet User Group.** Meets on last Sunday of month. Joseph Fox, 4 Harman Close, London NW2 2EA.

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

**Chelmsburg.** Contact Ian on Chelmsford 69174.

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

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

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

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

**Preston area BBC Micro User Group.** Meets at Boatmans Arms, Marsh Lane,

Preston, on last Thursday of month.  
 Duncan Coulter, 8 Briar Grove, Ingol, Preston, Lancashire, 0772 725793.  
**Tyne & Wear BBC User Club.** Contact Ian Waugh, 13 Briardene Drive, Wardley, Tyne & Wear NE10 8AN.  
**Wellingborough BBC Owners User Group.** Contact R Houghton, 49 Addington Road, Irthingborough.  
**Witham (NAMEBUG) BBC Micro User Group.** Meets at comprehensive school, Witham on second Thursday each month at 7.30pm. Dave Watts 0245 358127 after 7pm.

**Comal**

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

**Commodore ICPUG**

**Basildon.** Contact Walter Green, 151 The Hatfield, Basildon, Essex.  
**Bloxham.** Contact John Temple, Kirabanda, Rose Bank, Bloxham, Oxon.  
**Barnsley.** Bob Wool, 13 Ward Green, Barnsley, South Yorkshire, 0226 85084.  
**Blackpool.** Meets at Arnold School, Blackpool, on third Thursday of month. David Jarrett, 197 Victoria Road, Thornton Cleveleys, Blackpool FY5 3ST.  
**Birmingham.** Contact J A McKain, PPI Ltd, 177 Lozells Road, Birmingham, tel: 021-544 0202.

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

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

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

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

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

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

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

**Clwyd.** John Poole, 6 Ridgway Close, Connah's Quay, Clwyd CH4 4LZ.

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

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

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

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

**Devon.** Contact Matthew Sibbe, The Lawn, Lower Woodfield Road, Torquay, Devon.

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

**Northeast-Durham.** Meets at Lawson School, Burnley on the second and third Monday every month at 7pm. Contact Jim Cocalis, 20 Worcester Road, Newton Hall Estate, Durham, 0385 67045.

**Dyfed.** Simon Kniveton, 057 086 303.

**Gosport.** Meets at Bury House, Bury Road, Gosport, Hants at 7pm. Contact Tony Cox, 10 Staplers Reach, Rowne, Gosport, Hants.

**Hainault.** Meets at Grange Remedial Centre, Woodman Path, Hainault. Carol Taylor, 101 Courtlands Avenue, Cranbrook,

Ilford, Essex.  
**Glasgow.** Dr Jim MacBrayne, 27 Daidmyre Crescent, Newton Meams, Glasgow, 041-639 5696.

**Gloucester and Bristol Area.** Meets at 23 Sheppard Leaze, Wotton-under-Edge, Gloucester, on last Friday of month.

**Hampshire.** Meets at 70 Reading Road, Farnborough, on third Wednesday of month. Ron Geere, 105 York Road, Farnborough, Hants, 0252 542921.

**Gosport.** Contact Brian Cox, Bury House, Bury Road, Gosport, Hants, Fairham 280539.

**Hants.** Contact Tony Cooke, 7 Russell Way, Petersfield, Hampshire GU31 4LD.

**Hertfordshire North.** Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. B Grainger, 73 Minehead Way, Stevenage, Herts SG1 2HS, 0438 727925.

**Kilmarnock.** Meets at Symington Primary School on first and third Thursday of month at 7pm. John Smith, 19 Brewlands Road, Symington, Kilmarnock KA1 5RW, 0563 830407.

**Liverpool.** Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Tony Bond, 27 Ince Road, Liverpool L23 4UE, 051-924 1505.

**Llandyssul.** Contact F Townsend, The Hill, Rhydowen, Llandyssul, 05455 5291.

**London.** Alan Birks, 135 Queen Alexandra Mansions, Judd Street London WC1, 01-430 8025.

**London North.** Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.

**National.** Contact Membership Secretary, 30 Brancoates Road, Newbury Park, Ilford, Essex 1G23 7EP.

**Norfolk.** Proposed new club. Contact J Blair, 7 Beach Road, Cromer, Norfolk.

**Maidstone.** Meets on the first Wednesday of every month contact Ron Moseley, Lord Romney Hill, Weaving Maidstone, Kent, 0622 37643.

**Norfolk.** Peter Petts, Bramley Hale, Wretton, King's Lynn, Norfolk PE33 9QS, 0366 500692.

**Manchester.** Contact Clive Embrey, 17 Santon Avenue, Fallow Field, Manchester.  
**Mapperley.** Meets at Arnold & Carlton College, Digby Avenue, Mapperley every Friday. Contact Mark Graves, 8 Digby Hall Drive, Gunthorpe Road, Gedling, Notts NG4 4JT.

**Northumberland.** Graham Saunders, 22 Front Street, Guide Post, Northumberland.

**Rhyl.** Contact Frank Jones, 77 Millbank Road, Rhyl, Clwyd, 0745 54820.

**Slough.** Meets at Slough College on second Thursday of month at 7.30pm. Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DF, 0734 661494.

**South-East.** Regional Group. Meets at Charles Darwin School, Jail Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Jack Cohen, 30 Brancaster Road, Newbury Park, Ilford, Essex, 01-597 1229.

**South Midlands.** Meets at 12 York Street, Stourport-on-Severn on last Thursday of month. M J Merriman at above address.

**Staffordshire.** 57 Clough Hall Road, Kids Grove, Stoke-on-Trent.

**Teddington.** G Squibb, 108 Teddington Park Road, Teddington, Middlesex, 01-977 2346.

**Watford.** Meets on second Monday of month. Stephen Rabagiaty, c/o Institute of Grocery Dist. Grange Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

**Witney.** Contact Ian Blyth, 40 Wilmot Close, Witney 5171.

**Wolverhampton.** Meets monthly. Contact J Bowman, 6 The Oval, Albrighton, Wolverhampton, West Midlands.

**Commodore Pet Blackpool.** West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on

the third Thursday of month. D Jowett, 197 Victoria Road, East Thornton, Blackpool FY5 3ST.

**Southern Users of Pets Association.** Howard Pilgrim, 42 Compton Road, Brighton BN1 5AN.

**Pet User Group Crawley.** Richard Dyer, 33 Parham Road, Ilfield, Crawley.

**Pet Users Education Group.** Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.

**UK Pet Users Club.** 360 Euston Road, London NW1 3BL.

**Pet Users Group.** Meets at Polytechnic of North London, Eden Grove, Room 320. On alternate Tuesdays, 6pm. Barry Miles 01-607 2789.

**Pet User Club.** Margaret Gulliford, 818 Leigh Road, Slough Industrial Estate, 0753 1111.

**Independent Pet Users Group.** 57 Clough Hall Road, Kielsgrove, Stoke-on-Trent, Staffordshire.

**Commodore Vic National Association of Vic-20 Owners.** Contact S Tomanarek, 20 Milner Road, Sherwood, Nottingham.

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

**Clwyd.** Contact A Stanners, 192A Willow Park, Queensferry, Deeside, Clwyd, Wales, 816603.

**London.** Vic Users Group. Meets on alternate Tuesdays at 6.30pm at Polytechnic of North London, Community Centre. Robin Bradbeer.

**London.** Contact Jim Chambers, Department of Psychology, University College London, Gower Street, London, WC1, 01-387 7050x413. Meets at University College, 26 Bedford Way, London WC1, third Tuesday of each month at 8pm.

**Norfolk.** J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

**Compucolour Caversham.** Compucolour Users Group UK. Meets at Community Centre, Caversham Park Village twice a year. Peter Hiner, 11 Pennycroft, Harpenden, Hertfordshire, 05827 64872.

**CP/M Irish CP/M Users Group.** Meets monthly in Dublin area. Doug Nottle, Gardner House, Ballsbridge, Dublin 4, Dublin 686411.

**London.** CP/M User Group (UK). Subs £7.50. Produces newsletter. Contact David Powys-Lybbe, 01-247 0691.

**UK CP/M Users Group.** Lesley Spicer, 11 Sun Street, London EC2M 2QD, 01-247 0691.

**COSMAC COSMAC Users Group.** James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 423934.

**Decus UK Decus UK & Ireland.** Contact Tracey Pardee, DECUS, PO Box 53, Reading, Berks RG2 0TW.

**Digital Equipment Digital Equipment Users Society.** The Secretary, PO Box 53, Reading, Berkshire, 0734 387725.

**Dragon Brixham Dragon Owners Club.** Meets at Computer Systems (Torbay), Pump Street, Brixham, every Saturday at 2.30pm. Ian Chipperfield, 22 Brookdale Court, Brixham, Devon, Brixham 59224.

**Epson HX20 London.** Contact Terence Ronson, 25 Sawyers Lawn, Drayton Bridge Road, Ealing, W13, 01-998 1494.

**Greater Manchester.** Contact Melvin Franklin, 40 Cowlees, Westthoughton, Bolton, Lancs.

**Luton.** The Dragon's Den. Contact D Buckingham, 83 Neville Road, Limbury, Luton, Beds.

**Education Birmingham.** Education ZX80/81 User Group. Eric Deeson, Highgate School, Balsall Heath Road, Highgate, Birmingham B12 9DS.

**Birmingham.** MUSE. National body for co-ordinating activity in schools, colleges. Lorraine Boyce MUSE Information Office, Westhill College, Weoley Park Road, Birmingham, 021-471 3723.

**Dublin.** Computer Education Society of Ireland. Dairmuir McCarthy, 7 St Kevins Park, Kilmacud, Blackrock, Co. Dublin.

**Middlesex.** Educational Users Group. Offshoot of National TRS-80 Users Group. Dave Fletcher, Head Teacher, Beaconsfield First and Middle School, Beaconsfield Road, Southall Middlesex.

**Worcestershire.** Mini and Microcomputer Users in Education. National organisation. R Trigger, 48 Chadcote Way, Catshill, Bromsgrove, Worcestershire B61 0JT.

**Forth Forth Users Group.** David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW, 0202 764724.

**Forth Interest Group UK.** Meets at Room 408, South Bank Polytechnic on the first Thursday of month. K Goldie-Morrison, 15 St Albans Mansion, Kensington Court Place, London W8 5QH, 01-937 3231.

**Forum 80 Users Group.** Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

**FX-500P FX-500-P Users Association.** Max Francis, 38 Grymsdyke Great Missenden, Buckinghamshire HP16 0LP.

**Genealogists Society of Genealogists Computer Interest Group.** Anthony Camp, 01-373 7054.

**Genie Colour Genie User Group.** Details of meetings/membership from Pat Doohan, secretary, Nottingham (0602) 278791.

**Intel MDS Intel MDS Users Group.** Lewis Hard, c/o S.P.A.C.E., The Old Coach House, Court Row, Upton-on-Severn, Worcester WR8 0NS.

**Ithaca Audio S100 Ithaca Audio S100 Users Group.** Dave Weaver, 41 Dore Avenue, North Hykeham, Lincoln LN6 8LN.

**Jupiter Ace Jupiter Ace Users Group.** John Noyce, Remsoff, 18 George Street, Brighton BN2 1RH.

**Lynx National Independent User-Group.** Subs £9. Contact Robert Poat, 53 Kingswood Avenue, Sanderstead, South Croydon CR2 9DQ.

**Mattel Mattel Intellivision TV Game Group.** Warrington 62215 after 4pm.

**Medical Durham.** Primary Health Care Group. Dr Alastair Malcolm, British Computer Society, Cheveley Park Medical Centre, Belmont, Durham, 0385 64282.

**London.** Medical Micro Users Group. Medicom, 1-2 Hanover Street, London W1.

**Middlesex.** TRS-80 Medical and Laboratory Users. Dr Robinson, The Residency, Northwick Park Hospital, Harrow, Middlesex.

**Micronet**

**Micronet** Independent User Group. Contact George Foot, Prestel Mailbox No. 892852867.

**Nascom**

**Berkshire.** Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday fortnightly, 8pm. Mike Rothery, 37 Eaton Wick Road, Eton Wick, Windsor, Berkshire, Windsor 56106.

**Birmingham Nascom User Group.** Meets at Davenport's Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Martin Sidebotham, 021-744 3093.

**International Nascom Microcomputer Club.** 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.

**Merseyside Nascom User Group.** Meets at Mona Hotel, St James Street, Liverpool, on the first Wednesday of month, 7.30pm. Mr T Searle, 051-526 5256.

**Newbrain**

**Wakefield** Independent Newbrain User Group. Anthony Hodge, 15 St John's Court, Wakefield WF1 2RY.

**Welwyn.** Contact Angela Wakiss, 4 Ninnings Lane, Rabley Heath, Welwyn, Herts AL6 9TD.

**Ohio**

**Ohio Scientific User Group.** Tom Graves, 19a West End, Street, Somerset, 0458 45359.

**Oric**

**Oric Owners Group.** Paul Kaufman, 3 Club Mews, Ely, Cambridgeshire.  
**Kent.** Contact Roger Pyatt, 23 Arundel Drive, Orpington, Kent with SAE or call 66 20281.

**Osborne**

**British Osborne Owners Group.** J Anglesea, Flat 19, Rowan House, Mitton Road, Handsworth, Birmingham B20 2JR.

**OSI**

**OSI UK User Group.** Richard Elen, 12 Bennerley Road, London SW11 6DS.

**Pascal**

**Pascal User Group.** Nick Hughes, PO Box 52, Pinner, Middlesex HA5 3FE.

**PDP**

**Buckinghamshire.** PDP8 User Group. Nigel Dunn, 21 Campion Road, Widmer End, High Wycombe, Buckinghamshire, 0494 714483.

