40p EVERY WEEK · No 97 · FEB 2 1985

PERSONAL Computer NEWS

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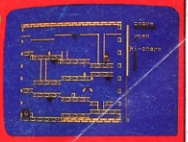
Hi-res graphics at your command

QL DRIVER
First disk system under review

AMSTRAD LANGUAGE
Compiled Pascal puts power in your CPC

BIG BROTHERS
New printers with something extra

CROWTHER'S CRAZY CAVERNS
A superb 64 program from the author of Suicide Express



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MONITOR

Sinclair Plus cuts spark price war

Sinclair has set the cat among the pigeons by slashing the price of the Spectrum Plus, and as a result a full-scale price war is on the way.

Acorn responded immediately by taking £70 off the cost of an Electron. Commodore said last week that it was 'watching the situation closely,' but it had no immediate plans to alter the price of the 64. MSX prices are continuing to fall in ones and twos — Mitsubishi is the latest — and a special offer that brought the Amstrad below £200 over Christmas is another sign of the way the wind is blowing.

The Spectrum Plus and the Electron now match each other stride for stride at £129. But if you already own a Spectrum it will cost less to turn it into a Plus — £20 for a kit, £30 for the Sinclair service, as opposed to the £30 and £50 prices of three weeks ago. At the same time Sinclair announced that it would stop building and selling the Spectrum in the UK.

Acorn's reply was intended as much to reassure the money men in the City of London as to boost its challenge in the home micro market. Apart from the scything cut to the Electron, it opened a trade-in deal under which any micro will be worth £50 to you when you buy a BBC.

The MSX price cuts started before Christmas, when Toshiba led the way and Goldstar brought MSX below £200 for the first time. The Mitsubishi models are going in the same direction — its 32K unit now costs £225, down from £249.

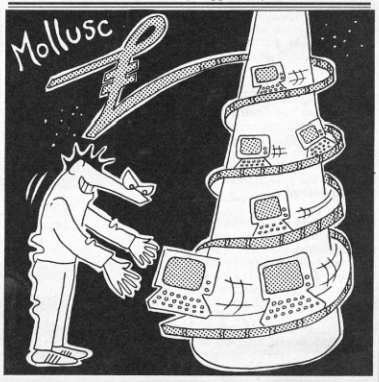
In firing the opening shot Sinclair said that strong sales of its machines had made it possible to take advantage of economies of scale in production, and so to cut prices. But it's difficult to avoid the conclusion that it wanted to kick Acorn while it was down — Acorn's sales of Electrons over Christmas were below target and the BBC, although its price has been steady, is not getting any younger.

Sinclair will also be looking over its shoulder at MSX, and, since Las Vegas (issue 95) at Atari. Few people argue now with the suggestion that MSX machines will eventually cost about £150. Atari's new systems promise much more, pound for pound, but they have yet to deliver.

Meanwhile the company that shares the lead in the UK with Sinclair is keeping its powder dry. Commodore has the C128 on the way, the Vic 20 on the way out, the 64 well established, and the C16 apparently in danger of being still-born.

Atari, which is partially responsible for the outbreak of price-cutting, doesn't rule out a further drop in the price of the 800XL. In the US the recommended retail price is $100 with some shops discounting it to $89, so there is clearly scope for further cuts in the UK price.

'We haven't finalised our UK pricing yet,' said Robert Harding, Atari's sales and marketing manager. 'We have a worldwide pricing strategy so we don't react to something that happens in just one market.'



MONITOR

IN BRIEF

Apple found the answer to its critics last week by announcing record sales and profits for its last three-month financial period. It may surprise you to learn that Apple has gone into selling records but there must be something to account for its profits of $46 million.

Still on the Apple bough, one of 1983's most attractive names has finally made it into the RIP column. The Lisa is no more. From now on it will be known as the Macintosh XL. It will cost $3,995; ordinary Macintoshes, which are still excelling and, more to the point, selling, are reduced by $700.

MSX Working Group members are opening their doors to MSX users. They have set up a special MSX Help Line for anybody with inscrutable questions about the Japanese micro standard that they can't find answers for anywhere else. If you need help, ring 01-799 9811 and ask for John Locke or Georgie Gibbs.

Alligata Software has re-released Rocket Roger in an easier version. Admitting that the Commodore 64 game launched last autumn was 'extremely difficult to master', its new version includes a reduced skill 'amateur level'. May we look forward to more difficult versions of some of the two-minute wonders now on sale? Only time will tell.

The Scottish Council on Disability has been given a BBC B with DFS, a monitor and a printer, to use on its mobile information unit; it would like to hear from anybody using a similar system so that you can pass on information and ideas on adaptations and means of putting such systems at the disposal of disabled people.

The award-winning Prism VTX 5000 modem has been cut in price by about 30 per cent, from £99.95 to £69.95. It is designed specifically for Spectrum owners and the price cut aims to appeal to the growing band of Sinclair followers.

Metacomco (0272-428781) has cut the price of its much fancied QL Assembler to £39.95 while enhancing the package by the addition of a linker. The price change brings Metacomco in line with the 'official' Assembler for the QL written by GST. Existing users of the Metacomco Assembler can upgrade to the enhanced version on payment of 'a nominal sum'.

Stratos pops up in Germany for debut

Oric's dream-machine, the Stratos, will now make its debut in Germany at the International Microcomputer Fair this week.

Originally, the 64K Stratos was due to make an appearance in March — to make a clean sweep of the French market. But, yet again, the company has changed course and the French must wait another month or so.

As for the UK, it's still unclear whether the Stratos will be available under another name. Oric says it will wait to see how the UK home computer market progresses before it makes any commitment.

Not only has Oric changed tactics with the Stratos, it's also trying to organise a management buy-out.

At the moment Oric is a subsidiary of a company called Edenspring. Edenspring rescued Oric from financial difficulty in October 1983 (issue 33).

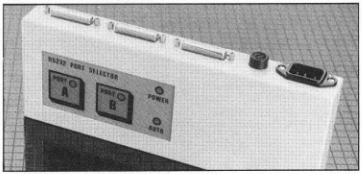
Oric had debts of £1.01 million at the time. Edenspring bailed it out by issuing 25 million new Edenspring shares which raised £750,000.

But since the financial rescue operation Oric ran into difficulty and at one time one of the creditors threatened to take court action for the sum of £100,000 owed to it.

At this moment Oric is talking to City institutions to organise the buy-out. If successful the buy-out would almost certainly involve Tansoft — Oric's software arm.

The upheavals at Oric will not help the company with its ambitious plans to release various other new machines this year, but it has at least taken the first step by moving its offices to Cambridge where it will be virtually next door to Tansoft.

The other new machines are supposed to include an IBM compatible system, a unit akin to ICL's One-Per-Desk, and possibly an MSX-standard micro.



TOUCHING — After touch-screens (from Hewlett-Packard, Microvitec and others) come touch switches, so far only from Computers and Peripherals of Sheffield. Its Autoswitch has touch-sensitive or remote control, depending on how far away you want to be from it. According to the manufacturer this increases its reliability and life expectancy. Incidentally, it is an RS232 T-Switch, but the principal could well be extended. Computers and Peripherals can be reached on 0742-352612.

Hard copy proof that printers are cheaper

The DX-85 from Samleco is hard copy proof that printers are definitely becoming cheaper. For £189, it features 120cps over 80 columns, friction and tractor feed, a nine-pin print head, and optional interfaces for Centronics, RS232, and Commodore 64.

Readers who have been browsing through recent Rotronics advertisements may recognise the serial number (DX-85). This is because Rotronics is one of the distributors for Samleco and will be selling it for £199.95 — this price is inclusive of the RS232 interface.

An unusual feature of the DX-85 is that the basic machine comes with no interfaces. These are available separately as plug-in cartridges. The RS232 will cost £41.40, the Centronics £23, and the Commodore 64 connection £51.75. This makes the printer with the Commodore 64 interface £240.75 — still cheaper than the opposition.

Samleco has not produced an interface for the Spectrum because it reckons the cost would have matched the Interface 1. Since this interface has a pseudo RS232 that works with the RS232 cartridge there should be no problems.

The DX-85 will be available in April or May by mail order and is due in the high street stores soon after. The Rotronics version is currently advertised as available, but don't be fooled, it won't be out for a month or so yet.

For more details, contact Samleco on 07353-54717 or Rotronics on 0494-452757.

Printers going cheap — the DX-85.

Thorn-EMI steps on to lapheld MAT

Thorn-EMI is to step into the portable market with a lapheld computer codenamed Mat (Management Aid Tool).

At the moment technical details of the Mat are a bit thin, as Thorn is tight-lipped about its creation. The launch date is sometime before March.

Mat will weigh less than 4lbs, be A4 sized, and battery-powered with a liquid crystal display. It will probably fall somewhere between the Data General One and Tandy, NEC and Olivetti portables. It will cost less than £700.

Ian Milne, marketing manager, said: 'Unlike the personal computer market, where there's a clear and dominant leader, the portable market does not have one clear leader.

'It's still quite a new market and no-one knows where it's going. So, companies such as Thorn-EMI can step in and try and get a slice of the market.'

As far as Thorn is concerned Mat could be the start of a range of computers. Mr Milne said: 'We have the facilities and capabilities.'

Thorn, one of the UK's biggest electronics companies, certainly has a finger in almost every pie. The company is involved in software production, maintenance, electrical goods, entertainment and produces micros for other hardware suppliers.

On another front it has recently been active in the US. With the aim of becoming the world's largest software supplier (outside the US) it is busy acquiring software houses.

MONITOR

BBC axe hangs over Chip Shop Basicode

Chip Shop listeners who download software with their Basicode kits could be brought down to earth with a bump.

The word is that Basicode, the attempt at a cut-down transportable form of Basic, could be for the chop. Trevor Taylor producer of the BBC radio programme said: 'There

BBC — Basicode on the way out?

are no immediate plans to continue to broadcast Basicode.

'The BBC is cutting back in various areas — and the cost of hiring a programmer to produce the programs to be transmitted over the air is rather expensive.'

Although the future of Basicode is still in the air, the Chip Shop programme is definitely on schedule for more dates later on in the year.

The programme, which started in 1983, introduced the Basicode kit for users to get hold of the free software transmitted on the radio. The kit translates software for home computers such as the Spectrum, MSX range, the Electron, the Dragon, and the Oric — in total 19 machines.

This feature of Chip Shop has proved popular and there's no doubt that many computer users who've forked out £3.95 for the kit, eager to download free software will be justifiably peeved if BBC radio decides to drop the facility.

But Basicode is very limited, having to make allowances for so many different Basics on different machines.

The BBC also made the mistake of asking for programs from listeners but not offering to pay for them.

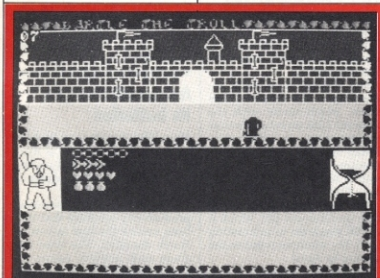
■ Hands off micro broadcasts! See Home Front (page 5) for the full story of the BBC's problems.

Competition prizes head for the winners

Two readers of *PCN* can look forward to a year full of computing. They are the winners of two of our recent competitions. First is D Kendrick, of Bracebridge Heath, Lincoln, who will be receiving an Apple IIc very shortly.

The second winner is David Bhatolaul, of Purley in Surrey. A complete Toshiba MSX system is on its way to him.

If you were among the thousands of entrants who failed to win, you've still time to enter the Spectrum disk drive competition run in last week's issue, and there'll be more great prizes on offer in the next few weeks.



FOUR PACK — Games Workshop (01-965 3713) has transferred its board game Talisman to the screen of a 48K Spectrum and claims the 'first animated multi-player' as a result. It doesn't mean the players must be animated, of course — you can play it in a state of complete torpor if you like. But seeing off computerised foes as well as your opponents round the screen could raise the temperature.

The game, for up to four players, costs £7.95 and is due to be released on March 1.