**Hertfordshire.** PDP11 User Group. Pete Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 5QB, 0707 52091.

**Pilot**

**UK Pilot User Group.** Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral. Merseyside L63 3AQ.

**Prestel**

**ACC National Prestel Committee.** Administrates Club Spot 800 (hobbyists on Prestel). Rupert Steele, St John's College, Oxford OX1 3JP.

**Research Machines**

**Birmingham.** Research Machines 380Z Peter Smith, Birmingham Educational Computing Centre, Camp Hill Teachers Centre, Stratford Road, Birmingham B11 1AR.

**Leamington Spa.** West Midlands RML User Group. Spencer Instone, c/o 59 Avenue Road, Leamington Spa.

**Newcastle.** NERML 380Z User Group. Meets monthly at Micro-Electronics Education Centre of the Polytechnic Coach Lane Campus. Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic, 0632 326002.

**Oxford.** Research Machines National User Group. RML, Mill Street, Osney, Oxford OX2 0BW, 0865 249866.

**Oxford.** Research Machines Ltd National User Group. M D Fisher PO Box 75, Oxford OX4 1EY.

**RML**

**West Midlands RML User Group.** Contact 0926 38751.

**Sharp MZ80**

**Aberdeen.** International Sharp Users Group. Graham Knight, c/o Knights Computers, 108 Rossermount Place, Aberdeen, 0224 630526.

**Essex.** Sharp MZ80K User Group. Joe Street, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE.

**Leeds.** Sharp PC1211 Users Club. Jonathan Dakeyne, 281 Lidgett Lane, Leeds LS17 3AQ.

**Somerset.** Sharp MZ80 Users Club. Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

**Sinclair**

**Brighton.** ZX Users Group. J Ireland-Hill Jnr, 145 Godwin Road, Hove, Brighton.  
**Aylesbury.** Sinclair ZX Computer Club. Ken Knight, 0296 5181.

**Colchester** Sinclair User Group. Meets fortnightly. Richard Lawn, 102 Pettygate Road, Colchester, Essex.

**Cardiff.** ZX Club. Meets on last Sunday of month, 2pm. Mike Hayes, 54 Oakley Place, Grangetown, Cardiff, 0222 371732.

**Doncaster & District** Sinclair User Group meets at St Andrews Hall, Morley Road, Wheatley, Doncaster, every Wednesday except the first in each month. Contact John Woods, Doncaster 29357.

**Edinburgh.** ZX. Meets at Claremont Hotel, Claremont Crescent, Edinburgh, on second and fourth Wednesdays every month, 7.30pm. John Palmer, 56 Meadowfield Drive, Edinburgh, 031-661 3183.

**Essex.** Contact M Burnet, 24 Inverness Drive, Hainault, Ilford, Essex.

**Glasgow.** ZX80/81 User Group. Ian Watt, 10 Greenwood Road, Clarkston, Glasgow, 041-638 1241.

**Liverpool.** ZX Computer Club. Meets at ZX Computer Centre, 17 Sweeting Street, Liverpool, on Wednesday, 6.30pm. Keith Archer, 051-260 4950.

**London.** National ZX User Club. Tim Hartnell, Interface, 44-48 Earls Court, London W8.

**London.** Sinclair User Group. Meets at Polytechnic of North London, Room 2-5 Tower Block. Monday, 6.30pm. Irving Brand, Polytechnic of North London, Holloway Road, London.

**Manchester** Sinclair Computer Users Club. Proposed new club. Contact Colin Rushby, 061-881 6592.

**ZX Spectrum Club.** D Beattie, 63 Kingsley Crescent, Sawley, Long Eaton, Nottingham NG10 3DA.

**Scunthorpe.** Grange Farm ZX Computer Club. Scunthorpe. South Humberside. Meets first and third Tuesday of month. Contact Sheila & Fred Wilkinson, 0724 842970.

**Staffordshire.** ZX80 National Software Association, 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.

**Suffolk.** ZX Amateur Radio User Group. Paul Newsman, 3 Red House Lane, Leiston, Suffolk, SAE essential. No telephone inquiries.

**Surrey.** Guildford ZX80/81 Users Group. Meets Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0483 62035.

**Surrey.** ZX80/81 User Club. David Bigden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5UQ.

**West Sussex.** Hassocks ZX Micro User Club. Paul King, 25 Fir Tree Way, Hassocks, West Sussex.

**Sirius**

**Sirius User Group.** Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-71 Gordon Street, Luton, 0582 412215.

**68XX**

**68XX Special Interest Group.** Tim Turner, 63 Millais Road, London E11 4HB, 01-558 3681.

**6809 User Group**

**6809 User Group.** Produce bi-monthly newsletter. Contact Mr Gibbons, Clarence Lodge, Hurdon Road, Launceston, Cornwall PL15 9DB.

**Software**

**London.** Software Group. Meets at Polytechnic of North London, Room 2-3 Tower block Thursday, 6pm. Mike Duck at Polytechnic of North London, Holloway, London N7.

**Oxford.** Program of the Month Club. Mr Durrant, 55 St Thomas Street, Oxford OX1 1JG, 0855 250333.

**Sorcerer**

**Liverpool European Sorcerer Club.** Monthly meetings. Colin Marle, 32 Watchyard Avenue, Formby, near Liverpool L37 3JU, 07048 72137.

**Surrey.** Exidy Sorcerer User Group. Andy Marshall, 44 Arthurs Bridge Road, Woking, Surrey GU21 4NT.

**Spreadsheet**

**International Electronic Spreadsheet Users Group.** UK Alpha House, 7th Floor, Rowlandsway, Manchester M22 5RG.

**Tangerine**

**Avon.** Tangerine Users Group. Bob Green, 1 Marlborough Drive, Worle, Avon, 0934 21315.

**Bristol.** Tangerine Homebrew. A Coales, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.

**Texas Instruments**

**Brighton.** Contact Clive & Audrey Scally, 40 Barrhill, Patcham, Brighton, Sussex.

**Ireland.** Proposed new club. Contact Mrs Ann Flynn, 53 Georgian Close, North Road, Drogheda, Co. Louth, Eire.

**Leeds.** T199/4A User Group. Meets at 30 Gipton Wood Road, Leeds 8, Mondays 7pm. I Youlden, 0532 401408.

**Manchester.** T1 User Group. T Grimshaw, 21 Allingham Street, Longsight, Manchester.

**Manchester.** T199 Club. Contact Tim Grimshaw, 21 Allingham Street, Longsight, Manchester, 061 0374.

**Manchester.** T19900 User Group. Chris Cadogan, Department of Computer Science, University of Manchester M13 9PL.

**Triton**

**Triton User Group.** Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

**TRS-80**

**Birmingham.** National TRS-80 User Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2260.

**Chelmsford.** TRS-80 User Group. Michael Dean, 22 Roughtons, Galleywood, Chelmsford, Essex.

**Durham.** North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month, 7pm. J Dunn, 8 Etrich Terrace, North Gateshead, County Durham.

**Edinburgh.** Scottish TRS-80 and Genie User Group. Meets at Mansion House Hotel, Milton Road, second Thursdays of month. Dick Mackie, 72 Morningside Drive, Edinburgh EH9 1DX, 031-447 6651.

**Herts.** Contact Reg Smith, 24 Sempill Road, Hemel Hempstead, Herts, 0442 60085.

**Hull & District** TRS-80/Beeb Users Group. Meets second Tuesday of month and Thursday 16 days later at Psychology Dpt,

Hull University. Contact J Lawrence, 2a Hall Road, Hull HU6 8SA.

**Isle of Wight.** TRS-80 User Club. Meets at London Hotel, Ryde on last Friday of month, 7.30pm. Sean Coulson, 0903 614589.

**Kent.** TRS-80 User Group. Alan Reid, 22 Wooddeys Road, Rainham, Kent, 0634 367012.

**Greater Manchester.** Northwest TRS-80 User Group. Meets at Barton Aero Club, Barton Aerodrome, Irlam, near Manchester on last Wednesday of month, 8pm. Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancs.

**Lancs.** TRS-80 Colour Computer Group. Subs: £3. Contact Ian Wild, 53 Darnton Road, Ashton-U-Lyne, Lancs OL6 6RL.

**Liverpool.** UK DOSPLUS User Group. Peter Toothill, 101 Swanside Road, Liverpool L14 7NL, 051-220 9733.

**Liverpool.** Merseyside TRS -80/Video Genie User Group. Meets second Thursday of month, 7.15pm. Peter Toothill, 101 Swanside Road, Liverpool L14 7NL, 051-220 9733.

**London, SW.** TRS-80 User Group. Ron Everitt on 01-394 2123

**Merseyside.** TRS-80 User Group. N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside.

**Milton Keynes.** National TRS-80 and Genie User Group. Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes.

**Nottingham.** TRS-80 Genie Users Group. Meets at Wilford Moderns Rugby Club House on first and third Wednesday every month at 7.30pm. Contact Geoffrey Hillier, 5a Gregory Street, Lenton, Nottingham NG7 2LR, Nottingham 783938.

**London.** TRS-80 Genie Group. Meets at Central Common Room, The Residency, Northwick Park Hospital on first Sunday of month. Dr Nick Robinson, Central Room, The Residency, Northwick Park Hospital.

**Northants.** TRS-80 User Group. Meets at Welwyn Park Community Centre on alternate Thursdays at 7pm. Neil Griffiths, 0858 65718.

**Nottingham.** East Midlands TRS-80 User Group. Mike Costello, 15 Langbank Avenue, Rise Park, Nottingham NG5 5BU, 0602 751753.

**West Herts** 80 User Group. Meets at St Stephen's Parish Centre, Station Road, Bricket Wood, St Albans, Herts. Tuesday evenings fortnightly. Contact Reg Smith, 24 Sempill Road, Hemel Hempstead.

**Colour Genie**

**International Colour Genie Users Group.** Write with SAE to The Secretary, NCGUG, 46 Highbury Avenue, Bulwell, Nottingham, 0602 278791.

**National Colour Genie User Group.** Marc Leduc, 46 Highbury Avenue, Nottinghamshire NG6 9DB.

**UCSD**

**Hants.** UCSD System Users Society. John Ash, Dicoll Data Systems Ltd, Bond Close, Kingsland Estate Basingstoke, Hants RG2 0QB.

**Oxford.** UCSD Pascal UK Users Group. Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

**CUA**

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

**6502**

**Bedfordshire.** 6502 User Group. Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG, 0582 26927.

**Hants.** 6502 User Group (Southern Region). Steve Cole, 70 Sydney Road, Gosport, Hants.

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# DATABASES

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

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

Companies wanting to add their best-selling packages to Databases, or wanting to update information already here, should send details to: Databases, Personal

Computer News, VNU, 62 Oxford Street, London W1A 2HG.

**APPLICATION** Each software package is listed alphabetically by its application. **PRICE** includes VAT.

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

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

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

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

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

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

**COMMENTS** — any other points of interest.

## SOFTWARE

### BUSINESS

Accounting	Price inc vat	Machine/Operating System	Other versions	Title	Media Supplied			Hardware Required			Publisher/Distributor	Comments
					Cassette	Disk	Cartridge	Mail order avail	Disk drive	Joystick		
	£3,320	Apple II	●	Financial Controller	●	●	●	●	●	●	S1	Also on Apple IIE. 8 modules (£402.50 each) — sales, purchase, invoicing, etc.
	£339.25	Apple II	●	General Ledger	●	●	●	●	●	●	C1	Supports 1000 accounts and 100 analyses. Self-balancing, full audit trail.
	£552	Apple II	●	Informex Integrated Accounting System	●	●	●	●	●	●	I1	Contains nominal, sales, purchase ledger + VAT. Can handle 800 accounts.
	£1,147.70	Apple II	●	Informex Integrated Business System	●	●	●	●	●	●	I1	Contains accounting system modules plus invoicing + stock.
	£172.50	Apple II	●	Micro-General Ledger	●	●	●	●	●	●	G1	Also on ITT 3030 and Basis 108. Goes through profit/loss + balance sheets.
	£402.50	Apple II	●	Nominal Ledger	●	●	●	●	●	●	J1	Also on Sirius, IBM PC, Apple III + UCSD. Requires 132 column printer.
	£431.25	Apple II	●	Payroll	●	●	●	●	●	●	C1	Supports weekly, monthly, + per monthly. Up to 350 employees per disk.
	£402.50	Apple II	●	Purchase Accounting & Cost Control	●	●	●	●	●	●	J1	Requires 132 column printer, also Sirius, IBM PC, Apple III, UCSD.
	£402.50	Apple II	●	Sales Accounting System	●	●	●	●	●	●	J1	Also on Sirius, IBM PC, UCSD. Provides conventional ledger.
	£339.25	Apple II	●	Sales Ledger	●	●	●	●	●	●	C1	Supports 700 + accounts. Direct posting, credit control & 100 analyses, self balancing
	£1,725	Commodore 8000	●	Auditman	●	●	●	●	●	●	C4	Also on Commodore 4000. Complete accounts production system.
	£2,052.75	Commodore 8000	●	Data-Lex	●	●	●	●	●	●	D1	Designed for solicitors + others who need to separate office & client's accounts.
	£2,070	Commodore 8000	●	Microfacts	●	●	●	●	●	●	M1	Also on Commodore 700, Victor & Sirius. £345 per module. Integrated accounting.
	£454.25	Commodore 8000	●	Micro-simplex	●	●	●	●	●	●	M2	Also on Commodore 64 (£172.50). Needs printer. For smaller retail business.
	£2,300	Commodore 4000	●	Pegasus Integrated Accounting Suite	●	●	●	●	●	●	P3	Also on MS-DOS (128K). Contains six stand alone modules.
	£1,437.50	CP/M	●	Aurora Integrated Accounting Package	●	●	●	●	●	●	G1	Five stand alone modules. Sales, invoicing, purchase, nominal and stock.
	£2,760	CP/M	●	Boss	●	●	●	●	●	●	F1	Seven stand alone modules. Can link to Autowriter & Autoindex.
	£805	CP/M	●	Cash Book Accounting	●	●	●	●	●	●	S2	Also on CP/M-86 and MS-DOS. Amalgamation of sales, purchase & nominal ledger.
	£2,300.00	CP/M	●	dBFlex	●	●	●	●	●	●	E1	Open item six module accounting system, (£575.00) per module. Works with dBase II.
	£402.50	CP/M	●	Exact	●	●	●	●	●	●	S3	Also on MS-DOS. Includes six modules — invoicing, ledgers, stock and payroll.
	£3,059	CP/M	●	ISBS-W	●	●	●	●	●	●	G2	Comes on hard disk. Contains ISBS functions plus job costing and purchase control.
	£1,840	CP/M	●	ISBS-S	●	●	●	●	●	●	G2	Also on CP/M-86. Contains seven modules.
	£2,271.25	CP/M	●	Multi-Index	●	●	●	●	●	●	B1	Also on MP/M & PC-DOS. Contains five modules. Sales, nominal, VAT & stock control
	£569.25	CP/M	●	Nucleus	●	●	●	●	●	●	C2	Also on MS-DOS. Disk drives of 280K needed. A program generating system.
	£1,431.75	CP/M	●	Padmede Business Control System	●	●	●	●	●	●	P2	Five modules (£286.35 per module). Nominal, sales, purchase, invoicing, stock.
	£1,380	CP/M	●	Motor Dealers Part Distribution	●	●	●	●	●	●	S2	Also on CP/M 86 & MS-DOS. Combines stock control, order processing ledgers.
	£1,868.75	CP/M	●	Peachtree Basic Accounting Systems	●	●	●	●	●	●	P1	Also on MP/M & MZ-DOS. Available on hard disk (£2,156.25). 5 stand alone modules.
	£287.50	CP/M	●	Sales Ledger	●	●	●	●	●	●	S2	Also on CP/M 86 and MS-DOS. Flexible ledger system.

	Price Inc VAT	Machine/Operating System	Other versions	Title	Memory required	Media Supplied	Mail order avail.	Hardware Required	Distributor	Comments
						Cassette Disk Cartridge		Disk drive Joystick		
										Also on Sharp MZ80B & M200K. VAT record system.
Agriculture	£45.42	Sharp MZ80A	●	Easy VAT	48K	●	●	●	K1	Available on floppy or hard disk. Files individual cow production, with herd summaries
	£1,150	Apple II	●	Dairy Package	64K	●	●	●	F2	Available on floppy or hard disk. Accounts for farm/estate management.
	£1,725	Apple II	●	Financial Management Program	64K	●	●	●	F2	Available on floppy or hard disk. Monitors individual field activities, budgets, etc.
	£1,150	Apple II	●	Management Program	64K	●	●	●	F2	Field data costings
	£35	Newbran	●	Agricultural Field costings	32K	●	●	●	P8	
Bill of Materials	£378.75	CPM	●	Facbill	60K	●	●	●	T2	Also on MS-DOS & TRS-DOS. Will give parts explosion at 10 levels, 99 items level.
Bookkeeper	£56.35	Apple II	●	Apple Bookkeeper	48K	●	●	●	H1	Needs printer. Keeps petty cash, sales, other business books, sorts, analysis etc.
Building Specifications	£460	Commodore 8000	●	National Building Specifications	32K	●	●	●	C3	Also on Commodore 4000. Used with Wordcraft. Produces building specifications.
Business Graphics	£471.50	16-bit machines	●	Micro-Graphpower	128	●	●	●	I2	Needs plotter. Business graphics which plots business data.
	£120.75	Apple III	●	Business Graphics	48K	●	●	●	P6	Also on Apple II (£125.35). Supports range of plotters & pie-charts, etc.
	£149.50	IBM PC	●	Graph Magic	96K	●	●	●	F1	Also on Apple II, III. Displays files graphically. Reviewed 18.3.83.
Business Management	£569.25	Commodore 8000	●	The Administrator	96K	●	●	●	S11	Complete applications generator. No programming required.
	£4,140	CPM	●	Peachtree Business Management System	48K	●	●	●	P1	Also on MP/M & Unix. Available on hard disk (£6,900). Six modules for single user.
	£684.25	IBM PC	●	Tomorrow's Office	128K	●	●	●	S11	Also on Sirius, Victor & MSDOS. Complete applications generator.
Cash Book	£224.25	Commodore 4000	●	Electronic Cash Book	32K	●	●	●	D1	Also on Commodore 8000 & 64. For small business or add-on products.
Cataloguing	£46.00	Apple II	●	Floppy Cat	48K	●	●	●	P4	Enables user to catalogue & store all information.
	£35.00	Newbran	●	Dentists NHS Schedule	32K	●	●	●	P8	Aid for checking statutory returns.
Estate Agents	£1,092.50	Apple II	●	Commercial Agency Systems	48K	●	●	●	C7	Matches in both directions with lists, labels and letters.
	£977.50	Apple II	●	Cyberpress Clients Recoverable Costs	48K	●	●	●	C7	Also on Rair Black Box. Designed to keep record of incurred expenditures.
	£1,121.00	Apple II	●	Cyberpress Residential System	48K	●	●	●	C7	Also on Rair Black Box. An applicant & property matching system.
	£419.75	CPM	●	Estate Agents Match & Mail	56K	●	●	●	S4	Matches & prints out potential customers for every property.
Financial Accounting	£569.25	Commodore 8000	●	Finplan	32K	●	●	●	M3	Also on Commodore 3, 4, & 8000, Vic-20 and Commodore 64. £46.57 on floppy disk
	£287.50	Commodore 8096	●	The Financial Director	96K	●	●	●	D1	Designed to handle large & complex planning & financial applications.
Financial Planning	£44.85	Apple II	●	Basiccalc	16K	●	●	●	S5	Also on Hytec & ICL_PC. 96K version available. Helps decide on financial strategy.
	£345.00	CPM	●	VisiCalc	48K	●	●	●	R1	Also on Apple III, Commodore & IBM PC, etc. The classic spreadsheet.
	£454.25	CPM	●	Bottom-Line Strategist	48K	●	●	●	P4	A business project forecasting program. Allows user to test business assumptions.
	£281.75	CPM	●	Fastplan	64K	●	●	●	C5	Needs double density disks. A file based modelling system for business planners.
	£396.75	CPM	●	Master Planner	64K	●	●	●	C5	Also on MS-DOS & CP/M 86. Needs 80 column printer. Upgrade of a spreadsheet.
	£343.85	CPM	●	Micro Plan	64K	●	●	●	B1	Also on MP/M. Spreadsheet financial planner.
	£182.85	CPM	●	Minimodel Financial Modelling	48K	●	●	●	G1	Needs 80 column screen. Model consolidation facility, colour option.
	£44.85	CPM	●	Multi-Plan	48K	●	●	●	P4	Also on PC-DOS, Cromix, Fortune, Corvus & Sirius. Second generation spreadsheet
	£218.50	CPM	●	Plannercalc	64K	●	●	●	C5	Needs 80 column screen. Entry level system for spreadsheet planning.
	£172.50	CPM	●	SP2020	48K	●	●	●	G2	Forecast effects of proposed actions. Aid to management decision-making.
	£212.75	CPM	●	Supercalc	128K	●	●	●	A1	Electronic worksheet, representing a large flexible accounting work pad.
	£178.25	CPM	●	Super Calculator	48K	●	●	●	E1	Spreadsheet calculator.
	£224.25	MS-DOS	●	T-Maker	48K	●	●	●	L1	Utility for analysis & presentation of numerical data & test material.
	£339.25	Osborne	●	Pulsar Business System	128K	●	●	●	A1	Consists of eight integrated packages & provides commercial accounting functions
	£632.50	UCSD-P System	●	PADA/C	64K	●	●	●	P2	Also on CP/M. Two systems. Incomplete records accounting, time/cost recording.
	£741.75	UCSD-P System	●	Microfinesse	128K	●	●	●	P5	Financial modelling program for businessmen.
	£747.50	Apple II	●	Micro-Modeller	48K	●	●	●	I2	Also on CP/M & MS-DOS. Designed for large corporations.
Insurance Accounting	£1,380	Commodore 4000	●	Stock & Production Costing	48K	●	●	●	A2	Also on Apple IIE & III & Sirius. Available on hard disk. Needs Pascal system.
Insurance Broking	£5,462.50	ICL DRS20	●	Insurance Man	32K	●	●	●	C4	Also in Commodore 8000, provides insurance broker with sales ledger.
Integrated Software	£569.25	IBM PC	●	HS-100	64K	●	●	●	H2	Requires 16 or 27 Mb hard disk to run off. Maintains client & policy records.
	£908.50	Commodore 8000	●	Context MBA	256K	●	●	●	B2	Also on Sirius & Victor. Comprises word processor database management system.
Linear Programming	£373.75	CPM	●	Silicon Office	256K	●	●	●	F1	Integrated spreadsheet modelling, graphics, WP, database & communications.
Local Authority	£862.50	Commodore 8000	●	Optimiser	48K	●	●	●	C6	Also on Apple. Management tool for optimizing the deployment of scarce resources
	£569.25	Commodore 8000	●	P.U.S.W.A.	96K	●	●	●	M3	Also on Hytec. Monitors road holes under Public Utilities Street Work Act (1950).
	£86.25	CPM	●	Road Register	96K	●	●	●	M3	D-base network based on road names. Modules (£373.75) on street, lighting etc.
Mailing				Mailing List	56K	●	●	●	S4	Works with Super file. Prints labels, files, names & addresses. Mail merge facility.

Management	£226.16	CP/M	Scratch Pad 3.0	48K	●	●	●	●	●	M4
Mathematics	£28.75	Commodore Pet	Infinite Arithmetic	16K	●	●	●	●	●	S5
Medical	£517.50	Apple II	Medical System	48K	●	●	●	●	●	A2
Office Information	£402.50	Apple II	Prophet II	48K	●	●	●	●	●	A4
Payroll	£69.00	Apple II	Payroll	48K	●	●	●	●	●	H1
	£287.50	Apple II	Tabs Payroll	48K	●	●	●	●	●	T3
	£977.50	CP/M	Powerday	48K	●	●	●	●	●	O2
Production Control	£2.645	CP/M, MP/M	Modular Production System	48K	●	●	●	●	●	B4
Project Management	£747.00	IBM PC	Micronet	48K	●	●	●	●	●	T2
Project Planning	£1,150.00	Commodore 8000	Hornet	32K	●	●	●	●	●	C3
Property Management	£517.50	Apple II	Property Management System	48K	●	●	●	●	●	A2
Purchase Ledger	£287.50	Apple II	Tabs Purchase Ledger	48K	●	●	●	●	●	T2
	£805.00	CP/M	Powerbought	48K	●	●	●	●	●	O2
Sales Ledger	£287.50	Apple II	Tabs Sales Ledger	48K	●	●	●	●	●	T3
	£805.00	CP/M	Powersales	48K	●	●	●	●	●	O2
	£325	DEC Rainbow 100	Sales Ledger System	64K	●	●	●	●	●	D2
Sales Order Processing	£805.00	CP/M	Compact Sales Order Processing	64K	●	●	●	●	●	C2
Sales, Purchase, Nominal Ledger	£1,207.50	CP/M	Compact Sales, Purchase & Nominal Ledger	64K	●	●	●	●	●	C2
Sick Pay	£80.50	Apple II	Statutory Sick Pay (SSP)	48K	●	●	●	●	●	H1
Statistics	£172.50	Apple II	Inter-Stat	48K	●	●	●	●	●	G1
	£287.50	Commodore Pet	Statistical Package for PCs	32K	●	●	●	●	●	P7
	£9.20	Sharp MZ80A	Statistical Analysis	48K	●	●	●	●	●	K3
	£15.00	Sinclair ZX81	Critical Path Analysis (CPA)	8K	●	●	●	●	●	H1
	£977.50	UCSD-P System	Trend Plot	128K	●	●	●	●	●	P5
Stock Control	£3,289	CP/M	M-SIS	48K	●	●	●	●	●	T2
	£33.92	Newbrain	Stock Control 40/4	32K	●	●	●	●	●	E2
	£25.00	Sinclair Spectrum	Stock Control	48K	●	●	●	●	●	H1
Word Processing	£228.85	Apple II	Format 80	48K	●	●	●	●	●	P6
	£92.00	Apple II	Plewriter	48K	●	●	●	●	●	M5
	£125.35	Apple II	Wordhandler	48K	●	●	●	●	●	P4
	£152.95	Apple III	Apple Writer 2	48K	●	●	●	●	●	P6
	£28.50	BBC Model B	Alphabeta	32K	●	●	●	●	●	H3
	£10.50	BBC Model B	Word Pro	32K	●	●	●	●	●	I4
	£90.85	Commodore 64	Infomast	64K	●	●	●	●	●	R2
	£89.00	Commodore 64	Paperclip	64K	●	●	●	●	●	K5
	£488.75	Commodore 8000	Wordcraft	32K	●	●	●	●	●	D1
	£51.75	Commodore Pet	Papermate +	16K	●	●	●	●	●	S5
	£125.00	Commodore BK-20	Wordcraft 20	8K	●	●	●	●	●	A3
	£145.00	CP/M	Mail Merge	64K	●	●	●	●	●	X1
	287.50	CP/M	Peactext	48K	●	●	●	●	●	P1
	£339.00	CP/M	Perfect Writer/Speller	64K	●	●	●	●	●	S3
	£431.25	CP/M	Select Word Processing System	64K	●	●	●	●	●	B1
	£316.25	CP/M	Spellbinder	48K	●	●	●	●	●	E1
	£333.50	CP/M	WP2020	48K	●	●	●	●	●	G2
	£225.00	IBM PC	Easywriter II	54K	●	●	●	●	●	X1
	£340.40	IBM PC	VisiWord	64K	●	●	●	●	●	R6
	£339.25	MS-DOS	WordStar	128K	●	●	●	●	●	A1
	£40.25	Newbrain	Word Processor 40/12	32K	●	●	●	●	●	E2
	£325.00	OS9	Stylograph	32K	●	●	●	●	●	S6
	£45.42	Sharp MZ804	Wordpro	48K	●	●	●	●	●	K1
	£49.95	Tandy TRS 80 I	AJ Edit	32K	●	●	●	●	●	M6
Basic Course	£9.95	Texas Instruments 99.4A	Beginners Basic Tutor	16K	●	●	●	●	●	T5
	£13.95	Texas Instruments 99.4A	Teach Yourself Extended Basic	16K	●	●	●	●	●	T5