VIEW FROM THE US

Now you see it — at a budget price

Most of us saw our first computer processed images on television: shots of the earth, the moon and Mars taken by US space vehicles. The enhancements were major, and the computers employed were mainframes. Since then engineers, designers and moviemakers have become very familiar with the technology; however, they are still working with mainframes.

Now image processing is coming into the micro price range. Before long, the image processing ability/capacity of a micro may well be its most important selling point. Last year some US companies, like Wang and Datacopy, brought out high resolution image processors/computers in the $10,000 range.

This year there are all sorts of very much less expensive devices that bring image processing, image filing and even computer camera work into the reach of everyone from IBM PC users to Commodore 64 experimenteers.

In the executive suite there can be a General Parametrics Videoshow machine, a $3,499 hi-res graphics computer with 1,000 colours, and about that many variants on a graph. The 256K 8086-based computer can store images on floppy disk, slide or directly to video cassette.

Of course you also need an IBM PC and the Picture-It software package with which to enter your data into the Videoshow. The software offers almost unlimited assistance in chart-making, having 25 graph formats, including five for pie-charts. However, the big advance is Macrovision Technology, which effectively triples resolution by addressing individual phosphor dots on a colour monitor screen, not the three-dot pixels. Using micro-dot control, Macro-vision produces images as sharp as those made by machines in the minicomputer range.

There are other approaches to image processing, the micro as camera for one. For Mac users Koala Technologies has brought out Macvision, a $399 image processor which hooks up through a serial port to any standard video camera or recorder. The software translates images from video form to digital form in five seconds, the image can then be transferred into MacWrite or MacPaint applications.

Another device is MicronEye from Micron Technology of Boise, Idaho, for the Mac, the PC, the Apple II and even the Commodore 64. MicronEye is an electronic camera that takes pictures through a normal lens on to an optic RAM which converts the light into digital impulses. Software then sorts it out on a 'grey scale'. Although optic RAM is a threshold device that sees things as black or white the unit takes four shots of each photo at different exposure times, and then merges them to produce a roughly shaded picture.

For a price tag below $2,900 there is the Photobase system for the PC from Chorus Data Systems of New Hampshire. This consists of a video interface board for $500 called PC-Eye and two pieces of software — Photobase ($235) which files images into dBase II (and certain other database system), and Imigit ($250), which connects the hardware to graphics programs.

In addition to a PC you'll need a high resolution graphics adaptor ($700 and up), a composite monochrome monitor ($600), and a video camera ($300) — plus dBase II, of course. PC-Eye will digitise any picture or video frame you want, with Imigit you can modify an image and insert it into another graphics program such as Lotus 1-2-3; with Photobase you can add images to records in dBase II.

The potential market for such devices is huge. At the moment most executive suites get their slide presentation artwork done outside, which can cost between $25 and $125 per transparency, depending on location and quality. Many companies are now finding the hi-res graphics display era surprisingly expensive, as each boardroom presentation may require something like 30 to 50 slides. At $100 a go, this mounts up.

As for inexpensive Photobases that can run on a micro, the possibilities are endless. X-rays and patient records can be married in one file, fingerprints, signatures and ID photos are on another; security conscious America will doubtless be keen to put all of this to use. Whether it's a good use depends on your point of view.

Chris Rowley

Nimbus set to cloud competitors

Research Machines (RML) is reaching for the sky with a new machine called the Nimbus that promises to take it out of its traditional educational fox-hole.

RML, known for its 380Z and 480Z, has moved away from its usual styling to produce a machine that will appeal to a wider market. Mike Fischer, managing director of Research Machines, said that: 'Schools and colleges are just about ready to upgrade from their 8-bit machines to 16-bit,' he added that 'timing is ideal for use of the new 80186'.

The RML Nimbus has an incredible specification for a machine with a price starting at £1,395. The machine has an 80186 running at 8MHz, 192K of RAM (including graphics), graphics up to 640 × 250 with four colours (16 colours available), a minimum of one 3.5in built-in disk drive giving 720K of storage. Expansion is also well catered for; memory can be expanded up to 1Mb, four internal expansion slots are included as well as a sub-system called Piconet.

Piconet allows up to 30 devices to be connected to the Nimbus through one port. Units that can be connected to this port range from RS232 and Centronics interfaces to modems. This method of expansion saves the user from running out of expansion space inside the machine.

Numerous facilities are included as standard with the machine. There is an RS232 socket, mouse/joystick socket, two cartridge sockets, softkey (dongle) socket, three channel sound device, and voice output. A network also provides the facility of linking the machine to other systems.

Research Machines is expecting to sell quite a number of machines to education, and is trying to get as much compatibility with the 480Z and BBC B as possible. At the moment an external disk drive will allow you to read and write 480Z disks, while software to emulate BBC Basic is under development.

Nimbus — silver lining for RML.

Joysticks designed for heavy duty

Hot-shot games players have a choice of new joysticks to waggle to destruction. The Gunshot and Harrier joysticks from Vulcan are described as durable and tough — which would be a welcome change from the cheap models that tend to come apart in your hands.

The Gunshot costs £8.95, and plugs directly into the Commodore 64 and Atari micros. It features dual fire buttons and suction pads on the base. The Gunshot can also be used with the Spectrum through Vulcan's own interface which is Kempston-compatible, and costs £11.50.

The £10.95 Harrier is tailor made for the BBC micro and again features suction pads on the feet. Vulcan also has a joystick interface for the Beeb costing £12.95, that allows you to use Atari type joysticks. Software on tape allows you to convert keyboard software for use with a joystick.

The joysticks are available through Lasky, Rumbelow, and independent retailers.

Mac integrated software soon

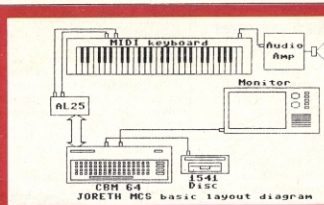
Software-starved Macintosh users will be pleased to hear that a full set of integrated applications software from Lotus (the company responsible for the best-selling Lotus 1-2-3 and Symphony) should be here by April.

Jazz is a close relation to Symphony consisting of word processing, spreadsheet, graphics, database, and communications software. The package has been completely re-written for the Mac so that it makes full use of the mouse, pull-down menus, and icons.

This cheery prospect is somewhat compromised by price: not only will Jazz cost £495, it also requires the expensively-expanded 'Big Mac' to run, involving an upgrade to 512K and the addition of the external floppy disk drive. This means the user unloading about £2,000 to get a standard Mac to run the package.

Even so, the arrival of Jazz is just as important an event for Apple as it is for Lotus. Apple desperately wants to build up a credible applications software library, to tempt potential users away from the ubiquitous PC/MSDOS standard. One of the Mac's target groups is the corporate business area where Lotus and Apple obviously hope the customers are less price-conscious.

Macintosh — to be Jazzed up.



FOOD OF LOVE — Music, that is, and Joreth Music (0386 831615) aims to make your Commodore 64's heart sing with its AL 25 MIDI-link. The AL 25 is a composer's tool that sits between a MIDI (Musical Instrument Digital Interface) keyboard and a 64 with a disk drive. Its features will probably make musicians drool — the one that Joreth is most proud of is the possibility of synchronisation to multi-track audio recording machines. The unit costs £250; a complete system, with computer, disk drive, keyboard, amp and software could be put together for about £1,000.

Servicon doubles up on Spectrum drives

Not content with launching one Spectrum disk drive, Servicon Dynamics (0594-542021) is launching two, both under the Crescent name.

The cheaper and more interesting is the Crescent 128 range, which starts with the Crescent 128i, an interface unit incorporating a BBC-style RS423 interface and an RGB monitor output. This comes with a single 128K drive and costs £150.

The unit can be expanded with the Crescent 128, which is a 128K single drive unit costing £115. The whole lot is due on the market by April.

The system's capacity is considerably below that of the newer disk systems now coming on to the market, but obviously the RS423 and RGB interfaces will increase its attractiveness to users.

Servicon also produces the Crescent 401 series for the Spectrum, which gives 200K storage (100K per side) on a 3in disk. The 401 interface plus a 200K DFS costs £230.

Cheetah stalks further peripherals

Rat-catcher specialist Cheetah, committed to make the joystick redundant, is taking on other familiar peripherals.

In the next eight weeks it plans to put out speech units, games, a joystick interface, an adaptor, and an extension cable for the most popular home micros.

Its speech synthesis module will be for the Commodore 64. Priced below £30, it employs your old friends the allophones to make its gargling sound intelligible. The joystick interface is planned for the Spectrum, as is the extension cable set to cost £10. The games will be for both the Commodore and Sinclair micros, but possibly the most interesting item in the pipeline is the simplest: a two-way aerial adaptor for computer/TV input. That will set you back a mere £2.

Ariolasoft charges its batteries

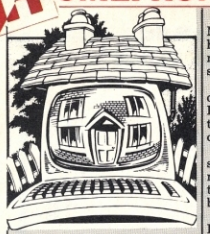
More US software is on its way to the UK thanks to a deal between Ariolasoft and a company with the unlikely name of Batteries Included.

The deal will bring personal productivity software that has been among the best sellers in North America. The titles include such familiar names as Paperclip and The Consultant.

There will also be Homepak, for those whose management talents lie in the home, and Home Organiser.

Ariolasoft opened up in the UK last October with a portfolio of US 'entertainment' programs from the likes of Electronic Arts and Broderbund.

HOMEFRONT



Hands off micro broadcasting

While the fight between television stations for the US soap operas reaches its climax, another set of forces are limbering up behind the BBC's microphones.

The BBC's popular radio computer programme Chip Shop could have its Basicode section chopped, and on the education front computer-synchronised radio programmes could get the axe.

It all boils down to a lack of funds. At the moment the BBC is in a turmoil over its licensing fees — and if unsuccessful in getting the £65 it's asking for, its cut-back axe is likely to fall on computer-oriented programmes.

On the whole BBC Radio has a good track record in producing computer-type programmes. But it's expensive, so it says, to take on a full-time programmer producing the right type of software to go with the radio coverage.

It's on this front that the Microelectronics Education Programme (MEP) has given financial assistance to help produce educational computer-synchronised radio programmes — for example The Mole Concept, Computers at Work and Uniform Accelerated Motion.

However, MEP's help is being withdrawn by March 1985 and the only direction in which producers can turn is to BBC Publications which itself has limited funds.

Julian Coleman, producer of school broadcasting, said: 'The MEP has allowed us to do things that are not quite the norm. For instance, with its help we've produced electronics kits and it has also paid for a programmer to help produce three of our computer-synchronised radio programmes.

'Frankly speaking, there's not a developed market to sell educational software. The problem is that educational establishments have been putting too much money into hardware and not enough into software.'

It's in this respect that the MEP has been able to give a helping hand, because one of its main objectives is to develop software.

Richard Fothergill, director of MEP, said: 'We provide BBC Radio with resources to show them the educational value of computer-synchronised radio.

'We see computer-synchronised radio programmes as a simple way of direct teaching — with interaction between teachers and children.

'I see no reason why BBC Radio couldn't pay for a computer programmer — in the same way they do for a producer, researcher or presenter. We have set the ball rolling, now it's up to them where it goes from here.'

Across the Channel, the French government steamed ahead with its plan to put micros into its lycées. Millions of francs were spent on equipment, training courses and developing software but it has fallen behind in broadcasting.

The UK was slow off the mark getting a micro into every school, but it wasn't long before the BBC got its act together.

Now BBC Radio is streets ahead of France in producing educational programmes involving a micro. And in terms of television, the UK beats France hands down.

Today all four television stations have had or have some form of computer programme — on BBC1 Using the BBC Micro, on BBC2 Micro Live, on ITV Database and on Channel 4 Me and My Micro.

But there's still room for improvement and the BBC should protect its audiences with sectional interests. Dynasty, Dallas, Coronation Street and Brookside may glue large audiences to their television sets — but shouldn't we be more concerned about quality rather than quantity?