# EDUCATION

Also on CP/M 86, MS-DOS & PC-DOS. Spreadsheet using virtual memory.  
 Also on Commodore 3000, 4000 & 8000. Available on floppy disk.  
 Also on Apple IIe, III & Sirius (£573.85). On hard disk. Age/sex register.  
 Also on IBM PC & Convus Concept. Information system which acts as a noticboard.  
 Also available as cassette for Spectrum ZX81 (£25.00). Needs printer.  
 Also on CP/M & MS-DOS (64K). Up to 2000 employees, nine pay schemes.  
 Also on MP/M and MS-DOS. Integrates with Omicrons nominal ledger. Handles SSP  
 Stock control, bill of materials, etc, flexible reporting, audit trails, etc.  
 Also on ICL PC, Sirius, Superbrain, Apple II, & others. Critical path analysis.  
 Has eight optional variants (all eight £4,025). Network logic & variety of screen display  
 Also on Apple III, Apple IIe & Sirius. Prints rem. reminders, demands etc.  
 Also on CP/M & MS-DOS (64K). Open item ledger — automatic payment facility, etc  
 Also on MP/M & MS-DOS. Integrates with Omicron's Nominal Ledger System.  
 Also on CP/M & MS-DOS. Part of integrated system. 300 analysis codes.  
 Also on MP/M & MS-DOS. Multi-user system based on mainframe software.  
 Also on DEC Mate II. Invoicing & monthly statement generating system.  
 Also on CP/M 80, 86 & MS-DOS. Comes on hard disk. Control, stock, ledgers.  
 Also on CP/M 80, 86 & MS-DOS. Follows standard accounting procedures.  
 Also on Spectrum. Does all SSP calculations.  
 Also on Basis 108 & ITT 3030. Needs printer.  
 Also on Commodore 64 (two modules at £99 each) & Sirius. Fully interactive.  
 Also on MZ80K. Calculates mean & standard deviation for up to 100 items.  
 Also on Spectrum (16K). Activities entered from arrow diagr. Finds critical path.  
 Needs Hewlett Packard plotter. Developed to analyse historical time series data.  
 Stock control system for manufacturing industry.  
 Stores large quantities of stock, accumulates new stock levels & checks stock level  
 Also ZX81. Fast 'add/delete' item. Prints complete or selective lists & total value  
 Also Apple IIe. Needs 80 column card. Storage/retrieval of names & addresses.  
 Needs 80 column card. Allows entry, editing & print formatting of any text type.  
 Word processor for the non-professional — minimum Apple system.  
 Also Apple II. Has word wrap, glossary & word processing language.  
 Also available on disk. Suitable for home & business.  
 Includes DELETE, INSERT, SAVE, Date etc.  
 Combined programmable word processor, Database and calculator.  
 Also Commodore 8000. Compatible with WordPro & SpellPro.  
 Also on SuperPet, Sirius 1, IBM PC & CBM 64. Routine correspondence, mailing, etc.  
 Also on Commodore 64, 3, 4, & 8000. Available on floppy (£53.49).  
 Also Commodore 64 — needs printer. Comprehensive word processor.  
 Also on CP/M 86 and PC-DOS. An optional MERGE, PRINT, extra for Wordstar.  
 Also MP/M & MS-DOS. Needs high quality printer. Contains proof reader.  
 Also MS-DOS & Apple DOS. Contains quick reference card.  
 Also MP/M & PC/DOS. Screen-oriented system.  
 Also on Oasis. Word processing & office management system.  
 Menu-driven, machine independent. Set of key-lops provided.  
 Bold face & underscoring on screen. 80,000 word spell checker extra (£43.15).  
 Mail merge facility with Visi file.  
 Also on CP/M. Needs printer. Complete screen-based WP.  
 Automatic word wrap, editing, saving paragraphs, deleting.  
 Expandable system with modular design.  
 Also on MZ80B+K. Available on disk (£91.94). One of few WP packages for Sharp.  
 Also on Gemie I & II. Needs printer.

	Price Inc Vat	Machine/Operating System	Other versions	Title	Memory required	Media Supplied			Hardware Required			Publisher/Distributor	Comments
						Cassette	Disk	Cartridge	Mail order avail.	Disk drive	Joystick		
Business Game	£9.95	BBC Model A	●	Business Game	16K	●	●	●	●	●	W1	Also on Model B. Two games for economics, business & general studies, teaching. Also on Vic-20. Rule for ten years, overcoming obstacles, e.g. famines.	
	£5.95	BBC Model B	●	Inkosi	32K	●	●	●	●	●	C9	Also on Apple II. Practise using chemical symbols, writing & mole concept.	
Chemistry	£14.38	Research Machine 380Z	●	Symbols To Moles	31K	●	●	●	●	●	H4	A set of five programs for developing graphics and maths skills. For children 8 to 13.	
Children	£37.89	Apple II	●	Bumble Plot	48K	●	●	●	●	●	P4	Also on IBMPC. Designed for children to learn computer keyboard by building up face.	
	£29.84	Apple II	●	Face Hanger	48K	●	●	●	●	●	P4	An educational game to teach logical thinking & planning. For children aged 6-9.	
	£37.89	Apple II	●	Gertrude's Secret	40K	●	●	●	●	●	T4	Also on Atari 800. Has 16 puzzles and optional difficulty.	
	£9.80	Atari 400	●	Jigsaw Puzzles	16K	●	●	●	●	●	C9	Designed for children aged 4-6 & for dyslexic & remedial children.	
	£9.95	BBC Model B	●	Letters	32K	●	●	●	●	●	C9	Also on Vic-20+ Spectrum. Structure of metric system, for children aged 10-15.	
	£9.95	BBC Model B	●	Metrics	32K	●	●	●	●	●	C9	Also on Vic-20. Shows construction of Pascal Triangle and tests on it.	
	£5.95	BBC Model B	●	Pascal	32K	●	●	●	●	●	C9	Reading aid. Plays nursery rhymes. Available on disk.	
	£5.95	BBC Model B	●	Sequences	32K	●	●	●	●	●	H3	Version of famous game. High resolution graphics. 800 words or enter own choice.	
	£6.50	BBC Model B	●	The Early Stages	32K	●	●	●	●	●	I4	Interactive program teaching categorisation. Simplified information retrieval.	
	£4.50	BBC Model B	●	Super Hangman	32K	●	●	●	●	●	A9	Also on MZ80K. Big screen figures & humorous error messages. 5 to 11 years.	
	£9.95	BBC Model B	●	Tree of Knowledge	32K	●	●	●	●	●	S8	Also on MZ80K. Four difficulty levels. For five to 11 year olds.	
	£4.95	Sharp MZ80A	●	Giant Maths	32K	●	●	●	●	●	S8	Also on MZ80A. Plays like game but motivates children to improve their ability.	
	£4.95	Sharp MZ80A	●	Rocket	3K	●	●	●	●	●	K3	Also on MZ80K. Repair a wall using random blocks. Teaches spacing.	
	£4.95	Sharp MZ80A	●	Teach Tables	48K	●	●	●	●	●	S8	Picture for each letter of the alphabet. Option for lower case. Aimed at ages 2-6.	
	£4.20	Sharp MZ80K	●	Master Builder	48K	●	●	●	●	●	W2	For children aged 3-7. Three animated programs with full graphics.	
	£5.25	Spectrum	●	Alphabet	48K	●	●	●	●	●	K4	Also on Apple II. Provides demonstration facilities & monitors student's progress.	
	£5.25	Spectrum	●	Adding and Subtracting	16K	●	●	●	●	●	W1	Also on Commodore Pet & BBC. Simulates micro & macro economics.	
Classroom Monitor	£322.00	UCSD-P	●	Classroom Monitor	64K	●	●	●	●	●	H4	Also on Apple II. Practising French verb formation (present tense).	
Economics	£28.75	Sharp MZ80K	●	Broadwater Economics Simulation	16K	●	●	●	●	●	K1	Also on MZ80K. Automatically conjugates regular verbs into tenses.	
French	£14.38	Research Machine 380Z	●	Repondez	31K	●	●	●	●	●	A5	Also on Spectrum (£5.75). Atom (£6.90) & on disk.	
	£9.20	Sharp MZ80A	●	French Conjugate	48K	●	●	●	●	●	A9	Book available (£7.50). Designed to illustrate BBC graphics.	
	£9.20	Sharp MZ80A	●	French Verbs	48K	●	●	●	●	●	K1	Also on MZ80K. Facts & figures on English monarchs since 1066.	
Graphics	£8.00	BBC Model B	●	Painter	32K	●	●	●	●	●	S8	Also on MZ80K. A language tutor to suit all European languages.	
	£9.95	BBC Model B	●	Creative Graphics	16K	●	●	●	●	●	C9	Also on Spectrum. Includes four programs designed to teach simple geometry.	
History	£20.13	Sharp MZ80A	●	Kings & Queens	48K	●	●	●	●	●	W1	Also on Model B. Includes four programs designed for use in maths teaching.	
Languages	£7.95	Sharp MZ80A	●	Multilingual	3K	●	●	●	●	●	I3	Learning basic arithmetic. Presents simple two-line sums in random order.	
Mathematics	£8.95	BBC Model B	●	Argle	32K	●	●	●	●	●	K3	Also on MZ80K. Calculates, intercepts & plots power curve.	
	£9.95	BBC Model A	●	Algebraic Manipulations	16K	●	●	●	●	●	K3	Also on MZ80K. Teaches difficult mathematical functions.	
	£82.80	IBM PC	●	Fact Track	64K	●	●	●	●	●	K3	Also on MZ80K. Teaches division at a variety of skill levels.	
	£46.00	Sharp MZ80A	●	Curve Fitting	48K	●	●	●	●	●	K3	Also on MZ80K & B. Teaches Simpson's Rule.	
	£9.20	Sharp MZ80A	●	Directed Numbers	48K	●	●	●	●	●	H4	Graded programs. 'Good as a first introduction to numbers.' Aimed at ages 3-6.	
	£9.20	Sharp MZ80A	●	Divisor Advisor	48K	●	●	●	●	●	K3	Also on Apple II. Gives synoptic charts. Teaches elementary meteorology.	
	£27.60	Sharp MZ80A	●	Numerical Integration	48K	●	●	●	●	●	K3	Also on MZ80K. Used to teach Morse code by sight and sound. At seven levels.	
	£5.25	Spectrum	●	Counting	16K	●	●	●	●	●	H4	Also on Apple II. Illustrates formation of images by lenses using ray diagrams.	
Meteorology	£23.00	Research Machines 380Z	●	Weather	31K	●	●	●	●	●	K3	Also on MZ80K. Uses radioactive chips to teach half-life concept.	
Morse Code	£9.20	Sharp MZ80A	●	Morse Tutor	48K	●	●	●	●	●	C6	Also on MS-DOS. Typing tutor for mastering numeric pad & Qwerty keyboard.	
Physics	£14.38	Research Machines 380Z	●	Lenses	31K	●	●	●	●	●	I3	Presents exercises for learning touch typing or for improving existing skills.	
	£9.20	Sharp MZ80A	●	Casino Chips	48K	●	●	●	●	●	C8	Also runs on TRS-80, BBC, Vic-20. A 'classic text adventure'.	
Typing	£28.75	GFIM	●	Touch'n'Go	48K	●	●	●	●	●	M7	Also runs on Atom. Many rooms to explore and many hazards to overcome.	
	£31.05	IBM PC	●	Typing Tutor	64K	●	●	●	●	●	W1	'Progress through a world of fiendish puzzles.'	
<b>GAMES</b>											W1	'A classic adventure, moving through caves avoiding hazards to collect treasure.'	
Adventure	£17.95	Atari	●	Arrow of Death	16K	●	●	●	●	●	S5	Also runs on Commodore 64, Vic-20, 3000, 4000, 8000. 'Involved, textual game.'	
	£7.99	BBC Model B	●	Adventure	16K	●	●	●	●	●	S5	'Increasingly difficult textual game based on Morty Python'. Disk available (£20.12).	
	£9.95	BBC Model B	●	Philosopher's Quest	16K	●	●	●	●	●	T4	Needs joystick. 'Captain boat through treacherous rivers to rescue explorers.'	
	£9.95	BBC Model B	●	Spinix	16K	●	●	●	●	●			
	£13.80	Commodore Pet	●	Hitch-Hikers Guide to the Galaxy	32K	●	●	●	●	●			
	£18.40	Commodore Pet	●	Pythonesque	32K	●	●	●	●	●			
	£24.99	Commodore Vic-20	●	River Rescue	8K	●	●	●	●	●			

	£8.00	Dragon 32	Escape	32K	●	●	●	M12	Needs joystick. 'A 3D maze game. Get clues from 15 rooms for code of elevator'.
	£8.00	Dragon 32	Flipper	32K	●	●	●	M12	'A game of intrigue and strategy. Requires an agile mind and a lot of fore-thought'.
	£8.00	Dragon 32	Mansion Adventure	32K	●	●	●	M12	'Wind your way through an old mansion picking up clues to find the diamond'.
	£7.95	Dragon 32	Wizard War	32K	●	●	●	S7	Needs joystick. 'Magical combat for two to nine players; interactive duel'.
	£35.00	IBM PC	Adventure in Serema	64K	●	●	●	I3	Needs colour graphics adaptor and direct drive colour monitor for use.
	£6.90	Oric	Zodiac	16K	●	●	●	A5	Also runs on Atom. 'A thinking persons adventure game'.
	£12.07	Sharp MZ80A	Adventure	48K	●	●	●	K1	Also runs on Sharp MZ80B and MZ80K. 'An interactive adventure game'.
	£12.07	Sharp MZ80A	Quest	48K	●	●	●	K1	Also runs on Sharp MZ80B and MZ80K. 'Dungeons & Dragons type game'.
	£7.95	Sharp MZ80K	Nightmare Park	48K	●	●	●	S8	Also runs on MZ80A. 'Cross Nightmare Park. Every few steps play game or task'.
	£7.95	Sharp MZ80K	Tombs of Karnak	48K	●	●	●	S8	Also runs on MZ80A. 'Bargain for items required before entering tombs'.
	£5.95	Spectrum	Fausi Folly	16K	●	●	●	A6	'A 16K adventure with the same traps, magic, fiends, treasure as the 48K game'.
	£14.95	Spectrum	The Hobbit	48K	●	●	●	M8	'Object is to get treasure. For one player. Can instruct computer in ordinary English'.
	£5.00	Spectrum	Orb	16K	●	●	●	I5	Also runs on Dragon 32 and Commodore Vic-20. 'Explore labyrinth and destroy Orb'.
	£10.00	Spectrum	Pirmania	48K	●	●	●	A7	Also runs on Sinclair ZX81, BBC 13, Dragon 32. Reviewed 18.3.83.
	£5.00	Spectrum	The Quest	48K	●	●	●	I5	Also runs on Dragon 32 and Commodore Vic-20. 'Hunt down the Klingon in space'.
	£5.00	Spectrum	Star Trek	48K	●	●	●	I5	Also runs on Dragon 32 and Commodore Vic-20. 'Snake type game'.
	£5.95	Spectrum	Slippery Sid	16K	●	●	●	S9	Needs joystick and keyboard to use. 'Snake type game'.
	£10.06	Tandy TRS-80 I	Mysterious Adventurer	16K	●	●	●	M6	Also runs on Tandy TRS-80 III, Genie II, Colour Genie and BBC B.
	£4.95	Texas Instruments 99/4A	Forbidden City	16K	●	●	●	A8	'You have to explore a deserted alien city with many hazards on the way'.
	£3.95	Texas Instruments 99/4A	Sorcerer's Castle	16K	●	●	●	A8	'You are trying to rescue the captured princess'.
	£7.50	BBC Model B	Atlantis	32K	●	●	●	I4	'Guide submarine through caverns & destroy enemy'.
Arcade type	£9.99	Commodore Vic-20	Night Crawler	5K	●	●	●	R2	'A Centipede style game. Fast action, graphics and sound effects'.
	£5.50	Spectrum	Arcadia	16K	●	●	●	I6	Also on Commodore Vic-20. '12 levels of aliens attacking in different ways'.
	£5.95	Spectrum	Ground Attack	16K	●	●	●	S9	'Variable speeds allows this game to be played by everyone'.
	£3.95	Texas Instruments 99/4A	Bomber	16K	●	●	●	A8	'Must land plane & bomb skyscrapers'.
	£5.95	Spectrum	Cyber Rats	16K	●	●	●	S9	Needs joystick and keyboard to run.
Asteroids type	£4.95	Spectrum	Meleo Storm	16K	●	●	●	Q1	'Progressive difficulty, variety of controls'.
	£6.95	Spectrum	Time-Gate	48K	●	●	●	Q1	'Time travel, 3D graphics, colour, cockpit view and instrument display'.
	£4.95	ZX81	Asteroids	4K	●	●	●	S9	'Fast moving, suitable for all ages'.
Ballooning	£14.95	Atari 400	Up Up Away	16K	●	●	●	S13	Reviewed in PCW week ending April 29. Also on Atari 800. Available on disk.
Centipede type	£7.99	Dragon 32	Caterpillar	32K	●	●	●	M12	'A new generation munching game'.
Chess type	£7.99	BBC Model B	Chess	16K	●	●	●	M7	'Machine code, high resolution graphics with many play options'.
	£24.95	Dragon 32	Cyrus Chess	32K	●	●	●	D3	'Won European microcomputer chess championship 1981. Nine levels of difficulty'.
	£14.50	Sharp MZ80A	Chess	48K	●	●	●	K1	Also on Sharp MZ80B & MZ80K. '14 levels of difficulty'.
	£42.95	Texas Instruments 99/4A	Chess	16K	●	●	●	T5	'Different difficulty levels. Will solve problems. Can teach chess'.
Darts	£19.99	Atari 400	Darts	8K	●	●	●	T4	Also on 800. 'Aim & throw — the computer does the arithmetic'.
Defender type	£22.80	Atari 400/800	Submarine Commander	16K	●	●	●	T4	'One player. Nine levels of difficulty. Destroy shipping. Oxygen levels, fuel etc'.
	£9.95	BBC Model B	Planetoid	32K	●	●	●	A9	'A game of speed & skill'. Available on floppy disk (£11.50).
	£7.95	Commodore Vic-20	Alien Blitz	5K	●	●	●	A3	Needs joystick to run. 'Difficulty levels, colour & sound'.
	£9.99	Commodore Vic-20	Annihilator	3K	●	●	●	R2	'Based on Defender'.
	£6.95	Spectrum	Penetrator	48K	●	●	●	M8	'Two levels of difficulty'.
	£21.95	Ti 99/4A	Parsec	16K	●	●	●	T5	'Increasingly difficult. After four onslaughts pass through to next stage'.
Flight Simulator	£22.80	Atari 400	Jumbo Jet Pilot	16K	●	●	●	T4	Also Atari 800. 'Ten difficulty levels. View through cockpit with flight instrumentation'.
	£7.95	Spectrum	Flight Simulation	48K	●	●	●	S10	Also on ZX81 (£5.95). 'Shows control panel & control view'.
	£17.20	Tandy TRS-80	Jumbo	16K	●	●	●	M6	Also on Genie II & BBC Model B. 'Simulation of piloting a Jumbo'.
Football	£29.99	Atari 400	Kick Back	8K	●	●	●	T4	Also available on Atari 800. Needs joystick to run. 'Beat the high score'.
	£19.55	Atari 400	Soccer	8K	●	●	●	T4	Also on Atari 800. 'Aerial view of field'. Reviewed 11.3.83.
Frogger type	£5.50	Commodore Vic-20	Wacky Waiters	3.5K	●	●	●	I6	'Walter serving drinks in hotel. Has to hop from lift to lift'.
	£9.99	Commodore Vic-20	Hopper	3K	●	●	●	R2	'A version of Frogger'.
	£5.95	Spectrum	Horace Goes Ski-ing	16K	●	●	●	S10	'Sequel to Hungry Horace. He must cross busy road, fetch skis & ski down slope'.
Golf	£7.95	Dragon 32	Golf	32K	●	●	●	S7	'For one or two players. Full handicapping system'.
	£3.75	Spectrum	Golf	16K	●	●	●	R3	'For one or two players. Choice of nine or 13 holes'.
	£3.75	Sinclair ZX81	Golf	16K	●	●	●	R3	'Similar to other golf games, in black and white'.
Helicopter	£24.95	Commodore Vic-20	Chop Lifter	8K	●	●	●	A3	Also on Commodore 64. Needs joystick to run. 'Vic version of USA's best-seller'.
Jigsaw	£14.99	Atari 400	British Heritage Jigsaw Puzzle	8K	●	●	●	T4	Also on Atari 800. 'Educational game with selective difficulty'.
Kong type	£7.95	Commodore Vic-20	Bonzo	8K	●	●	●	A3	'Workman dodges robots on split-level. Sound & full graphics'.

	Price	Machine/Operating System	Other versions	Title	Memory required	Media Supplied			Hardware Required		Distributor	Comments
						Cassette	Disk	Cartridge	Mail order avail	Disk drive		
	£8.00	Dragon 32		Donkey King	32K	●			●		M12	'Popular arcade game'.
	£9.95	BBC Model B		Monsters	32K				●		W1	'The player has to run up & down ladders & along walls, pursued by monsters'.
Maze type	£24.95	Dragon 32		Ghox: Attack	N/A				●		D3	'The aim is to avoid & eliminate ghosts which roam a maze'.
	£8.00	Dragon 32		Jerusalem Adventure	32K	●			●		M12	'Aim is to get treasure & avoid being eaten'.
	£5.95	Spectrum		Hungry Horace	16K	●			●		S10	'Animated maze game with sound & full graphics'.
	£4.95	Spectrum	●	Mined-Out	48K	●			●		Q1	Reviewed in PCN week ending April 22. Also on Dragon 32.
	£5.95	Spectrum		Muncher	16K	●			●		S9	'A monster munching marathon'.
	£8.00	Spectrum		Spectres	16K	●			●		B3	'An increasingly difficult maze game. The object is to fit light bulbs & destroy ghosts'.
	£10.00	Sinclair ZX81		Mazogs	16K	●			●		B3	'Three levels. Find & collect treasure in a maze & escape'.
Pacman Type	£9.95	BBC Model B		Shapper	16K	●			●		W1	'Based on Pacman'.
	£9.50	Colour Genie		Chcmper	16K	●			●		K2	'Based on Pacman'.
	£8.00	Dragon 32		Scaifman	32K	●			●		M12	'Based on Pacman'.
	£4.95	Spectrum		Gnasher	16K	●			●		R3	Joystick optional. 'Based on Pacman using Beano characters'.
Pool	£8.50	BBC Model B		Billiards	32K	●			●		H3	Available on disk. 'A game for all ages'.
Racing	£7.95	Dragon 32		Grand Prix	32K	●			●		S7	'For one or two players, features eight Grand Prix tracks & 10 levels of difficulty'.
	£21.95	T1 99/4A		Car Wars	16K	●			●		T5	'Race through maze whilst avoiding computer controlled car'.
Science Fiction	£19.95	Apple II		Lunar Leeper	16K	●			●		S12	Reviewed in PCN week ending April 22.
Shooting	£29.95	Atari 400	●	Claim Jumper	16K	●			●		C8	Also on Atari 800. 'A two player shoot-out over gold nuggets & cash'.
	£29.95	Atari 400		Shamus	16K	●			●		C8	'Player has to move through lair avoiding hazards'.
	£5.95	BBC Model B	●	Invisible Man	32K	●			●		C9	Also on Commodore Vic-20. 'Aim is to shoot man who keeps disappearing'.
	£9.99	Commodore Vic-20		Quacker	32K	●			●		R2	'Aim is to shoot down ducks & rabbits on shooting gallery'.
	£19.95	Commodore Vic-20	●	Spiders of Mars	N/A				●		A3	'Popular game for the Vic-20'. Also on Commodore 64.
Space	£5.95	Spectrum		High Noon	16K	●			●		A6	'Clean up chaos & disorder in town'.
	£9.95	Dragon 32		Dragon Trek	32K	●			●		S7	'A version of Star Trek with ten levels of difficulty'.
	£5.95	Spectrum		Android Run	16K	●			●		A6	'Control android to shoot walls, kill mutants & reach central complex'.
	£5.95	Spectrum		Cosmos	16K	●			●		A6	'Defend space convoy from aliens & asteroids'.
	£5.50	Spectrum		Schizoids	16K	●			●		I6	'Space bull-dozer nudges shapes into black hole'.
	£5.95	Spectrum		Starship Enterprise	48K	●			●		S9	'Based on the classic Star Trek. Includes arcade action'.
Space Invader type	£4.95	Spectrum	●	Star Trek Swoop	48K	●			●		R3	Also on ZX81 (£3.95). 'One player, sound & full colour graphics strategy game'.
	£7.99	BBC Model B		Model E Invaders	32K	●			●		M7	'Written in machine code with full colour & high resolution graphics'.
	£7.50	BBC Model B		Orbis	3K	●			●		I4	'A Space Invaders game with high resolution & colour graphics'.
	£9.99	Commodore Vic-20		Cosmic Invaders	16K	●			●		R2	'Based on Missile Command. Fast & colour'.
	£6.50	Spectrum		Destroyer	16K	●			●		D3	Joystick optional. '15 levels of difficulty'.
	£4.95	Spectrum		Intruders	16K	●			●		I5	'Destroy the varying alien invaders'.
	£5.00	Spectrum		Spectral Invaders	16K	●			●		Q1	'Includes mutants, random saucers, bonus base & 14 different aliens. Sound & colour'.
	£21.95	T1 99/4A		Invaders	16K	●			●		B3	'For one or two players. Increasingly difficult, high resolution colour graphics'.
Sport	£3.95	Sinclair ZX81		Invaders	4K	●			●		T5	'Based on Space Invaders. After every two screens a new character appears'.
Strategy	£33.35	IBM PC		Decathlon	64K	●			●		S9	'Based on Space Invaders'.
Variety	£7.95	Dragon 32		Wizard War	32K	●			●		I3	Needs colour graphics adaptor & direct drive colour monitor. 'For up to six players'.
	£5.95	Commodore Vic-20		Innovation Cassette	48K	●			●		S7	Reviewed in PCN week ending April 8.
	£5.95	Spectrum		Picnic Paranoia	16K	●			●		M8	'One tape containing seven games'.
Various	£29.95	Atari 400	●	Breakout	16K	●			●		M8	'One tape with 10 games. Defender to geometry, beginners to advanced'.
	£4.95	Colour Genie		Amok	5K	●			●		C8	Also on Atari 800. Needs joystick to run. 'A graphics game based on picnic site'.
	£5.95	Commodore Vic-20		Black Squid	3K	●			●		A3	'Different levels of skill'.
	£24.95	Commodore Vic-20		Mutant Herd	8K	●			●		C8	'Chased by robots in enclosed room. Different levels of difficulty'.
	£5.90	Dragon 32		Dead Wood	32K	●			●		T4	'Get men to shore in shortest time'.
	£3.95	Texas Instruments 99/4A		Chalice of Kalmar	16K	●			●		A5	'Protect a powerhouse from mutants. Enter their burrows & destroy eggs'.
				Clubman	48K	●			●		A8	'A game for all the family'.
				Sharp MZ80A	48K	●			●		S8	'The aim is to retrieve a chalice from a temple'.