The BBC has always argued that the type of programmes it broadcasts shouldn't be decided by the number of people likely to tune in. In the past this has worked very well, particularly where computers have been concerned — BBC programmes introduced a lot of us to micros. It should stick to its guns. Hands off micro broadcasts!

Sandra Grandison

There was 'a deep conviction that there ought to remain in Britain one sector of broadcasting in which programmes are not interrupted, one sector in which the numbers of listeners and viewers for a given programme are not decisively important.'

BBC director-general Alasdair Milne in the *Mail* last week — but does he mean it?

CHARTS

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	1	Ghost Busters	Activision	SP,C64	£9.95
2	4	DT's Decathlon	Ocean	SP, C64	£7.90
3	2	Match Day	Ocean	SP	£6.90
4	5	Knight Lore	Ultimate	SP	£9.95
5	7	3D Star Strike	Real Time	SP	£5.95
6	6	Elite	Acornsoft	AC	£15.00
7	9	HunchBack II	Ocean	SP,C64	£6.95
8	3	Airwolf	Elite	SP	£6.95
9	12	Select 1	Comp Records	SP, C64	£12.49
10	11	Doomdark's Rev.	Beyond	SP	£9.95
11	15	Booty	Firebird	SP, C64	£2.50
12	—	S Davis Snooker	CDS	SP, AC	£7.95
13	13	Staff of Karnath	Ultimate	C64	£9.95
14	17	Spy Hunter	US Gold	C64	£9.95
15	8	Skool Daze	Microsphere	SP	£5.95
16	—	Combat Leader	US Gold	C64	£9.95
17	—	Int Football	Commodore	C64	£14.95
18	—	American Football	Argus	SP, C64	£7.95
19	—	Beach Head	US Gold	SP, C64	£9.95
20	18	Impossible Mission	CBS/Epyx	SP	£9.95

SPECTRUM

TW	TITLE	PRICE
1	Ghost Busters	£9.95
2	Match Day	£6.90
3	Knight Lcre	£9.95
4	Star Strike 3D	£5.95
5	Airwolf	£6.95
6	Doomdark's Rev	£9.95
7	DT's Decathlon	£7.90
8	HunchBack II	£7.90
9	Skool Daze	£5.95
10	S D Snooker	£7.95

COMMODORE

TW	TITLE	PRICE
1	GhostBusters	£9.95
2	DT's Decathlon	£7.90
3	HunchBack II	£7.90
4	Staff of Karnath	£9.95
5	Spy Hunter	£9.95
6	Select 1	£12.49
7	Booty	£2.50
8	Combat Leader	£9.95
9	Int Soccer	£14.95
10	Impossible Mission	£9.95

MICROS

BELOW £1,000

TW	MACHINE	PRICE
1	Spectrum	£125
2	CBM 64	£199
3	Electron	£199
4	Amstrad	£349
5	CBM 16	£140
6	BBC B	£399
7	Atari 800XL	£125
8	MSX (series)	£250
9	Einstein	£500
10	Sharp MZ700	£250

ABOVE £1,000

TW	MACHINE	PRICE
1	IBM PC/XT	£2,390
2	ACT Apricot	£1,760
3	Compaq	£1,795
4	Olivetti M24	£1,595
5	Dec Rainbow	£2,359
6	Televideo 1605	£2,640
7	Wang Professional	£3,076
8	ITT Extra	£1,985
9	Ericcson PC	£2,095
10	Macintosh	£1,795

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the week up to January 24. The games chart is updated every week. The prices quoted are for the no-frills model and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month. PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.

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Textpro	d12.95
VizaSpell	d65.00
VizaWrite	d68.00
VizaWrite	r85.00
VizaWrite + VizaSpell	d99.00
Word Writer	d42.00
Word Wizard	c6.99
Wordcraft 40	d85.00

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Adv Report Generator	d42.00
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Magic Desk	r40.00
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SPP-Junior	d39.00
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VizaStar	r99.00

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Gemini Stock Control	d24.00
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Stock Aid	c/d30.00
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Buscom3-Retail Accts	c/d25.50
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Gemini Cashbook	d80.00
Gemini Final Accounts	c55.00
Gemini Final Accounts	d60.00
Gemini Purchase Ledger	d75.00
Gemini VAT File	c19.50
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PractiFile	c38.00
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Machine Lightning	c39.95
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Share your words of praise or send us a rocket about *PCN*. We want to hear your views and feelings on the articles we print — and those you feel we ought to. Write to *Random Access, Personal Computer News, Evelyn House, 62 Oxford Street, London W1A 2HG*. You could win £15 for the best letter of the week.

Speedy solution gets approval

I must congratulate you on the speed and helpfulness of the reponse to my problem of linking QL to Brother M1009 printer. In the first possible issue, ie the next but one after my query was published, Stephen Horn's letter appeared, giving the pin connections between QL and Brother — precisely what I lacked. I have been in joyful print ever since.

As if Mr Horn's cornucopia were not enough, your next issue carried a splendidly comprehensive review of the problem by Allan Postgate. For my money Boots could do worse than employ Mr Postgate full-time, studying the linking of home computers with the major peripherals and passing on the results to all branches.

Thanks to you all, I am able to confirm Stephen Horn's view that the Brother M1009 is indeed an 'excellent little printer'.

Anyone wishing to marry the M1009 to the Spectrum with Interface 1 may be interested to know that the RS232 lead for this combination from Transform of Beckenham worked for me straight from plug-in.

G C Watson.
Croydon, Surrey.

English micro that reads my needs

I have just read Mr Tappy's letter (issue 95), and am forced to agree that the home micro market needs a machine to fill the Spectrum/BBC gap. I also look in the mirror and note my lack of yellow skin and slant eyes!

Mr Tappy, the micro you describe has existed for well over a year and, not only exceeds MSX and the majority of current machines, but is designed and manufactured in England.

It has an excellent Basic, an in-built assembler/disassembler, front panel, text-handling language, sprites, superb sound and you can plug your joystick, TV, monitor, printer, any old cassette player (no dedicated recorders here), hi-fi and ROMs into the standard sockets.

What about peripherals you ask? This micro can be upgraded to a full business system, but this is an expensive move for the home enthusiast. However, there are now available, two cheap disk drives, a dot-matrix printer that plugs straight in Epson-style, plus various other items soon to be available.

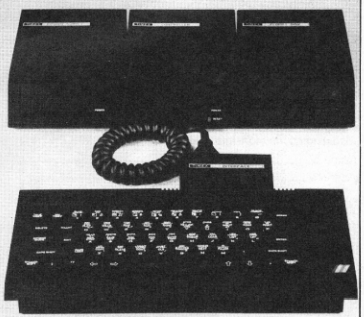
On the software front, there is a rapidly growing catalogue of quality games and utilities from both in-house authors, and other companies such as Hisoft, PSS, Xaviersine and Level 9.

Finally, what other micro has the support of a user group which, for £16 a year, produces a superb monthly magazine, markets members programs, and among many other benefits has the facilities of direct advice from the magazine editor, the venerated Keith Hook (sometime sage within the pages of *PCN*?

Oops! I almost forgot to tell you. This all-metal, professional keyboarded (wot, no membranes?) micro is a Memotech. So go all you patriots, forget about the invasion from the East, we have already got better machinery available. I've bought British (an MTX512) so now it's up to the rest of you.

C M Taylor
Melksham, Wilts.

WIN A SPECTRUM DISK DRIVE



The good news for Spectrum owners is that *PCN* and Spectrum dealer Micro Interface have extended the date of *PCN*'s competition. The not so good news is that it's only extended by one week, to February 8. Together we're offering three superb Timex disk systems worth £300 each. They're fast, easy to use and store 160K on each 3in disk — just the thing for yawning cassette users.

In addition, we'll give away 24 keyboard overlays to the runners up.

All you have to do is complete the sentence on the right in the funniest or most entertaining (and printable) way. Entries must be received by Friday, February 8. The editor's decision is final and no correspondence will be entered into.

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Send to: Spectrum Disk Competition, *Personal Computer News*, 62 Oxford Street, London W1A 2HG.

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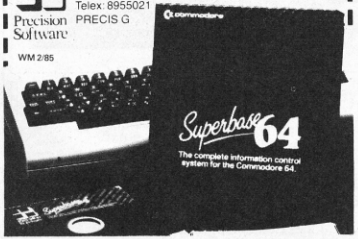

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RGB/composite output choice

Q I am thinking of buying a TV monitor to use with my issue 2 Spectrum. I know that (with a small internal connection) the video signal is available on the edge connector, therefore could you answer the following queries:

1 Is this signal a standard composite input?

2 If so, are there any problems using a monitor with composite input?

3 Is the Microvitec 1431 MZ likely to offer a better display than a TV/monitor?

4 Can the Microvitec be used with computers other than the Spectrum (if I upgrade)?

5 Is my interface 1 likely to cause any additional problems?

Graham Croucher, Sittingbourne, Kent.

A Yes, the signal you can get out of a Spectrum is standard composite. On issue 3 Spectrums and upwards you take the Video line and the 0 volts line from the edge connector and connect them to a cable (cutting off the TV end of your current TV cable will produce the right configuration), you then connect 0 volts to the outer part of the cable and Video to the core.

On issue 1 and 2 Spectrums you need to bridge a gap in the Video line on the circuit board. The gap is between TC1 and TC2, and is marked 'VID'. A small blob of solder between the two should do the trick.

Alternatively, you can intercept the signal going into the modulator, as this is composite video anyway. Attach the core of the cable to the input (left hand side of the modulator, nearest the rear of the machine), and the outside to the modular case. You get a firm connection here by prising the top of the case off, inserting the cable, then wedging it back on so the cable is trapped. This should work on all machines, and won't interfere with your TV output.

But if you want to use a 1431MZ you might as well throw away all the above intructions except for the solder connection. The 1431 has built-in circuitry that decodes the Spectrum's signals so it can be used with an RGB monitor, so the 1431 is RGB, not composite, and because of this it will produce a better picture than other monitors/TVs (unless they happen to be RGB), and with rival RGB monitors you'd still have to buy an RGB adaptor. Adapt Electronics, of 20 Starling Close, Buckhurst Hill, Essex tel: 01-504 2840) offers about the cheapest of these.

The Microvitec is switchable, so the only problem involved in using another micro with it is in getting the right cable made up. As far as interface 1 is concerned, there are no problems.

Vic 20 printers are thick on the ground

Q I want a printer for my Vic 20 but I cannot find one to suit my needs. I have noted the specifications I require and hope you can suggest a suitable printer.

I need: 9×9 pin, dot matrix; user defined graphics, true descenders; enlarged print; easy connection to the Vic 20; tractor and friction feed; 80 cloumn print; cost £100-£400.

M Davies, Llandeilo, Dyfed.

A You're simply not paying attention. With the single exception of user defined graphics, the list of features you mention is available on several machines.

Most of the popular printers are dot matrix with a 9×9 print head, which means they can offer true descenders. There are few printers that feature less than 80 column print.

With the exception of Commodore's own printers, all are equally easy (or difficult) to connect to a Vic or 64. What you need is a printer interface, for which you should talk to your local computer specialist dealer.

So, where do you go from there? Let's start with user defined graphics. There are two alternatives here: if you want the Commodore character set, most of the good interfaces will give you this. The second option is to buy a printer with a built-in buffer which holds any character set you wish. However, you'll have to write your own program to send the characters to the buffer.

Your final features — friction feed and a range of type styles — are also widely available. Try the printers from Star, Mannesmann Tally and Shinwa. Your best bet might be the Epson RX80F/T and the FX80 and FX100 machines. The only snag with the latter is price — generally around £450.

Losing your way in Simons Basic

Q I own a Commodore 64 with Simons Basic. Recently I bought a 1541 disk drive and the book *The Anatomy of the 1541*. My problem is that in the book are some Basic extensions and programs for the 1541.

All of these are listed both in assembler and as a Basic loader program but once loaded and run, all my Simons Basic keywords are gone.

The programs are stored at addresses 828-901; 51200-51478 and 49152-49887. Can you help?