	£575.00	Apple II	●		48K	●	●	●	T3	Also on MS-DOS (64K). Maintains members handicaps including 1983 regulations
	£28.18	Epson HX20	●	Tabs Golf Package	48K	●	●	●	K1	Also on Newbrain and Sharp. A punters aid to betting.
	£28.69	Sharp MZ80A	●	Horse Race Forecast	48K	●	●	●	K1	Also on MZ80K. Simulations of navigating a yacht on the English Channel.
Diary	£9.95	BBC Model A	●	Navex	16K	●	●	●	W1	Also on BBC Model B. Consists of address book & diary planner (plus instructions).
Home budget	£19.99	Atari 400	●	Desk Diary	16K	●	●	●	T4	Also on Atari 800. Needs Atari Basic cartridge. Aids money management.
	£19.95	Epson HX20	●	Home Financial Management	16K	●	●	●	K1	Also on Sharp, MZ80 & Osborne. Keeps records of home finances with graphics.
	£14.95	Sharp MZ80A	●	Epson HX20	16K	●	●	●	S8	Designed for balancing home debits & credits.
Music composition	£24.99	Commodore Vic-20	●	Sam Analysis	3K	●	●	●	T4	Aids to aspiring composer. Also for entertainment and education.
	£5.75	Spectrum	●	Vic Music Composer	9K	●	●	●	B5	Teaches musical notation, aids composition.
Stock control	£10.00	Spectrum	●	Music Maker	48K	●	●	●	A5	Stock control program useful in home, e.g. record collection, etc.
Various	£4.95	Spectrum	●	Spec File	48K	●	●	●	S14	900-page colour teletext simulation with 24-hour clock etc.
	£12.95	Commodore Vic-20	●	ZX Text	16K	●	●	●	A3	Comprises VicPro (word processor) & VicData (A database program).
				Homs Office	5K	●	●	●		
<b>UTILITIES</b>										
Basic	£201.25	CP/M	●	Basic 80	48K	●	●	●	L1	Industry standard Basic.
	£235.70	CP/M	●	Basic Compiler	48K	●	●	●	L1	Companion to Basic 80. Allows programs to run faster.
	£80.50	CP/M	●	BDS C Compiler	48K	●	●	●	L1	A subset of 'C' that enables its implementation. Includes symbolic debuggers.
	£121.90	CP/M	●	C Basic	64K	●	●	●	X1	Commercial Basic. Also on CP/M86 (£265.65).
Basic Upgrader	£213	Any Z80	●	X-Basic	48K	●	●	●	X1	Built-in matrix functions. Supports MP/M record locking. Graphics option.
Card Index System	74.75	Commodore 64	●	VicTree	64K	●	●	●	S5	Also Commodore Vic-20. Also on floppy (£92.00). Adds 50 commands to Basic.
	£215.05	Apple II	●	VisiDex	48K	●	●	●	R1	Also on IBM PC. Needs printer. One record/screen designed for cross-referencing.
	£178.25	CP/M	●	Cardbox	48K	●	●	●	C6	Also on MS-DOS. Needs 24x80 VDU & 100K disk storage.
Communications	£102.35	Apple II	●	ASCII Express - The Professional	48K	●	●	●	P4	Needs RS232. Asynchronous serial communications package.
	£448.50	Apple II	●	Editel	48K	●	●	●	O1	Needs modem. A Viewdata frame word processor designed to aid data editing.
	£626.75	Apple II	●	Owlisync 3780	48K	●	●	●	O1	A full IBM 3780 emulator package allowing communication up to 2400 Baud.
	£454.25	Apple II	●	Owlitel	48K	●	●	●	O1	Needs modem. Allows access to Prestel & private viewdata systems.
	£149.50	Apple II	●	Terminal Utilities	48K	●	●	●	C1	Also on Apple IIE. Converts Apple II to intelligent terminal. Speeds of up to 9600 BPS.
	£57.50	CP/M	●	Xcopy 1.0	64K	●	●	●	X1	Disk copy utility for Cromemco machines. Copies 8" or 5 1/4" single/double sided.
	£454.25	CP/M	●	Micro-Linkline	64K	●	●	●	I2	Also on UCSD-P. Teletype comms for transferring datafiles.
	£575	CP/M	●	Blisync AC-3780	64K	●	●	●	E1	Also on MP/M & CP/M86. Micro to mainframe comms through IBM terminal emulation.
	£41.40	IBM PC	●	Asynchronous Communications	64K	●	●	●	I3	Needs asynchronous comms adaptor. Makes PC act as asyncs comms terminal.
	£117.30	IBM PC	●	IBM 3101 Emulation Program	64K	●	●	●	I3	Makes PC act as 3101 terminal provides 3270 emulations when connected to host.
	£638.25	IBM PC	●	PC SNA 3270 Emulation	128K	●	●	●	I3	Needs SDLL adaptor card makes PC act as IBM 3270 terminal.
	£22.43	Sharp MZ80A	●	Zen	48K	●	●	●	K1	Also MZ80K & B. Full Z80 editor/assembler.
	£115.00	IBM PC	●	Interlink	48K	●	●	●	T2	Also on Sirius, Apple II, Xerox, Osborne etc. Connects processors for downloading
Database	£132.25	Apple II	●	DB Master	48K	●	●	●	M5	Available on hard disk. Allows 1K records over 100 fields. Report generation, etc.
	£224.25	Apple II	●	Informex Database System	48K	●	●	●	I1	Database system which can be used to & update info on any type of record.
	£402.50	Apple II	●	Mallist	48K	●	●	●	A4	Also for IBM PC & Convus Concept. Requires hard disk. A networking product.
	£96.60	Apple III	●	PFS: File	48K	●	●	●	P6	Also for Apple II (£135.70). Used in tandem with PFS (£96.60).
	£215.05	Apple II	●	VisiFile	48K	●	●	●	R1	Also on IBM PC (£273.70; 64K). A database program suitable for up to 500 entries.
	£217.35	Apple IIE	●	VisiTrend + VisiPlot	48K	●	●	●	R6	Also for CP/M. Graphic representation of data. Compatible with VisiCalc.
	£10.30	BBC Model B	●	Filer	16K	●	●	●	M7	Allows searching, sorting, saving & recovery of data.
	£201.25	CP/M	●	Dataflow II	56K	●	●	●	G1	Also on CP/M 86. Needs 160K disk space. Extract files to link with other systems.
	£201.25	CP/M	●	Datastaff	64K	●	●	●	X1	Data entry & retrieval system. Interfaces with WordStar
	£499.74	CP/M	●	dBase II	48K	●	●	●	E1	Micro DBMS. Can be used for high level programming for a range of applications.
	£557.50	CP/M	●	Superfile	56K	●	●	●	S4	Multi-file database giving application package information.
	£166.75	CP/M	●	Supersort 116	64K	●	●	●	M10	A sort utility for handling various forms of data files. Mainframe-like additions.
	£1,840	CP/M	●	MDBS II	64K	●	●	●	T2	Also on CP/M-86, MS-DOS, Turbo DOS, Unix and Xenix. Mainframe-like facilities.
	£569.25	Commodore 8000	●	The Administrator	32K	●	●	●	S11	Applications generator. No programming involved.
	£68.42	Newbrain	●	Invoice & Credit Program	32K	●	●	●	E2	The invoice program allows you to put in your own information and design invoice.
	£29.32	Newbrain	●	Database 40'S	32K	●	●	●	E2	Information gatherer, stores large quantity of information & can be interrogated at will.
	£684.25	Sirius, IBM PC, MS DOS	●	Tomorrow's Office	128K	●	●	●	S11	Complete applications generator.
Debugger	£258.75	CP/M	●	Armtor	64K	●	●	●	M11	Also on Unix & MS100S, interactive source level debugging tool for CIS-Cobol.
File Transfer	£132.25	CP/M	●	BSTAM	16K	●	●	●	L1	Needs common interface ports or modem access. Utility for transferring CP/M files.
Graphics	£34.50	Apple II	●	Graphic Utilities	48K	●	●	●	C1	Also for Apple IIE. Parameter driven machine code programs' high res graphics.
	£24.95	Atari	●	Constructor	48K	●	●	●	C8	Less experienced & new programmers can design animated sequences.
	£9.95	BBC Model A	●	Creative Graphics	16K	●	●	●	W1	Also for BBC model B.30 programs on cassette produce range of pictures & patterns

Language	£24.95	BBC Model B	EDG Graphics Package	32K	●	●	●	S7	Computer aided design package. Reviewed 11.3.83.
	£50.60	CP/M	CP/M Graphics	64K	●	●	●	D4	Range goes up to £421.70 & conforms to GKS Graphics Standard.
	£488.75	CP/M	CIS Cobol	64K	●	●	●	M11	Also on Unix. Compact, interactive ANSI 74 standard implementation of Cobol.
	£1,109.75	CP/M	Level II Cobol	96K	●	●	●	M11	Also on Unix & MS-DOS. High level ANSI 74. Compiler, mainframe-compat code.
	£396.00	CP/M	Fortran 80	48K	●	●	●	T2	Useful for scientific applications, where Pascal is inefficient.
	£285.20	CP/M	Pascal — MT +	64K	●	●	●	X1	ANSI standard Pascal for Z80 processors. Also on CP/M 86 (£484.90).
	£210	CP/M	Supersoft C Compiler	48K	●	●	●	M4	Also on CP/M-86, MS/DOS, PC, DOS. Fast implementation of C.
	£114.43	Commodore 64	DTL-Basic Compiler	32K	●	●	●	D1	Also on Commodore 8000, 4000 & 3000. Also tape version on CBM 64 (£39.96).
	£16.85	BBC Model A	Lisp on the BBC	16K	●	●	●	W1	Also on BBC Model B. Book available £7.50. Lisp is artificial intelligence language.
	£253.00	CP/M	ProPascal	56K	●	●	●	E1	Also on CDOS. Needs two disk drives. Native code Pascal.
	£40.19	Sharp MZ80A	Forth	48K	●	●	●	K1	Also on MZ80K & Osborne. Allows implementation of Forth.
	£25	Spectrum	Hisoft Pascal	48K	●	●	●	H5	Reviewed in PCN week ending April 8. Pascal compiler and screen editor.
	£421.70	Any 8 or 16 bit machine	PL1	48K	●	●	●	D4	A compact implementation based on ANSI standard general purpose subset of PL1.
	£350.75	IBM PC	Lattice-C	64K	●	●	●	L1	Also on MS-DOS, C. Compiler for 16 bit machines — full implementation & execution.
Linker	£172.50	UCSD p-System	UCSD Pascal	48K	●	●	●	D4	Portable Pascal for systems development or commercial applications.
Operations	£224.25	CP/M	Plink 2	48K	●	●	●	L1	Up to 8 megabytes.
Operating system	£59.80	CP/M	Operating Guide	48K	●	●	●	E1	Works by putting CP/M to sleep & replacing it with operating environment.
	£22.94	Apple II	Fasdos	48K	●	●	●	P4	Disk operating system for Apples which speeds up location of binary & Applesoft files.
	£277	8086 micro	Concurrent CP/M-86	48K	●	●	●	T2	Enables four separate tasks to run in a single user station.
	£431.25	Many processors	UCSD p-System	48K	●	●	●	D4	Portable user-friendly operating system including one compiler.
	£295.20	8080 and Z80 micros	CP/M +	128K	●	●	●	D4	Upward compatible from CP/M enhanced 8-bit micro. O/S.
	£120.50	8080 and Z80 micros	CP/M 2.2	64K	●	●	●	D4	O/S for 8 bit microc with over 1.5 million ucores.
	£379.50	8080 and Z80 micros	MP/M	64K	●	●	●	D4	Multuser, multitasking. Features record & file locking, date & time stamping etc.
	£210.80	8086 and 8088 micros	CP/M-86	64K	●	●	●	D4	Manages up to one megabyte of RAM & allows up to 128 megabytes of on-line storage.
	£548.20	8086 and 8088 micros	MP/M-86	64K	●	●	●	D4	Multi-user. Multi-tasking. Multi-user capability with multi-programming for each user.
	£168.70	8080, Z80, 8086 and 8088 micros	CP/Net	64K	●	●	●	D4	A CP/M compatible O/S designed to access local & networked resources.
	£295.20	Motorola MC68000	CP/M 68K	64K	●	●	●	D4	Extends CP/M to Motorola MC68000 microprocessors. Single user, single tasking.
Program Generator	£228.85	Apple II	Quickcode	64K	●	●	●	P4	Also on IBM PC. Program generator for dBase II.
	£126.50	CP/M	Furcs	64K	●	●	●	M11	Also for Unix & MS-DOS. Programming tool, for generating Cobol code.
	£379.50	CP/M	Last One	64K	●	●	●	S3	Also on MS-DOS and Apple DOS.
Programming Tool	£2,500	Apple II	Pascal Isam/Pascal Form	48K	●	●	●	A4	Also on IBM PC & Corvus Concept. Needs Corvus hard disk. Pascal prog tool.
	£287.50	CP/M	Fleshare	48K	●	●	●	M11	Also on MP/M. Bank-switched memory or CP/M network.
	£7.95	Dragon 32	Dragon Selection 2	32K	●	●	●	D3	Four utility programs which can be listed to see how the program works.
Telex	£2,113.70	Superbrain	Micro Telex	64K	●	●	●	E1	Also on Televideo 802. Enables automatic sending/receiving or telex by micro.
Testing Tool	£95.82	CP/M 80	Diagnostics II	32K	●	●	●	M4	Also on CP/M-86 and MS/DOS. Tests systems.
Time Recording	£962.50	Commodore 8000	Minuteman	32K	●	●	●	C4	Also on Commodore 4000. Time recording system. Can produce range of reports.
	£402.50	CP/M-88	Time Recording System	64K	●	●	●	D2	Also on CP/M 80. Control over man/hour expenditure by job or account number.
Utilities	£23.00	Apple II	Compucon Utilities Disk II	48K	●	●	●	C1	Also on Apple IIe. Error checking, copying. Single disk copy. Label disk.
	£115.00	IBM PC	C-Food Smorgasbord	64K	●	●	●	L1	Decimal arithmetic, low level & terminal independent input & output.
	£79.35	CP/M	Visa 80	64K	●	●	●	M13	Constructs a menu-driven system to your design.

Computers, Nottingham 412777 **K5** Kobra Micro Marketing, Henley-on-Thames 2512  
**L1** Lifeboat, 01-836 9028  
**M1** MMS, Bedford 40601 **M2** Microsimplex, Macclesfield 615000 **M3** McDowell Knaggs & Associates, Worcester 612261 **M4** Micro Technology, Tunbridge Wells 45433 **M5** Micromedia, 01-843 9457 **M6** Mollimer, Bexhill-on-Sea 223636 **M7** Micro Power, Leeds 683186 **M8** Melbourne House, 01-977 9160 **M9** Mercury Software, Darwen 776677 **M10** MicroPro, 01-499 5777 **M11** MicroFocus, Swindon 685891 **M12** Microdeal, St Austell 67676 **M13** Mediatech, 01-903 4372  
**O1** Owl Microcommunications, Bishops Cleeve 723848 **O2** Omicron, 01-636 6575  
**P1** Peachtree Software International, Maidenhead 32711 **P2** Padmead, Fleet 21892 **P3** Pegasus, Kettering 522822 **P4** Pete & Pam Computers, 01-769 1022 **P5** PE Consulting Group, Egham 34411 **P6** Personal Computers, 01-377 1200 **P7** PTRC, 01-836 2208  
**P8** Privity, 02407-4906  
**Q1** Quicksiva, Southampton 20169  
**R1** Rapid Terminals, High Wycombe 26271 **R2** Rabbit Software, 01-863 0833 **R3** R & R Software, Gloucester 502819  
**S1** Systematics International Microsystems, Haverhill 61121 **S2** SGS Software Products, 01-486 7498 **S3** Silicon Valley Trade, 01-242 2807 **S4** Southdata, 01-994 6477 **S5** Supersoft, 01-861 1166 **S6** Seed, Brownsills 378151 **S7** Salamander, Brighton 771942 **S8** Sol Software, Worcester 424152 **S9** Silversoft, 01-748 4125 **S10** Sinclair Research, Cambridge 353204 **S11** Stage One Software, Poole 735656 **S12** SBD Software, 01-870 9275 **S13** Starcade, 051-236 6628 **S14** Iain Stewart, 0259-60840  
**T2** Tamsys, Windsor 56747 **T3** Tabs, Andover 5893 **T4** Thorn EMI, 01-836 2444 **T5** Texas Instruments, Bedford 63211  
**W1** John Wiley & Sons, Chichester 784531 **W2** Widdig Software, 01-444 5285  
**X1** Xitan Systems, Southampton 334711

**A1** ACT Pulsar, 021-454 8585 **A2** Advanced Quality Software, Norwich 21117 **A3** Audiogenic, Reading 595647 **A4** Atlantic Software, Nottingham 412777 **A5** A & F Software, 061-223 6206 **A6** Abbex Electronics, 01-203 1465 **A7** Autorrata UK, Portsmouth 735242 **A8** Apex Trading, Brighton 36894 **A9** Acornsoft, Cambridge 316039  
**B1** Bonsai, 01-580 0902 **B2** Bristol Software Factory, Bristol 23430 **B3** Bug-Byte, 051-227 2299 **B4** Bytesoft, 04-80-215005 **B5** Belliflow software, 01-903 1816  
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**D1** Dataview, Colchester 869414 **D2** DEC, Basingstoke 59200 **D3** Dragon Data, Kenilg Hill 744700 **D4** Digital Research, Newbury 35304  
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**H1** Hilderbey, 01-485 1059 **H2** Harford Software Northwich, 781156 **H3** H & H Software, Runcorn 65566 **H4** Heinemann, 01-637 3311 **H5** Hisoft, Swindon 26616  
**I1** Informex, 01-318 4213 **I2** Intelligence (UK), 01-543 3711 **I3** IBM UK Product Services, Basingstoke 56144 **I4** IJK Software, Jackpool 21555 **I5** Impact Software, 031-441 4257 **I6** Imagine Software, 051-236 6849  
**J1** Jarrman Systems, Tring 6841  
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**Dragon 32** plus joysticks plus games, eg Dragonrek, Datatank, Spacewar, for £180. 4 Levedale Road, Penkridge, Staffordshire ST19 5AT. Tel: Penkridge 3057.

**Lynx 48K**, six months old, excellent condition includes user manual plus Lynx Computing book, demo tape and Monster Mine £185 own. Tel: 0480 213587.

**Pet 32K** including twin disk drive £499 own. Tel: 021-454 6447 weekday evening.

**Acorn Atom 12K-ROM, 12K-RAM, 6522 VIA + bus buffers** boxed, tape recorder, PSU, all leads, manuals, Magic Book, programs. £175. Tel: Milton Keynes 0908 582265.

**Apple II + disk interface cards DOS 3-2 £25, DOS 3-3 £30, Versawriter plus five disks £65, also original software half price.** Tel: Martin, Bristol 514698.

**Commodore Pet 2001 8K**, manuals, programming and reference book. Much software. Excellent condition. £170. Tel: Weybridge 47472.

**Atari owners**, disk drive wanted will swap for over £300 software, or for 48K RAM board, will sell or swap software as well. Tel: 0767 260470 (after 6pm).

**Vic 20 Commodore 16K £25.** Super Expander plus graphics book £25, Speech Synthesiser £15, Music Composer £15, various software. Tel: A J Ayling 01-679 3425, 84 Donnybrook Road, London SW16 5AZ.

**ZX81 16K**, transformer and leads, manual, games: Sorcerer's Island, Asteroids, Super Programs 5, still boxed, bargain at just £35. Tel: Brighton (0273) 779060, (Jacob).

**TRS 80/Genie** software. Kansas Editor Assembler £12, Master Monitor £10, Ascertain £3, all for £20. Richardson, 35 Banks Avenue, Ackworth, Pontefract, West Yorkshire. Tel: 0977-610168.

**Wanted**, printed suitable Sinclair 48K Spectrum. Devonport Old Forge, High Street, Barkway, Nr Royston, Herts.

**Aculab** floppy tape system £125, complete with free TRS 80 Model I Level II 48K computer, all in mahogany desk console. Tel: Waterlooville Hants 66398.

**Tandy** pocket computer and printer/cassette interface, all leads, manuals and mains adaptor, also games software, excellent condition, just £50. Tel: 0902 894775 after 6pm.

**Atari VCS**, as new with seven cartridges. Including Asteroids, Space Invaders, Maze Craze, Missile Command, Defender, Adventure and Combat, all for £100! Tel: 01-994 8341 (after 6pm).

**Texas TI 99/4a** with joysticks, cassette, games, still under guarantee £120. Tel: Woking 67454 (eve). D Watson, 18 The Moorlands, Kingfield, Woking, Surrey, GA22 9BJ.

**Tandy PCI** Pocket Computer, printer, cassette recorder, interface, software, spare batteries, paper rolls etc. complete system only £69. 4 Sutherland Place, Clifton, Bristol BS8 7Z. Tel: 0272 735419.

**ZX81** software, Forth, Ju-Calc, Flight Simulator, Fantasy games, toolkit, ZXDB, ZXAS, compiler, Hi-Res, over £60. Sell £30. Martin McAuley, WM7/B, University of Essex, Colchester.

**Apple II** colour-card plus UHF Modulator boxed, unused, cost £100, sell £60. Robocom Bit-Stik, new, boxed, cost £300 sell £170 or £220 for both. Tel: 01-886 2311 (anytime).

**65K**, Vic 20 cassette deck, T.V., books, magazines, £110. Software, Super Expander, joystick manual, cartridge, blank tapes boxed, five months guarantee. Cost me £440 sell for £220. Tel: Studley 3720.

**Acorn Atom 12+12K, 3A PSU**, Forth, Chess, Invaders, and many other games, £119 own. K Powell, 18 Kings Avenue, Marcham, Oxon OX13 6QA. Tel: Frlford Heath 391492.

# PCN Billboard

**Wanted**, pay £125 for disk drive; £140 paid for Grundig R/C TV; £50 paid for BBC disk interface. BBC software for swapping. Tel: Stephen, 01-524 1168.

**Vic 20 + C2N + 16K RAM + six cartridges + four tapes + book**, £350 own. David Blomfield, 57 Silver Street, Norwich NR3 4TT. Will deliver to nearest BR station.

**Oric 48K** computer, as new with £40 software and colour monitor/TV, £300 own. Will split. Tel: Martin, 01-633 3771 (work), Orpington 72793 (home).

**Acorn Atom 7K RAM 8K ROM**, complete with PSU, manual, leads, book, £95. Tel: 01-452 5363.

**Wanted**, Jupiter Ace, Oric or Spectrum, any size memory, any condition (even non-working), but must be cheap. P Tan, 2 Ridley Road, London NW10 5UA. Tel: 01-961 6658.

**Sharp PC-1500** Pocket Computer with 4K RAM plus printer/cassette interface, cost £350, sell £225. Mr Warhurst, 194 Southfields Avenue, Stanground, Peterborough. Tel: Peterborough (0733) 44701 (eves).

**BBC Microcomputer**, OS 1.2, version II Basic, Issue four board, fitted with disc interface and View word-processor ROM. Two months old, immaculate, £485. Tel: 051-644 6568.

**BBC** disc drive, Mitsubishi Slimline 80 track double-sided drive cased with data and power cables, one month old. Immaculate. £295. Tel: 051-644 6568 (Merseyside).

**Apple II + full ASCII keyboard**, £330; colour card, £40; Z80 card with CP/M Basic compiler and dBase II, £180; Videx 80-col card, £90. Tel: John, 66 23903 (days).

**16K Oric I**, all leads, manual, Flight Simulator cassette, two issues Oric Owner, boxed, condition as new, full guarantee, only £85 own. Tel: Winch (0962) 64783 (anytime).

**VDU + printer**, uncased, B & W, 18MHz, 75Ω IVP-P. £50; 32 column printer, parallel TRS-bus RS232C, 10 months' use, + connectors. Ideal for listings. £50. Both £80. Tel: D Spindrod, 021-378 1782.

**BBC** bits and pieces, BBC/NEC, 30hr Basic course and cassettes. All Beebugs to date. Acorn user Nos 1-11, BBC Basic book; Software: Frogger, Hitch Hiker, Star Trek and BBC Music, £30 the lot, or offers. Tel: 0963 250115.

**Sharp PC1215** portable with cassette and printer in detachable module which includes charger. Extremely flexible machine with user definable keys, £140 own. Tel: Glossop (045 74) 5530.

**Bargain**. Fully expand your Vic 20: motherboard + 16K + superexpander + Vicmon cartridge + £70 software including Matrix, Laser Zone, Whacky Waiters, Catcha Snatcha. Best offer over £100. Tel: 0203 416175.

**Mattel Intellivision 23** cartridges: Tron, Pitfall, Star Strike, Dungeons and Dragons, Lock 'n Chase, Space Armada, Skiing, Boxing, Tennis, Basketball, etc. £280 own. Tel: Pudsey 561760.

**Vic 20 + tape deck + Skramble + Frantic + Catcha Snatcha + Intro to Basic + nine other professional progs**, all under a month old, £120. Tel: Gravesend (0474) 67326.

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**Swap** Bug Bytes' City Defence for any other BBC original. Two BBC books and Spectrum pocket book (offers), back issue magazines. Tel: Quorn 413590.

**CBM Pet 32K (3032)**, dual disk (3040), printer (4022), cassette deck, Visicalc, rarely used, might split, £800 own. Tel:

Jones, Sheffield (0742) 304982 (days), 661986 (after 7pm).

**16K ZX81** with manual and leads, lots of software including Black Crystal, Asteroids, Scramble, etc. Nearly new, sell for £70 own. Tel: Chertsey 65209.