Marc de Schryver, Aalst, Belgium.

A Afraid we can't be much help on this. The problem lies (we think) in the fact that what you're trying to do is add Basic extensions to a program that already consists of Basic extensions.

Simons Basic must alter the 64's system pointers to the Basic interpreter. There is a strong chance that your disk routines come along later and alter those pointers again so that the 64 'forgets' all about Simons Basic.

The best solution lies in a good deal of ferreting around in assembly language. What you need to do is work out where the start address of the new commands lie, then call them with a SYS call instead of the new keywords. You'll also have to disable the part of the new routine which is changing the pointers.

As we say, this will involve you in a great deal of machine code. If it's any consolation, it will be a wonderful educational exercise.

Atmos remote control of cassette recorder

Q Is there any way of operating the motor of a cassette recorder remotely controlled by an Oric Atmos?

Philip Smith, Salisbury, Wilts.

A The best answer is, it depends. Yes, you can use remote control but it depends on how much control you need. Physically, you need a cassette player with the regular three jack sockets — EAR, MIC and REM. Next, get a cable that runs from a 7-pin DIN plug (at the Atmos end) to three single jacks (at the cassette end). The pin outs are in your Atmos manual.

The next stage involves a bit of pokeing around to find the register that sends the required pulse to the cassette player, at which point we bow out gracefully . . .

Differing values puzzle on Spectrum

Q Why when I format a Microdrive cartridge several times does the CAT command return different values? I have had values of 85K, 86K and 87K remaining.

Also, if I purchased an Alphacom printer for my Spectrum, would I get a full 64 characters per line from the Tasword package, and would it be legible?

M James, Dagenham, Essex.

A There hangs a tale. Initially the Microdrives were said to produce different values from cartridge to cartridge because they were identifying bad sectors on the tape. Capacity would therefore vary between around 85K and 95K.

But a while ago *PCN* found that the same cartridge formatted on different Microdrives came back with capacities well outside this range. You'll find that one Microdrive will almost inevitably format cartridges in a 2-3K range of its own given baseline, so in your case Microdrive formats around 86K, in a range 85K-87K, while you might know someone whose drive will format the same cartridges in the range 90K-92K.

Why? The reason is quite straightforward, and has very little to do with bad sectors. Microdrives run at different speeds, so the faster the Microdrive, the higher the capacity. If you do have a friend whose drive formats at 95K then it makes sense to get all your cartridges formatted on it.

You shouldn't have any great problems with an Alphacom. The print quality will be better than a ZX printer, but worse than most dot matrix machines. If you do have any problems interfacing Tasword 2 to any printer, however, Tasman Software (0532-438301) is quite helpful as regards the ins and outs.

MICROWAVES

Got any good tips for Commodore users, or sparky ideas for the Spectrum? Then air your discoveries in the forum by sending them to us. £10 for every answer printed and £50 for the Microwave of the month. Send to Microwaves, *Personal Computer News*, Evelyn House, 62 Oxford Street, London W1A 2HG.

Copycat Amstrad appears in print

This short machine code routine for the Amstrad CPC 464 prints a copy of the screen display to a printer. To ensure it works on any Centronics type printer, only ASCII characters are produced and any graphic or user defined characters are replaced by spaces.

The routine is located in memory addresses 43824 to 43899 and is invoked by CALL 43824 but since all jumps are relative, it can be relocated to any other address.

Note, that the address 43900 is used to store a value relating to the mode and if this needs to be avoided for any reason (*eg* another routine is at that address) then the two occurences in the listing of &7C,&AB will need to be replaced by the HEX representation of an alternative address to be used.

K H Denham,
Wimborne, Dorset.

```
5 REM "screencopy" K.H.Denham 15.12.84
10 MEMORY 43823:FOR x=43824 TO 43899:READ a:POKE x,
a:NEXT:STOP
20 DATA &cd,&11,&bc,&21,&7c,&ab,&36,&15,&fe,&00,
&28,&0a,&fe,&01,&28,&04,&36,&51,&18,&02,&36,&29,
&1e,&01,&16,&01,&d5,&e1,&cd,&75,&bb,&cd,&60,&bb,
&fe,&30,&30,&04,&fe,&20,&30,&02,&3e,&20,&cd,&2e,
&bd,&38,&fb
30 DATA &cd,&2b,&bd,&14,&3a,&7c,&ab,&ba,&20,&df,
&3e,&0a,&cd,&2b,&bd,&1c,&3e,&1a,
&bb,&20,&d2,&3e,&0a,&cd,&2b,&bd,&c9
```

Handy routine for 64 and Vic 20

While experimenting with the switches connected with the joystick port on the Commodore 64 I realised how useful a program which displays the individual bit values would be. I produced the following program to work on both the 64 and the Vic 20.

Running the program prompts you for the memory location you want to examine. The 8-bit binary value is shown at the top of the screen and continually updated until function key number 1 is pressed. This returns you to input stage.

The program is very handy for looking at joystick and user ports. Try these addresses:

- 653 — the keyboard flag; press SHIFT, CTRL and Commodore logo to see the flags switch on and off
- 56321 — the joystick port 1, moving the stick changes the bit values
- 56320 — the joystick port 2
- 56577 — the input/output lines for the user port (port B), after first setting the DDR at 56579
- 1 — bit 4 the cassette switch and bit 5 the cassette motor control
- 53265 — bit 7 the raster compare register as it works

David Rossiter,
Paignton, Devon.

```
1 REM * CONSTRUCTED,DIRECTED, AND    *
2 REM * PROGRAMMED BY DAVID ROSSITER.*
3 REM *  *  *    (C) JULY '84    *  *  *
4 PL$="1"
5 OFF$="0"
6 DIM A#(7)
7 PRINT"□":REM * CLEAR SCREEN *
8 REM * NEXT LINE = HOME,DOWN,DOWN,DOWN,DOWN.
9 REM * ,CURSOR LEFT,THEN CURSOR LEFT AGAIN. *
10 PRINT"■■■■■■■■ADDRESS OF BYTE ?"
20 INPUT B
25 P=PEEK(B)
29 REM * BIT 7 *
30 IF(P AND 128)>0THEN A#(7)=PL$:GOTO 50
40 A#(7)=OFF$
49 REM * BIT 6 *
50 IF(P AND 64)>0THEN A#(6)=PL$:GOTO 70
60 A#(6)=OFF$
69 REM * BIT 5 *
70 IF(P AND 32)>0THEN A#(5)=PL$:GOTO 90
80 A#(5)=OFF$
89 REM * BIT 4 *
90 IF(P AND 16)>0 THEN A#(4)=PL$:GOTO 110
100 A#(4)=OFF$
109 REM * BIT 3 *
110 IF(P AND 8)>0 THEN A#(3)=PL$:GOTO 130
120 A#(3)=OFF$
129 REM * BIT 2 *
130 IF(P AND 4)>0 THEN A#(2)=PL$:GOTO 150
140 A#(2)=OFF$
149 REM * BIT 1 *
150 IF(P AND 2)>0 THEN A#(1)=PL$:GOTO 170
160 A#(1)=OFF$
169 REM * BIT 0 *
170 IF(P AND 1)>0 THEN A#(0)=PL$:GOTO 190
180 A#(0)=OFF$
190 Z$=" "+A#(7)+A#(6)+A#(5)+A#(4)+A#(3)+A#(2)+A#(1)+A#(0)
199 REM * NEXT CHARACTERS ARE HOME,DOWN,THEN DOWN AGAIN *
200 PRINT"■■■";Z$
210 GET G#
219 REM * THE NEXT CHARACTER IS 'F1' *
220 IF G#="■"THEN GOTO 10
230 GOTO 25
```

Listing programs on a ZX printer

Here's a simple way to obtain a list of all the programs saved on a tape as a printout on the ZX printer. The Spectrum prints on the screen the name of any program it finds before the correct one when it executes a LOAD or a MERGE command.

The stream used is not accessible to the OPEN command, so it cannot be changed in this way. There is, however, a trick used in ROM to allow both screen and printer to share the same output routine, which means that by changing just one byte, all screen output can be directed to the printer to give you a written record.

all screen output can be directed to the printer.

Using the following procedure you can therefore obtain a listing of all the programs on a given cassette.

Then, type POKE 23743,80

Then place the tape in the cassette positioned before the start of the first program and type LOAD"nosuchname" (or any name not used for a program).

Finally, wait until the printout is completed, BREAK the LOAD command, type PRINT:POKE 23743,83 and the Spectrum will be restored to normal.

The last POKE is essential (PRINT is only there to give an extra line) as without it, it would not be possible to output anything else on the screen. This is because the routine is not equivalent to the more frequently used OPEN statement, which directs output from the PRINT statement to the printer, but works quite differently and is much more powerful.

Another use for the technique would be to verify a screen. Simply replace the second step with SAVE"screen"SCREEN$ and the VERIFY"SCREEN$ until you get perfect saving.

Harry Sahinoglou
Thessaloniki, Greece.

Clear-out of integer variables on Electron

While searching through the Electron's memory I discovered where the 26 integer variables (A% ... Z%) are stored. The BBC advanced user guide was of little help saying that pages 4 to 7 were main workspace but giving no further help.

The resident integer variables are, in fact, stored in memory locations 1028 (&404) to 1131 (&46B). Using this information I have written a small routine to clear these interger variables, as they are not affected by the standard CLEAR command.

Anyone more familiar with machine code might like to store the object code elsewhere (page 10, for example) or even develop a *CLEAR command using Stephen Grigg's program (issue 86).

The program also works on the BBC. Note that the routine does not clear the format variables @%.

Stephen Baker,
St George, Bristol.

```
10DIM C 10
20FOR T=0 TO 2 STEP 2
30P%=C
40[OPT T
50.VCLR
55LDX£104
60LDA £0
70.LOOP
75STA &403,X
80DEX
90BNE LOOP
100RTS
110]
120NEXT
```

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CRAZY CAVERNS

Calling all Commodore 64 owners — get your digits ready to type in the first part of *PCN*'s exclusive game written by Tony Crowther.

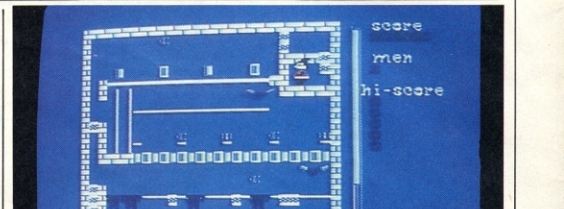
This week *PCN* is proud to present the first part of Crazy Caverns, an all machine code game of arcade quality written by Tony Crowther. Tony is the author of several chart-toppers, including *Potty Pigeon*, *Monty Mole* and *Suicide Express*.

Over the next few weeks the Crazy Caverns listing will build up into the kind of game you'd normally have to pay real money for.

The game is of the *Manic Miner* type, and consists of ten screens. You need to collect a series of objects in order to move from screen to screen. Type in the sections one at a time, then run it to check that your data statements are correct. If they are you should save the section, then begin typing in the next one.

Note that the listing here is for disk users. If you wish to use tape you should change the last line of each section to LOAD "FILENAME",1,1.

To be continued next week



Set-up for loaders

```
1 POKE56,32:PRINT"[CLEAR]LOAD"CHR$(34)"P
ART1"CHR$(34)",8
2 POKE198,2:POKE631,19:POKE632,131:NEW
```

Listing

Part 1

```
0 REMPART1:CODE1:WIZARD DEVELOPMENT LTD.
1 DATA169,64,133,251,169,4,133,253,1176
2 DATA169,0,32,14,196,234,133,254,1032
3 DATA133,255,174,163,3,240,17,165,1050
4 DATA250,24,105,89,133,250,165,251,1267
5 DATA105,1,133,251,202,76,21,192,981
6 DATA162,0,160,0,177,250,74,74,897
7 DATA74,74,168,185,118,192,164,254,1229
8 DATA145,252,160,0,177,250,41,15,1040
9 DATA168,185,128,192,230,254,164,254,15
75
10 DATA145,252,230,254,232,165,250,24,15
52
11 DATA185,1,133,250,144,2,230,251,1116
12 DATA224,14,144,206,230,255,165,252,14
90
13 DATA24,185,48,133,252,144,2,230,938
14 DATA253,162,0,134,254,166,255,224,144
8
15 DATA224,144,181,96,0,0,32,65,542
16 DATA67,69,73,75,71,72,77,85,589
17 DATA32,66,68,70,74,76,71,72,529
18 DATA77,85,169,0,133,250,169,64,947
19 DATA133,251,174,63,3,240,17,165,1046
20 DATA250,24,105,89,133,250,165,251,126
7
21 DATA185,1,133,251,202,76,149,192,1189
22 DATA162,0,160,0,152,145,250,200,1069
23 DATA192,14,208,249,232,165,250,24,133
4
24 DATA185,14,133,250,144,2,230,251,1129
25 DATA224,25,208,230,96,169,0,141,1093
26 DATA141,220,128,169,4,141,25,208,898
27 DATA141,26,208,169,0,141,18,208,911
28 DATA141,17,208,169,231,141,20,3,930
29 DATA169,192,141,21,3,88,96,169,879
30 DATA1,141,25,208,169,0,141,18,703
31 DATA208,169,27,141,17,208,206,255,123
1
32 DATA207,173,255,207,41,7,141,255,1286
33 DATA207,170,169,234,157,72,50,169,122
8
34 DATA170,157,80,50,138,24,105,1,725
35 DATA41,7,170,169,224,157,72,50,898
36 DATA169,14,157,80,50,173,255,207,1105
37 DATA74,234,144,49,74,234,144,45,1204
38 DATA170,189,82,193,141,56,50,141,1022
39 DATA57,50,141,71,50,141,70,50,630
40 DATA169,7,56,237,255,207,141,69,1175
41 DATA189,82,193,141,62,50,141,63,921
42 DATA50,141,64,50,141,65,50,76,637
43 DATA26,198,128,32,8,2,255,191,840
44 DATA255,0,255,0,169,212,141,0,1032
45 DATA208,169,85,141,1,208,169,255,1236
46 DATA141,28,208,141,21,208,169,128,104
4
47 DATA141,248,7,96,255,169,255,141,1312
48 DATA208,220,173,0,220,141,116,193,1063
49 DATA169,253,141,0,220,173,1,220,1177
50 DATA141,16,208,16,173,116,193,41,804
51 DATA4,240,37,173,116,193,56,233,1052
52 DATA4,76,181,193,169,251,141,0,1015
53 DATA220,173,1,220,41,128,208,16,1007
54 DATA173,116,193,41,8,240,9,173,953
55 DATA116,193,56,233,8,141,116,193,1056
56 DATA169,191,141,0,220,173,1,220,1115
57 DATA116,193,24,105,8,141,116,193,784
58 DATA105,16,141,116,193,96,234,169,107
0
59 DATA8,133,250,169,4,133,251,173,1113
60 DATA0,208,56,233,20,74,74,74,739
61 DATA133,250,173,1,208,56,233,53,1107
62 DATA74,74,74,133,252,166,252,240,1265
63 DATA15,165,250,24,105,40,133,250,982
64 DATA144,2,230,251,202,76,239,193,1337
65 DATA96,177,250,201,65,240,6,201,1236
66 DATA66,240,2,24,96,56,96,234,814
67 DATA173,116,193,41,4,208,9,206,950
68 DATA0,208,32,51,194,238,0,208,931
69 DATA173,116,193,41,8,208,9,238,986
70 DATA0,208,32,51,194,206,0,208,899
71 DATA76,75,194,32,207,193,160,41,970
72 DATA32,1,194,176,8,160,81,32,684
73 DATA1,194,176,1,96,169,255,141,1033
74 DATA116,193,96,76,59,196,160,121,1017
75 DATA177,250,201,32,208,9,169,255,1301
76 DATA141,116,193,76,133,195,96,201,115
1
77 DATA77,144,11,201,84,240,10,176,943
78 DATA5,24,105,1,145,250,76,143,749
79 DATA195,169,32,76,108,194,173,255,120
2
80 DATA207,74,144,58,173,116,193,41,1006
81 DATA4,200,22,238,248,7,173,248,1140
82 DATA7,201,128,144,7,201,132,176,996
83 DATA3,76,153,194,169,128,141,248,1112
84 DATA7,173,116,193,41,8,208,22,768
85 DATA206,248,7,173,248,7,201,132,1222
86 DATA144,7,201,136,176,3,76,182,925
87 DATA194,169,135,141,248,7,173,1,1068
88 DATA208,41,7,201,5,240,6,169,879
89 DATA255,141,1,193,208,1,206,96,1248
90 DATA15,0,173,116,193,41,16,208,762
91 DATA1,169,1,141,201,194,173,116,1006
92 DATA193,141,200,194,96,174,201,194,13
93
93 DATA32,206,195,56,253,8,132,141,1023
94 DATA1,208,76,24,195,0,0,0,145
95 DATA116,193,189,7,132,240,3,32,912
96 DATA13,195,238,201,194,238,201,194,14
74
97 DATA173,201,194,201,89,144,5,169,1176
98 DATA0,141,201,194,96,32,193,195,1052
99 DATA41,0,208,3,238,0,208,173,879
100 DATA116,193,41,4,208,3,206,8,771
101 DATA208,96,32,207,193,160,121,177,11
94
102 DATA250,201,32,240,22,173,1,208,1127
103 DATA41,7,201,5,208,13,173,201,849
104 DATA194,201,38,144,6,169,0,141,893
105 DATA201,194,96,174,201,194,76,237,13
73
106 DATA194,0,255,0,255,0,255,0,959
107 DATA32,117,193,173,18,208,201,255,11
97
108 DATA208,249,173,201,194,208,9,32,127
4
109 DATA16,194,32,151,195,76,110,195,969
110 DATA32,201,194,76,130,195,32,24,984
111 DATA196,41,8,208,3,238,0,208,902
112 DATA173,116,193,41,4,208,3,206,944
113 DATA0,208,76,92,196,238,1,208,1019
114 DATA169,1,141,142,0,96,0,169,718
115 DATA0,141,142,195,76,118,194,173,103
9
116 DATA142,195,208,3,76,202,194,96,1116
117 DATA173,116,193,41,4,208,9,206,958
118 DATA0,208,32,51,194,238,0,208,931
119 DATA173,116,193,41,8,208,9,238,986
120 DATA0,208,32,51,194,206,0,208,899
121 DATA96,173,200,194,141,116,193,32,11
45
122 DATA160,195,173,116,193,96,173,1,110
7
123 DATA208,41,7,201,5,208,51,173,894
124 DATA1,208,56,253,8,132,141,1,800
125 DATA208,32,207,193,174,201,194,173,1
382
126 DATA1,208,24,125,8,132,141,1,640
127 DATA208,160,41,177,250,201,65,240,13
42
128 DATA7,201,66,240,3,76,10,196,799
500 PRINT"[CLEAR]PLEASE WAIT!"
501 FORI=0TO127:R=0:FORJ=0TO7:READA:R=R+
A:POKE49152+I*8+J,A:NEXT
502 READA:IFR<>ATHENPRINT"ERROR IN"I+1:E
ND
503 NEXT:PRINT"OK. ALL DONE!"
504 LOAD"PART2",8
```

Part 2

```
0 REMPART2:CODE2:WIZARD DEVELOPMENT LTD.
1 DATA173,1,208,24,125,8,132,141,812
2 DATA1,208,173,1,208,96,169,41,897
3 DATA133,252,169,0,133,250,96,234,1267
4 DATA32,31,196,173,116,193,96,173,1010
5 DATA1,208,41,7,201,5,208,18,689
6 DATA160,121,177,250,201,71,208,3,1191
7 DATA206,0,208,201,72,208,3,238,1136
8 DATA208,208,96,32,207,193,160,81,977
9 DATA177,250,201,73,240,7,201,74,1223
10 DATA240,3,76,78,194,206,1,208,1086
11 DATA96,201,5,240,3,206,1,208,960
12 DATA96,234,234,238,91,196,173,1263
13 DATA91,196,201,4,144,8,169,0,813
14 DATA141,91,196,32,113,196,76,30,875
15 DATA197,198,220,165,220,208,61,160,14
29
16 DATA0,140,11,212,140,18,212,169,902
17 DATA58,141,12,212,169,29,141,19,781
18 DATA212,177,222,141,0,212,141,15,1128
19 DATA212,200,177,222,141,7,212,141,131
2
20 DATA14,212,200,177,222,133,220,169,13
47
```

Listing

```
21 DATA65,141,18,212,169,71,141,11,828
22 DATA212,165,222,24,105,3,133,223,1086
23 DATA144,2,238,223,198,221,165,221,140
4
24 DATA208,42,160,0,140,4,212,169,935
25 DATA48,141,5,212,177,218,141,1,935
26 DATA212,200,177,218,141,0,212,169,132
9
27 DATA37,141,4,212,200,177,218,133,1122
28 DATA221,165,218,24,105,3,133,218,1087
29 DATA144,2,230,219,165,223,201,139,132
3
30 DATA208,9,165,222,201,132,208,3,1148
31 DATA32,244,196,96,169,0,133,222,1092
32 DATA169,133,133,223,169,132,133,218,1
310
33 DATA169,139,133,219,169,1,133,220,118
3
34 DATA133,221,173,24,212,169,1,141,1074
35 DATA17,212,169,7,141,3,212,169,930
36 DATA7,141,10,212,96,0,160,41,667
37 DATA32,53,197,141,41,212,133,197,765
38 DATA160,81,32,53,197,160,121,32,836
39 DATA53,197,76,135,197,177,250,201,128
6
40 DATA75,240,13,201,76,240,9,201,1055
41 DATA69,240,13,201,70,240,9,96,938
42 DATA169,32,145,250,32,219,197,96,1140
43 DATA104,104,96,169,70,133,228,169,107
3
44 DATA4,133,229,160,0,169,96,145,936
45 DATA228,162,0,165,228,24,105,40,952
46 DATA133,228,144,2,230,229,169,86,1221
47 DATA145,228,232,224,23,208,236,169,14
65
48 DATA97,145,228,169,110,133,228,169,12
79
49 DATA4,133,229,76,80,195,0,238,955
50 DATA134,197,173,134,197,201,20,144,12
00
51 DATA49,160,0,140,134,197,177,228,1085
52 DATA24,105,1,145,228,201,95,144,943
53 DATA14,165,228,24,105,40,133,228,937
54 DATA144,2,230,229,173,145,197,165,128
5
55 DATA229,201,7,208,13,165,228,201,1252
56 DATA180,144,7,177,228,201,97,208,1242
57 DATA1,96,173,255,207,201,115,240,1599
58 DATA173,249,7,24,233,0,201,136,1023
59 DATA176,2,169,139,141,249,7,76,959
60 DATA253,197,0,140,252,4,189,0,655
61 DATA111,4,24,105,1,157,111,4,517
62 DATA201,58,144,8,169,48,157,111,894
63 DATA4,202,208,225,201,72,240,2,1081
64 DATA228,238,29,197,96,173,30,208,1199
65 DATA141,210,197,41,2,240,10,173,1022
66 DATA29,197,201,1,240,3,76,20,741
67 DATA198,76,7,199,169,255,141,29,1074
68 DATA197,96,162,0,160,0,185,67,867
69 DATA3,201,1,208,2,169,4,208,882
70 DATA201,2,208,3,222,5,200,201,1050
71 DATA3,208,3,222,4,208,201,0,849
72 DATA208,3,254,5,208,254,76,3,1011
73 DATA189,76,3,217,69,3,144,16,717
74 DATA185,67,3,24,105,2,41,3,430
75 DATA153,67,3,169,0,157,76,3,628
76 DATA232,232,152,24,105,5,168,224,1142
77 DATA44,144,187,76,210,198,169,128,1116
78 DATA133,250,169,37,133,251,174,63,121
0
79 DATA3,240,11,165,250,24,105,18,816
80 DATA32,177,199,76,113,198,120,160,107
5
81 DATA0,177,250,153,65,3,200,192,1040
82 DATA10,200,246,173,65,3,141,4,850
83 DATA208,173,66,3,141,5,208,173,977
84 DATA68,3,141,250,7,173,73,3,718
85 DATA141,251,7,173,70,3,141,6,792
86 DATA208,173,71,3,141,7,208,160,971
87 DATA18,177,250,153,254,207,200,192,14
43
88 DATA18,208,246,160,0,169,149,153,1103
89 DATA252,7,208,177,250,24,169,1,1270
90 DATA1,141,76,3,141,78,3,88,531
91 DATA96,5,238,209,198,173,209,198,1326
92 DATA201,8,144,44,169,0,141,209,943
93 DATA198,162,0,160,0,254,250,7,1031
94 DATA185,68,3,24,105,3,221,250,859
95 DATA7,176,6,185,68,3,157,250,852
96 DATA7,232,234,152,24,105,5,168,927
97 DATA224,2,144,225,76,49,234,173,1127
98 DATA218,197,41,2,208,8,173,218,1065
99 DATA197,41,1,240,3,76,209,198,732
100 DATA195,1,160,0,140,134,197,177,1004
101 DATA228,24,105,1,145,228,201,95,1027
102 DATA144,4,165,228,24,105,40,133,853
103 DATA228,144,2,230,229,173,145,197,13
48
104 DATA165,229,201,7,208,17,165,228,122
0
105 DATA201,180,144,11,177,228,201,97,12
39
106 DATA208,5,169,1,141,25,199,96,844
107 DATA169,0,141,25,199,32,26,199,791
108 DATA162,5,189,13,24,105,1,40
109 DATA157,111,4,201,58,144,8,169,852
110 DATA48,157,111,4,202,208,235,173,113
8
111 DATA18,208,201,255,208,249,238,148,1
525
112 DATA199,169,0,141,4,212,173,148,1046
113 DATA149,141,1,212,169,41,5,872
114 DATA212,169,33,141,4,212,173,25,969
115 DATA199,240,194,96,245,120,169,49,13
12
116 DATA141,20,3,169,234,141,21,3,732
117 DATA169,1,141,14,220,169,121,141,976
118 DATA25,208,169,240,141,26,208,88,110
5
119 DATA96,133,250,144,2,230,251,202,130
8
120 DATA96,255,0,255,0,255,0,255,1116
500 PRINT"{CLEAR}PLEASE WAIT!"
501 FORI=@TO119:R=@:FORJ=@TO7:READA:R=R+
A:POKE50176+I*8+J,A:NEXT
502 READA:IFR<>ATHENPRINT"ERROR IN"I+1:E
ND
503 NEXT:PRINT"OK. ALL DONE!"
504 LOAD"PART3",8
```