**For sale**, BBCB, DFS, Teac slimline drive, Microvitec monitor plus loads of software, cassette, £850. Must sell. Keith, 45 Fairhaven Road, Widnes, Cheshire. Tel: 051-424 8853.

**Atom** fully expanded, BBC ROM fitted, leads, PSU and software. As new, £90. 7 Derwent Close, Elvington, York YO4 5AW. Tel: 090 485328.

**BBC 32K Model A** with 6522 chip, all leads and manuals, software including games and Lisp, £230. Tel: 061-773 8671.

**Atari** owner wishes to swap latest software including Shamus II, Necromancer, Pharaohs Curse, and Astro Chase for Preppie II or others. Tel: Milton Keynes (0908) 750948.

**Spectrum 48K** plus cassette recorder, manuals, books and software, must sell — moving. Worth over £200. Will sell for £100 own. Tel: Harry, 01-727 6956 for details.

**Dragon 32** with manual, joysticks, books, software, worth over £250; tape recorder, total value over £500, will sell £300 own. Must sell — moving. Tel: Harry, 01-727 6956 for details.

**Super ZX81**, dk'tronics keyboard with numeric keypad and 16K RAM. Also switched video inverter and three books. Snip at £65. Tel: Mac, Keynsham 2120.

**Lynx 48K**, leads, manual, eight computer quality tapes, genuine reason for sale, hence bargain price of £175. Tel: 061-707 3716 (Manchester) after 6.30pm.

**Vic** Programmers Aid cartridge, four months old, very good condition, £25 own. Tel: Ruislip 30168 (eves).

**Atari** cassettes, 13 games originals, £60, cost £350, will split for 1/3 cost. Also 410 cassette player, six months old, £30 own. Tel: Broadstone 691306.

**Pet 2001 8K** with integral cassette drive, excellent Basic tutorial included along with many other program tapes, worth seeing, £270 own. Tel: 01-889 3952.

**Atari** cassette software — Shamus, Time-warp, Escape from Perilous (32K), (graphic adventures). Galactic chase (Galaxian). Originals as new with documentation, £9.50 each. Tel: Mike, Bolton 593313.

**For** quick sale: remaining software after sale of Sharp MZ80A/K hardware, letters only, guaranteed bargains. Mr C Kennett, 17 Moseley Wood Way, Cookridge, Leeds 16 7HN, West Yorks.

**T199/4A** cassettes for adventure module, Adventureland, Mystery Funhouse, Ghost Town, Savage Island & Golden Voyage. Original packing, £10 each or swaps. Tel: 0501 70326.

**Seikosha GP-100A** printer, boxed as new, hardly used, suitable for any computer with parallel centronics interface, £160. Tcny, 041-636 1239 (Glasgow).

**ZX81 + 16K** with leads and book, only £40. Also joystick and joystick interface with tape and book only £20. (0295) 720812, Alec.

**TRS80 Model I 32K + VDU + tape drive + TRS80 disk drive + Seikosha GP80 printer + compiler + assembler/editor + many games**, £400. Tel: 01-555 9977.

**Spectrum 16K**, good condition £85, also DK'Tronics keyboard worth £45, very little used, £25. Software, Orbiter, Spectres, etc, worth £47, £25. Ben. Tel: Alfriston (0323) 870201, 4pm-10pm.

**Atari TV** game, with Asteroids, Circus, Combat, Missile Command, Joysticks, Paddles etc, excellent condition, £80. Tel: 0667-52174.

**Wanted** 16K RAM pack for Sinclair ZX81. 01-969 3513.

**Wanted**: Atari disk drive and 48K Atari 800, must be in perfect working order, and cheap. Tel: 01-341-0464 (evenings).

**Spectrum** software — The Hobbit, Time Gate, Arcadia, Hungry Horace, Ground Attack, Cruising Reversi, cost £52.20, sell £25. 01-960-4388 after 7pm.

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**Spectrum** games wanted: I buy or exchange 16 or 48K programs — adventures, languages — Steve. Sheffield 666867.

**CBM 4032**, 32K RAM + programmers toolkit, cassette recorder, operating manuals, games, Pet Chess, Space Invaders, 18 months, good condition, original packing, £500 own. Tel: Doncaster 0302-840630.

**Byte**, Kilobaud, DDJ, micro 6502 back issues wanted, American computer magazines in exchange. Smith, 84 Edenfield Gardens, Worcester Park, Surrey, KT4 7DY. (see sales list).

**Seikosha GP-100A** printer, boxed as new, hardly used, suitable for any computer with parallel centronics interface. £160. Tel: Tony, 041-636 1239 (Glasgow).

**Bored** with your Spectrum games? Why not swap them with me — 16 and 48K — Tel: Steve, Sheffield 666867.

**Wanted** ZX81 1K will pay up to £110, also if ZX81 bought, then RAMPack wanted, will pay £10. Both must be in good condition. Tel: Bobby, Bradford (0274). Tel: 495882 after 5pm weekdays.

**Ardor/Torch** Vic 20 Expansion Unit with lid, £70, Super Expander cartridge, £25. Vic revealed, £5. Tel: 061-439 7716 from 5-7pm and ask for Simon.

**Intellivision**, five months old, hardly used, plus five games, £180, sell to buy BBC (B) micro, Tel: 01-889 9882 evenings.

**ZX81 (16K)** Kempston keyboard + Zon X sound unit + Spectrum extension board + £20 of software, worth £180, offers over £125. Tel: S Kenton, 660-6607, first come first served + manual etc.

**Spectrum 48K**, only weeks old, 11 months guarantee, software over £150 worth, includes Hobbit, Penetrator, Time Gate, Chess, Galaxians, Invaders, Defender, 3D-Tanx, Mazeman, Adventure, Planetoids, Ground Attack, etc, bargain. Tel: 01-590-8301.

**Prestel** Adaptor (Tantel numeric), as new, best cash offer, or swap for Spectrum 48K or similar computer. Tel: 048 67 (Brookwood) 4755, also ZX81 books.

**ZX81** mains adaptor, suitable for printer use, only £5 exchange, Cox T.D.010 model engine unused collector's item £40. Borland, 51 Lovell Gardens, Watton, Norfolk IP25 6TX.

**Commodore Pet 3008** 32K RAM cassette drive, Basic 2 sound box and tons of software, both games and utilities. Cost £900, accept £500 own. Tel: 01-803 4733.

**Prestel** adaptor (Tantel numeric), as new, best cash offer, or swap for Spectrum 48K or similar computer. Tel: 048 67 (Brookwood) 4755, also ZX81 books.

**Atari 400/800** cartridge £20 or swap for assembler cartridge or good ROM. Tel: 0667 52174.

**CRT** GEC E4103/B/4 1in with data £5. D Buckley, 142 Lynton Road, West Acton, London W3. Tel: 01-993 3123 eve, 01-211 3192 day.



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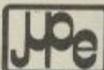
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## Laugh line

Our horsey Laughline in issue 20 had many of you champing at bit and inventing new 'GG' micros.

Close runner for the £20 prize was Richard Porter, of Croydon, Surrey, who thought Rosalind Bevan was telling Tony Clarke, managing director of Dragon Data: 'I found him outside the main gate. There's a man lying in the road next to a big pile of

armour.' (Don't worry . . . we had to think about it too . . .). And Helen Potter, of the Isle of Wight, reckoned Mr Clarke was thinking:

10 REM OPEN 11  
20 ? "ICAGG"  
30 END

But winning by a clear head was Christopher Green, from Norwich, who suggested that Mr Clarke was saying: "No Ms Bevan, I said I wanted an Epson printer, not an Epsom sprinter!"



## SYNTAX ERRORS

### SUM total

Routine Inquiries (PCN issue 22) got a bit stropky with a teeny fault in the documentation for Orbiter. The simple instruction to 'press ENTER' was omitted and confused a reader.

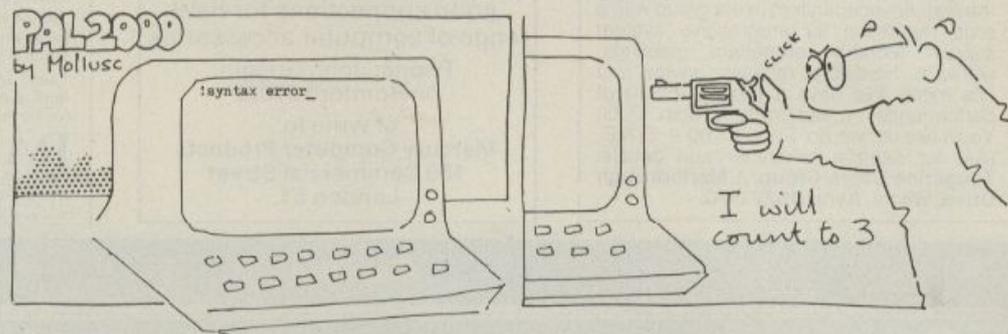
And guess what got left out of Max's answer? It should read: 'type CLEAR 25102, press Enter then LOAD "" CODE and press Enter.' Come back Silversoft — all is forgiven!

### NEXT WEEK

● Don't miss part one of the pull-out Micropaedia series on the Commodore 64 ● How to program adventure games ●

Pro-Test of the cheapest colour computer in the UK ● Software Pro-Test of Fifth on the Spectrum and T-Maker for the IBM PC ● Peripheral Pro-Tests look at a new digital tracer for the

Spectrum and compare printer values ● Gameplay tests new games for the Oric, Dragon, BBC, Commodore 64 and Spectrum ● PLUS all the regulars.



## PCN DATELINES

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

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

## UK EVENTS

Event	Dates	Venue	Organisers
8th ZX Microfair	August 20	Alexandra Palace, London	Mike Johnstone, 01-801 9172
Acorn User Exhibition	August 25-18	Cunard International Hotel, London	Computer Marketplace Ltd, 01-930 1612
Strathclyde Home Computer Fair	August 26-27	McLellan Galleries, Sauchiehall Street, Glasgow	Jarak Sales, 25 Dungavel Gdns, Silvertonhill, Hamilton, Scotland. 0698 457204
Computer Open Day	September 1	Draganora Hotel, Leeds	Tony Kaminiski, Couchmead Communications Ltd, 01-778 1102
Video, Audio and Computer Show	Sep 16-18	Bradford Exposition Centre	R. Cooper, J. Wood & Sons Ltd, Bradford 720014
Home Entertainment Show	Sep 17-25	Olympia, London	Montbuild Ltd, 01-486 1951
Computer Open Day Exhibition	September 22	Central Hotel, Glasgow	Couchmead Communications Ltd, 01-778 1102
Microcomputers in Business	Sep 27-29	Warwick University, Coventry	Peter Bubb, 01-892 4422
Personal Computer World Show	Sep 29-Oct 2	Barbican Centre, London	Montbuild Ltd, 01-486 1951
Computer Fair	Oct 2	The Sir Frederic Osborn School, Welwyn Garden City	R Brown, Welwyn Garden City 23367
European Computer Trade Forum	Oct 4-7	NEC, Birmingham	Clapp & Poliak Europe Ltd, 01-747 3131

## OVERSEAS EVENTS

Event	Dates	Venue	Organisers
National Computer Business & Office Systems	Aug 16-19	Auckland, New Zealand	Trade & Industrial Exhibitions, 12 Heather Street, Parnell, PO Box 9682, Auckland
Personal Computers & Office Automation Systems Exhibition	Sep 5-8	Amsterdam, The Netherlands	RAI Gebouw BV, Europaplein 2, 1078 GZ, Amsterdam
Australian Computer Exhibition	Sep 13-16	Melbourne, Australia	Riddell Exhibition Promotions PTY Ltd, 166 Albert Road, South Melbourne, Vic 3205
International Peripheral Equipment & Software Exposition	Sep 13-15	Moscone Centre, Anaheim, USA	Cahners Exposition Group SA, 0483 38085
Gulf Computer Conference	Nov 22/23	Dubai International Trade Centre	Reed Conferences, Surrey House, Throwley Way, Sutton, Surrey. 01-643 8040

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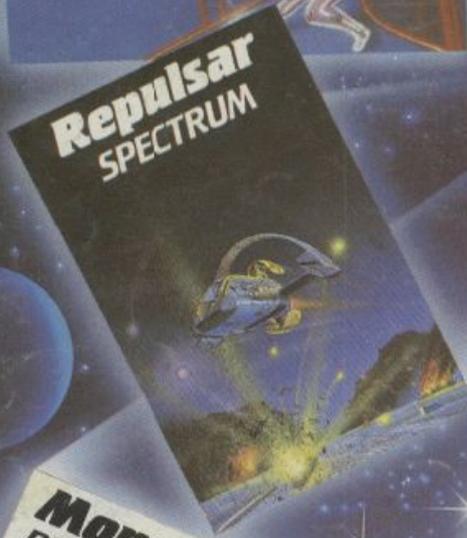
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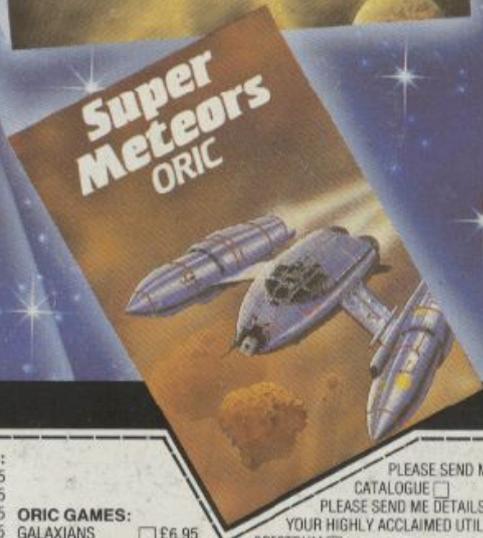


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