Part 3

```
0 REMPART3:SPRII:WIZARD DEVELOPMENT LTD.
1 DATA0,0,0,0,0,80,0,1,81
2 DATA80,0,5,64,0,21,64,0,234
3 DATA63,64,0,55,80,0,255,208,725
4 DATA0,63,208,0,5,0,0,10,286
5 DATA0,0,41,128,0,41,128,0,335
6 DATA150,160,0,170,160,0,255,240,1135
7 DATA0,85,80,0,21,64,0,5,255
8 DATA0,0,5,0,0,21,0,0,26
9 DATA0,0,0,0,0,0,80,0,1,81
10 DATA80,0,5,64,0,21,64,0,234
11 DATA63,64,0,55,80,0,255,208,725
12 DATA0,63,208,0,5,0,0,10,286
13 DATA0,0,41,128,0,41,128,0,335
14 DATA150,160,0,170,160,0,255,240,1135
15 DATA0,85,80,0,21,64,0,5,255
16 DATA0,0,5,0,0,21,0,0,26
17 DATA0,0,0,0,0,80,0,1,81
18 DATA80,0,5,64,0,21,64,0,234
19 DATA63,64,0,55,80,0,255,208,725
20 DATA0,63,208,0,5,0,0,10,286
21 DATA0,0,41,128,0,41,128,0,335
22 DATA150,160,0,170,160,0,255,240,1135
23 DATA0,85,80,0,21,64,0,5,255
24 DATA80,0,80,80,1,81,64,0,386
25 DATA0,0,0,0,0,80,0,1,81
26 DATA80,0,5,64,0,21,64,0,234
27 DATA63,64,0,55,80,0,255,208,725
28 DATA63,208,0,5,0,0,10,286
29 DATA0,0,41,128,0,41,128,0,335
30 DATA165,96,0,170,160,0,255,240,1086
31 DATA85,80,0,21,80,0,21,287
32 DATA80,0,20,16,84,0,0,200
33 DATA0,0,0,5,0,0,5,64,74
34 DATA0,1,80,0,1,84,0,1,167
35 DATA252,0,5,220,0,7,255,0,739
36 DATA0,0,0,0,0,0,0,0,0,234
37 DATA63,64,0,55,80,0,255,208,725
38 DATA63,208,0,5,0,0,10,286
39 DATA0,0,41,128,0,41,128,0,335
40 DATA0,0,5,0,0,5,64,74
41 DATA0,1,80,0,1,84,0,1,167
42 DATA0,4,20,0,21,0,0,45
43 DATA0,0,0,5,0,0,5,64,74
44 DATA0,1,80,0,1,84,0,1,167
45 DATA252,0,5,220,0,7,255,0,739
46 DATA7,252,0,0,0,0,0,160,499
47 DATA7,252,0,0,80,0,0,160,499
48 DATA0,2,104,0,2,152,0,10,270
49 DATA165,0,10,170,0,15,255,0,615
50 DATA5,85,0,1,84,0,0,85,260
51 DATA0,1,69,64,1,80,0,0,215
52 DATA0,0,5,0,0,5,64,74
53 DATA0,1,80,0,1,84,0,1,167
54 DATA252,0,5,220,0,7,255,0,739
55 DATA7,252,0,0,80,0,0,160,499
56 DATA0,2,104,0,2,152,0,10,270
57 DATA0,0,5,0,0,5,64,74
58 DATA0,1,80,0,1,84,0,1,167
59 DATA252,0,5,220,0,7,255,0,739
60 DATA7,252,0,0,80,0,0,160,499
61 DATA0,2,104,0,2,152,0,10,222
62 DATA150,0,10,170,0,15,255,0,600
63 DATA5,85,0,1,84,0,0,80,255
64 DATA0,0,80,0,0,80,0,0,0,0
65 DATA85,85,0,85,85,0,106,169,615
66 DATA0,106,169,0,111,249,0,111,746
67 DATA0,249,0,108,57,0,108,57,0,579
68 DATA0,108,57,0,108,57,0,111,249,690
69 DATA0,111,249,0,106,169,0,106,741
70 DATA0,169,0,85,85,0,85,85,0,589
71 DATA0,0,0,0,0,0,0,0,0,0
72 DATA0,0,0,0,0,0,0,0,0,0
73 DATA0,0,0,0,0,0,0,21,84,105
74 DATA0,21,84,0,21,84,0,26,321
75 DATA164,0,27,228,0,27,228,0,674
76 DATA27,228,0,27,228,0,26,164,700
77 DATA0,0,0,0,0,0,0,0,0,21,316
78 DATA84,0,0,0,0,0,0,0,84
79 DATA0,0,0,0,0,0,0,0,0,0
80 DATA0,0,0,0,0,0,0,0,0,0
81 DATA255,255,0,255,255,0,192,3,1215
82 DATA0,192,3,0,197,83,0,197,672
83 DATA83,0,198,147,0,198,147,0,773
84 DATA198,147,0,198,147,0,197,83,970
85 DATA0,197,83,0,192,3,0,192,667
86 DATA3,0,255,255,0,255,255,0,1023
87 DATA0,0,0,0,0,0,0,0,0,0
88 DATA0,0,0,0,0,0,0,0,0,0
89 DATA170,170,0,170,170,0,191,254,1125
90 DATA0,191,254,0,170,170,0,170,811
91 DATA1,0,177,78,0,177,78,0,524
92 DATA177,78,0,177,78,0,176,14,700
93 DATA0,176,14,0,191,254,0,191,826
94 DATA254,0,170,170,0,170,170,0,934
95 DATA0,0,0,0,0,0,0,0,0,0
96 DATA0,0,0,0,0,0,0,0,0,0
97 DATA0,0,0,0,0,0,0,0,0,0
98 DATA0,0,0,0,0,0,0,5,5
99 DATA1,64,29,69,208,127,87,244,829
100 DATA127,87,244,252,16,252,252,0,1230
101 DATA252,240,0,60,240,0,60,48,900
102 DATA48,0,0,0,0,0,0,0,48
103 DATA0,0,0,0,0,0,0,0,0
104 DATA0,0,0,0,0,0,0,0,0
105 DATA0,0,0,0,0,0,0,0,0
106 DATA20,244,0,124,61,1,240,13,703
107 DATA69,192,1,69,0,0,84,0,415
108 DATA0,84,0,0,16,0,0,0,100
109 DATA0,0,0,0,0,0,0,0,0
110 DATA0,0,0,0,0,0,0,0,0
111 DATA0,0,0,0,0,0,0,0,0
112 DATA0,0,0,0,0,0,0,0,0
113 DATA0,0,0,0,0,0,0,0,0
114 DATA64,40,0,160,168,0,168,105,641
115 DATA1,164,101,69,100,16,84,16,551
116 DATA0,84,0,0,16,0,0,0,100
117 DATA0,0,0,0,0,0,0,0,0
118 DATA0,0,0,0,0,0,0,0,0
119 DATA0,0,0,0,0,0,0,0,0
120 DATA0,0,0,0,0,0,0,0,0
121 DATA0,0,0,0,0,0,0,0,0
122 DATA0,0,0,0,0,0,0,0,0
123 DATA0,0,2,2,0,2,86,0,92
124 DATA9,85,128,7,19,64,4,0,316
125 DATA0,0,0,0,0,0,0,208,16,552
126 DATA0,16,112,0,52,112,0,52,344
127 DATA0,0,0,0,0,0,0,0,0
128 DATA0,0,0,0,0,0,0,0,0
500 PRINT"{CLEAR}PLEASE WAIT!"
501 FORI=@TO127:R=@:FORJ=@TO7:READA:R=R+
A:POKE50176+I*8+J,A:NEXT
502 READA:IFR<>ATHENPRINT"ERROR IN"I+1:E
ND
503 NEXT:PRINT"OK. ALL DONE!"
504 LOAD"PART4",8
```

Part 4

```
0 REMPART4:SPRI2:WIZARD DEVELOPMENT LTD.
1 DATA0,0,119,0,0,221,0,0,340
2 DATA119,0,0,221,0,0,119,0,499
3 DATA0,0,0,0,0,0,0,17,0,1,147,488
4 DATA5,6,169,26,90,169,106,170,741
5 DATA169,106,170,169,106,170,169,26,100
5
6 DATA169,85,85,85,21,85,84,21,635
7 DATA0,0,0,0,0,0,0,0,0
8 DATA0,0,0,0,0,0,0,0,0
9 DATA0,0,0,0,0,0,0,0,0
10 DATA0,0,0,0,0,0,0,5,5
11 DATA1,64,17,69,16,64,84,4,319
12 DATA1,64,16,64,4,0,0,0,168
13 DATA0,0,0,0,0,0,0,0,0
14 DATA0,0,0,0,0,0,0,0,0
15 DATA0,0,0,0,0,0,0,0,0
16 DATA0,0,0,0,0,0,0,0,0
17 DATA0,0,0,0,0,0,80,0,80
18 DATA0,0,0,0,64,1,1,0,1,91
19 DATA69,0,1,69,64,84,0,223
20 DATA0,84,0,0,16,0,0,0,100
21 DATA0,0,0,0,0,0,0,0,0
22 DATA0,0,0,0,0,0,0,0,0
23 DATA0,0,0,0,0,0,0,0,0
24 DATA0,0,0,0,0,0,0,0,0
25 DATA0,0,0,0,0,0,0,0,0
26 DATA0,0,0,0,0,0,0,0,65,65
27 DATA1,4,69,69,68,16,84,16,327
28 DATA0,84,0,0,16,0,0,0,100
29 DATA0,0,0,0,0,0,0,0,0
30 DATA0,0,0,0,0,0,0,0,0
31 DATA0,0,0,0,0,0,0,0,0
32 DATA0,0,0,0,0,0,0,0,0
33 DATA0,0,0,0,0,0,0,0,0
34 DATA0,0,0,0,0,0,0,0,0
35 DATA0,0,0,0,0,0,84,0,84
36 DATA1,85,0,4,16,64,4,0,174
37 DATA4,16,0,16,16,0,16,16,144
38 DATA1,84,0,4,16,0,4,0,152
39 DATA0,0,0,0,0,0,0,0,0
40 DATA0,0,0,0,0,0,0,0,0
41 DATA0,0,0,0,0,0,0,81,442
42 DATA0,21,81,0,20,81,0,20,223
43 DATA80,0,4,80,0,4,80,0,248
44 DATA0,0,0,0,0,0,0,0,124
45 DATA0,0,16,0,0,16,0,0,20
46 DATA16,0,0,16,0,0,16,0,48
47 DATA0,0,0,0,0,0,0,0,0
48 DATA0,0,0,0,0,0,0,0,0
49 DATA120,58,1,145,90,168,98,0,680
50 DATA140,98,82,96,130,208,162,1804
51 DATA140,110,184,186,128,144,40,885
52 DATA66,1,140,150,232,106,176,202,1073
53 DATA224,186,128,226,112,122,0,145,114
3
54 DATA45,192,66,1,140,0,208,170,822
55 DATA64,98,216,66,232,74,40,178,968
56 DATA140,110,184,186,128,145,0,711
57 DATA184,130,224,162,96,202,152,82,115
2
58 DATA224,162,1,140,0,80,186,1,714
59 DATA140,110,184,186,128,186,72,186,11
92
60 DATA56,186,208,154,1,140,0,64,881
61 DATA202,1,145,0,40,66,56,66,576
62 DATA216,66,232,66,40,74,1,140,835
63 DATA170,40,202,1,145,190,40,58,844
64 DATA232,66,224,218,176,218,80,202,141
6
65 DATA184,130,192,66,0,145,150,853
66 DATA232,66,224,218,176,218,80,202,141
6
67 DATA160,202,1,140,0,200,202,1,986
68 DATA145,0,32,58,48,58,120,58,519
69 DATA240,58,56,66,0,140,170,184,834
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 70 DATA66,0,140,160,88,66,134,66,722
 71 DATA232,66,48,202,0,0,0,0,540
500 PRINT"{CLEAR}PLEASE WAIT!"
501 FORI=@TO127:R=@:FORJ=@TO7:READA:R=R+
A:POKE3072+I#8+J,A:NEXT:CK=CK+R:NEXT
502 READA:IFR<>ATHENPRINT"ERROR IN"I+1:E
ND
503 NEXT:PRINT"OK. ALL DONE!"
504 LOAD"PARTB",8
```

Part 5

```
0 REMPART5:CHARS=WIZARD DEVELOPMENT LTD.
1 DATA255,0,255,37,255,255,255,0,1312
2 DATA0,0,124,198,62,230,202,122,938
3 DATA224,96,108,118,102,102,118,220,112
0
4 DATA0,0,124,206,206,192,192,60,890
5 DATA14,12,108,220,204,220,220,118,1116
6 DATA0,0,124,230,254,224,102,60,994
7 DATA28,54,54,56,254,48,48,120,662
8 DATA0,0,118,236,204,102,60,224,992
9 DATA224,96,108,126,118,102,102,230,110
6
10 DATA56,32,8,56,24,24,24,60,284
11 DATA56,32,8,56,24,24,24,24,248
12 DATA204,102,108,120,102,102,102,230,1
870
13 DATA8,56,24,24,24,24,24,60,244
14 DATA0,0,102,63,57,49,49,113,433
15 DATA0,0,236,126,118,102,102,230,914
16 DATA0,0,124,254,214,214,214,214,1136
17 DATA0,0,236,126,102,102,126,108,800
18 DATA0,0,110,252,204,204,252,108,1130
19 DATA0,0,236,126,108,102,102,230,902
20 DATA0,0,124,238,96,28,238,124,848
21 DATA32,224,96,248,96,92,94,60,942
22 DATA0,0,206,206,204,204,222,252,1184
23 DATA0,0,206,206,102,108,56,56,734
24 DATA0,0,59,253,221,99,54,60,746
25 DATA0,0,230,102,60,120,252,238,942
26 DATA0,0,230,206,104,100,52,62,754
27 DATA0,0,126,204,88,52,102,248,820
28 DATA0,0,124,246,230,124,0,0,0,724
29 DATA0,0,104,248,112,216,108,0,472
30 DATA0,0,120,236,204,140,140,142,982
31 DATA96,96,96,240,0,0,0,0,528
32 DATA0,0,12,12,30,30,0,0,66
33 DATA0,0,0,0,0,0,0,0,0
34 DATA0,0,220,198,182,204,128,56,972
35 DATA0,0,180,72,0,0,0,0,252
36 DATA12,108,232,112,0,0,0,0,464
37 DATA0,0,24,126,216,124,54,252,48,844
38 DATA0,0,240,230,220,216,220,0,14,916
39 DATA0,0,124,198,128,204,206,122,974
40 DATA0,0,24,16,0,0,0,0,64
41 DATA0,0,120,120,240,240,0,120,30,1020
42 DATA0,0,240,120,60,60,60,120,240,900
43 DATA0,0,231,60,255,60,231,0,837
44 DATA0,0,24,0,24,126,24,24,0,222
45 DATA0,0,0,0,60,60,0,0,0,188
46 DATA0,0,0,0,126,0,0,0,0,126
47 DATA0,0,0,0,60,60,60,0,0,180
48 DATA0,0,0,6,12,24,48,96,0,378
49 DATA0,0,124,246,178,134,206,254,124,126
6
50 DATA0,0,56,24,24,24,24,60,220
51 DATA0,0,124,238,78,24,98,254,156,972
52 DATA0,0,124,230,70,28,70,230,124,876
53 DATA0,0,28,60,92,108,252,12,30,616
54 DATA0,0,254,128,188,198,54,230,124,1176
55 DATA0,0,62,192,188,246,166,204,120,1178
56 DATA0,0,254,228,24,48,48,120,120,882
57 DATA0,0,124,198,198,254,198,246,124,125
2
58 DATA0,0,60,198,218,222,122,12,248,1080
59 DATA0,0,60,60,60,60,60,60,0,300
60 DATA0,0,60,60,60,60,12,56,308
61 DATA0,0,30,60,120,240,120,60,60,660
62 DATA0,0,0,24,0,0,24,0,0,240
63 DATA0,0,240,120,60,30,60,120,240,870
64 DATA0,0,124,230,206,30,60,0,24,718
65 DATA255,0,255,32,255,255,255,255,0,1307
66 DATA85,247,247,247,85,255,255,255,167
6
67 DATA85,255,255,255,85,247,247,247,167
6
68 DATA255,234,58,14,14,58,234,255,1122
69 DATA255,171,172,176,176,172,171,255,1
548
70 DATA170,190,190,190,190,190,190,170,1
400
71 DATA255,215,215,215,215,215,215,255,1
800
72 DATA8,0,85,255,255,85,32,32,760
73 DATA32,32,85,255,255,85,0,0,760
74 DATA224,224,224,224,224,234,224,224,1
802
75 DATA14,14,14,14,14,170,14,14,268
76 DATA0,0,36,153,169,153,153,0,664
77 DATA0,0,41,144,144,144,41,0,514
78 DATA255,255,204,51,204,51,255,255,153
0
79 DATA255,255,204,51,204,51,255,0,1275
80 DATA255,255,204,51,204,0,0,0,1020
81 DATA255,255,204,51,204,0,0,0,969
82 DATA255,255,204,51,0,0,0,0,765
83 DATA255,255,204,0,0,0,0,0,714
84 DATA255,255,0,0,0,0,0,0,510
85 DATA255,0,0,0,0,0,0,0,255
86 DATA85,255,85,0,0,0,0,0,425
87 DATA85,105,105,105,105,105,105,105,0
40
88 DATA85,105,105,105,105,105,105,105,02
0
```

```
89 DATA125,85,105,105,105,105,105,105,04
0
90 DATA125,125,85,105,105,105,105,85,06
0
91 DATA125,125,125,85,105,105,105,85,08
0
92 DATA125,125,125,125,85,105,105,85,10
0
93 DATA125,125,125,125,125,85,105,85,92
0
94 DATA125,125,125,125,125,125,85,85,94
0
95 DATA125,125,125,125,125,125,125,85,96
0
96 DATA125,125,125,125,125,125,125,125,1
000
97 DATA0,0,0,0,0,65,20,85,170
98 DATA221,119,221,119,221,119,221,119,1
360
500 PRINT"{CLEAR}PLEASE WAIT!"
501 FORI=@TO97:R=@:FORJ=@TO7:READA:R=R+A
:POKE12288+I#8+J,A:NEXT
502 READA:IFR<>ATHENPRINT"ERROR IN"I+1:E
ND
503 NEXT:PRINT"OK. ALL DONE!"
504 LOAD"PART6",8
```

Part 6

```
0 REMPART6:MUSIC=WIZARD DEVELOPMENT LTD.
1 DATA0,0,6,51,97,2,45,198,399
2 DATA4,51,97,2,45,198,4,51,452
3 DATA97,2,45,198,4,43,52,6,447
4 DATA38,125,32,45,198,4,43,52,535
5 DATA4,45,198,2,43,52,4,45,393
6 DATA198,2,43,52,4,38,125,6,356
7 DATA34,76,32,51,97,2,45,198,533
8 DATA4,51,97,2,45,198,4,51,452
9 DATA97,2,45,198,4,43,52,6,447
10 DATA198,2,43,52,4,38,125,6,468
11 DATA34,74,32,28,214,4,30,140,558
14 DATA6,34,74,6,38,125,6,34,323
15 DATA74,6,43,52,12,38,125,6,356
16 DATA34,76,32,51,97,2,45,198,459
17 DATA6,34,74,6,30,140,6,28,324
18 DATA214,32,51,97,2,45,198,4,643
19 DATA97,2,45,198,4,51,97,2,545
20 DATA2,45,198,4,43,52,6,61,411
21 DATA25,1,76,251,1,61,25,1,441
22 DATA45,198,1,38,125,1,45,198,651
23 DATA1,38,125,1,38,140,1,30,366
24 DATA140,1,38,125,1,30,140,1,476
25 DATA22,227,1,19,62,1,22,227,581
26 DATA1,19,62,1,15,70,1,45,230
27 DATA25,1,76,251,1,61,25,1,441
28 DATA45,198,1,38,125,1,45,198,651
29 DATA1,38,125,1,38,140,1,30,366
30 DATA140,1,38,125,1,30,140,1,476
31 DATA22,227,1,19,62,1,22,227,581
32 DATA1,19,62,1,15,70,1,45,230
33 DATA198,2,43,52,4,45,198,2,544
34 DATA43,52,4,45,198,2,43,52,439
35 DATA38,125,6,68,149,1,91,140,682
36 DATA140,1,68,149,1,57,172,1,589
37 DATA45,198,1,57,172,1,45,198,717
38 DATA1,34,74,1,28,214,1,34,387
39 DATA74,1,28,214,1,22,227,1,568
40 DATA17,37,1,22,227,1,17,37,359
41 DATA1,14,107,1,68,149,1,91,432
42 DATA140,1,68,149,1,57,172,1,589
43 DATA45,198,1,57,172,1,45,198,717
44 DATA1,34,74,1,28,214,1,34,387
45 DATA74,1,28,214,1,22,227,1,568
46 DATA17,37,1,22,227,1,17,37,359
47 DATA1,14,107,1,28,214,1,30,481
48 DATA140,6,34,74,6,38,125,6,429
49 DATA34,74,6,43,52,12,38,125,384
50 DATA6,34,74,6,30,140,6,28,324
51 DATA125,6,34,74,6,30,140,6,421
52 DATA68,149,1,91,140,1,68,149,667
53 DATA57,172,1,45,198,1,57,172,589
54 DATA172,1,45,198,1,34,74,1,526
55 DATA28,214,1,34,74,1,28,214,594
56 DATA1,22,227,1,17,37,1,22,328
57 DATA227,1,17,37,1,14,107,1,485
58 DATA68,149,1,91,140,1,68,149,667
59 DATA1,57,172,1,45,198,1,57,532
60 DATA28,214,1,34,74,1,28,214,594
61 DATA1,22,227,1,17,37,1,22,328
62 DATA227,1,17,37,1,14,107,1,485
63 DATA10,30,140,2,34,74,2,30,322
64 DATA140,2,34,74,2,34,74,2,497
65 DATA38,125,6,34,74,12,40,199,528
66 DATA6,38,125,6,34,74,10,30,323
67 DATA140,2,34,74,2,34,74,2,524
70 DATA34,74,2,40,199,6,38,125,518
71 DATA6,34,74,12,40,199,6,38,409
72 DATA125,6,45,198,6,38,125,625
73 DATA51,97,6,45,198,6,38,125,566
74 DATA12,40,199,6,38,125,6,34,660
75 DATA74,6,30,140,12,34,74,6,626
76 DATA30,140,2,34,74,2,40,199,521
77 DATA6,38,125,6,34,74,12,51,346
78 DATA97,2,45,198,4,51,97,2,496
79 DATA45,198,4,51,97,2,45,198,640
80 DATA4,43,52,6,38,125,32,45,345
81 DATA198,2,43,52,4,45,198,2,544
82 DATA43,52,4,45,198,2,43,52,439
83 DATA4,38,125,6,34,74,32,51,364
84 DATA97,2,45,198,4,51,97,2,496
85 DATA45,198,4,51,97,2,45,198,640
```

```
86 DATA4,43,52,6,61,25,1,76,268
87 DATA251,1,61,25,1,45,198,1,583
88 DATA38,125,1,45,198,1,38,125,571
89 DATA1,30,140,1,30,140,1,38,381
90 DATA125,1,30,140,1,22,227,1,547
91 DATA19,62,1,22,227,1,19,62,413
92 DATA1,15,70,1,61,25,1,76,258
93 DATA251,1,61,25,1,45,198,1,583
94 DATA38,125,1,45,198,1,38,125,571
95 DATA1,30,140,1,30,140,1,38,381
96 DATA125,1,30,140,1,22,227,1,547
97 DATA19,62,1,22,227,1,19,62,413
98 DATA1,15,70,1,45,198,2,43,375
99 DATA52,4,45,198,2,43,52,4,400
100 DATA45,198,2,43,52,4,38,125,507
101 DATA6,68,149,1,91,140,1,68,524
102 DATA149,1,57,172,1,45,198,1,524
103 DATA57,172,1,45,198,1,34,74,582
104 DATA1,28,214,1,34,74,1,28,381
105 DATA214,1,22,227,1,17,37,1,528
106 DATA22,227,1,17,37,1,14,107,426
107 DATA1,68,149,1,91,140,1,68,519
108 DATA149,1,57,172,1,45,198,1,524
109 DATA57,172,1,45,198,1,34,74,582
110 DATA1,28,214,1,34,74,1,28,381
120 DATA140,2,34,74,2,40,199,6,497
121 DATA38,125,6,34,74,12,40,199,528
122 DATA6,38,125,6,34,74,10,30,323
123 DATA140,2,34,74,2,30,140,2,424
124 DATA74,6,38,125,6,34,74,6,518
125 DATA6,34,74,12,40,199,6,38,409
126 DATA125,6,45,198,6,40,199,6,625
127 DATA51,97,6,45,198,6,38,125,566
128 DATA12,40,199,6,38,125,6,34,660
129 DATA74,6,30,140,12,34,74,6,626
130 DATA30,140,2,34,74,2,40,199,521
131 DATA6,38,125,6,34,74,12,51,346
132 DATA97,2,45,198,4,51,97,2,496
133 DATA45,198,4,51,97,2,45,198,640
134 DATA4,43,52,6,38,125,32,45,345
135 DATA198,2,43,52,4,45,198,2,544
136 DATA43,52,4,45,198,2,43,52,439
137 DATA4,38,125,6,34,74,32,51,364
138 DATA97,2,45,198,4,51,97,2,496
139 DATA45,198,4,51,97,2,45,198,640
140 DATA4,43,52,6,61,25,1,76,268
141 DATA251,1,61,25,1,45,198,1,583
142 DATA38,125,1,45,198,1,38,125,571
143 DATA1,30,140,1,30,140,1,38,381
144 DATA125,1,30,140,1,22,227,1,547
145 DATA19,62,1,22,227,1,19,62,413
146 DATA1,15,70,1,61,25,1,76,258
147 DATA251,1,61,25,1,45,198,1,583
148 DATA38,125,1,45,198,1,38,125,571
149 DATA1,30,140,1,30,140,1,38,381
150 DATA125,1,30,140,1,22,227,1,547
151 DATA19,62,1,22,227,1,19,62,413
152 DATA1,15,70,1,45,198,2,43,375
153 DATA52,4,45,198,2,43,52,4,400
154 DATA45,198,2,43,52,4,38,125,507
155 DATA6,68,149,1,91,140,1,68,524
156 DATA149,1,57,172,1,45,198,1,524
157 DATA57,172,1,45,198,1,34,74,582
158 DATA1,28,214,1,34,74,1,28,381
159 DATA214,1,22,227,1,17,37,1,528
160 DATA22,227,1,17,37,1,14,107,426
161 DATA1,68,149,1,91,140,1,68,519
162 DATA149,1,57,172,1,45,198,1,524
163 DATA57,172,1,45,198,1,34,74,582
164 DATA1,28,214,1,34,74,1,28,381
165 DATA214,1,22,227,1,17,37,1,528
166 DATA22,227,1,17,37,1,14,107,426
167 DATA1,68,149,1,91,140,1,68,519
168 DATA149,1,57,172,1,45,198,1,524
169 DATA57,172,1,45,198,1,34,74,582
170 DATA1,28,214,1,34,74,1,28,381
171 DATA214,1,22,227,1,17,37,1,528
172 DATA22,227,1,17,37,1,14,107,426
173 DATA1,51,97,2,45,198,4,51,449
174 DATA97,2,45,198,4,51,97,2,496
175 DATA45,198,4,51,97,2,45,198,640
176 DATA1,76,251,1,61,25,1,45,461
177 DATA198,1,38,125,1,45,198,1,607
178 DATA38,125,1,38,140,1,30,140,1,585
179 DATA1,38,125,1,30,140,1,22,227,1,358
180 DATA227,1,19,62,1,22,227,1,560
181 DATA19,62,1,15,70,1,45,198,411
182 DATA2,45,198,4,43,52,6,447
183 DATA52,4,45,198,2,43,52,4,400
184 DATA38,125,6,68,149,1,91,140,618
185 DATA140,1,68,149,1,57,172,1,589
186 DATA198,1,57,172,1,45,198,1,673
187 DATA34,74,1,28,214,1,34,74,460
188 DATA1,28,214,1,22,227,1,17,511
189 DATA37,1,22,227,1,17,37,1,434
190 DATA14,107,1,68,149,1,91,140,571
191 DATA1,68,149,1,57,172,1,45,494
192 DATA198,1,57,172,1,45,198,673
193 DATA34,74,1,28,214,1,34,74,460
```

To be continued next week.

OUT AND ABOUT

Use your Casio as a remote terminal, thanks to Robert Miles.

It would be nice if you could get hold of a cheap, hand-held computer which you could take out into the world and then bring back to base with all your precious data inside it. Well, you could use the Casio PB-100 pocket computer as a 'remote terminal' for your Beeb.

The Casio is also sold by Tandy as the PC-4. It has built-in Basic, a 12 character display and a tiny qwerty keyboard. It also interfaces to a cassette.

The Casio can control the cassette recorder, switching it on and writing stuff out when its internal buffer gets too full. If you already have a Casio machine and you are having difficulty finding a cassette interface for it the Tandy one fits and works well. In fact the best way to put together a system is to buy the computer from Casio and all the add-ons from Tandy.

The BBC program reads an array of strings, or number of string variables which have been sent to tape by the Casio using the PUT keyword from Casio Basic. The second set of listings are programs for the Casio which take text in and store it, automatically writing to tape when necessary.

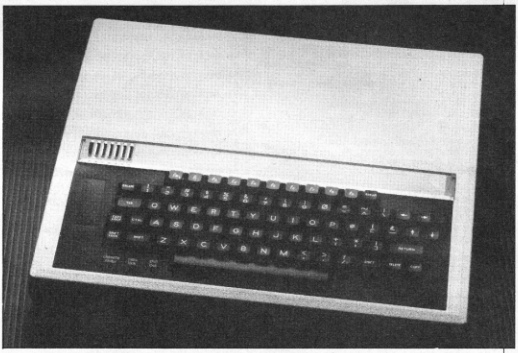
Program 0 allows you to insert text into the buffer. If there is already some text there it is added onto the end. When the buffer becomes full the cassette recorder is switched on and the entire buffer written out. Each line of text is first input to the special $ variable used in Casio Basic. This means that the usual text editing facilities are available, but you must be careful not to enter any strings longer than 32 characters.

Program 1 displays the text held in the buffer. The entire buffer will scroll across the display from right to left.

Program 2 resets the text space and begins input. You can use this program when you want to scrub the buffer and start afresh.

Program 3 saves the contents of the text buffer onto tape. You can use this if the buffer is not yet full but you want to save some data for transfer.

You can connect the Casio tape interface to the BBC machine's input, but you need a resistor (about 5K should do) across the line to make it work.



The PB-100 (below, right) can be used as a remote terminal for the BBC.

Listing

```
 10 REM CASIO tape reader
 20 REM
 30 REM (c) 1984 Rob Miles
 40 REM
 50 REM CASIO produces 8 bits, odd
 60 REM       parity and 1 stop bit.
 70 REM
 80 REM Turn off interlace.
 90 *TV 0,1
100 MODE 6
110 baud=&1A
120 REM Setup program area (code%) and output buffer (buffer%)
130 DIM code% 400,buff% 1000
140 REM Setup decode area
150 DIM decode 256
160 REM Put the character conversion table into memory.
170 FOR i%=0 TO 255
180   READ val
190   decode?i%=val
200   NEXT i%
210 OSASCI=&FFE3:bpt%=&70:chct%=&72
220 REM Assemble the program.
230 PROCassem
240 A%=buff%:B%=bpt%:REM Prepare for BREAK!
250 REM User presses BREAK to end the session and dump the data to
260 REM tape.  This is messy but works!
270 PRINT''''"Hit BREAK when your tape has finished""running."
280 *KEY 10 OLD¦MGOTO 310¦M
290 REM Call the program.
300 CALL code%
310 REM We get here when all the data has been read in.
320 REM The user presses BREAK to stop the data transfer at tape end.
330 buff%=A%:bpt%=B%:REM Recover the vital pointers.
340 MODE 6
350 INPUT "Name of output file",fil$
360 f=OPENOUT fil$
370 buffend=(?bpt%+256*?(bpt%+1))
380 FOR i%=buff% TO (?bpt%+256*?(bpt%+1))
390   BPUT# f,?i%
400   NEXT i%
410 CLOSE# 0
420 END
430 DEF PROCassem
440 FOR p%=0 TO 2 STEP 2
450   P%=code%
460   [OPT  p%
470
480         JSR  init    ;set up ACIA
490   .st   JSR  getbyt  ;get a byte
500         CMP  #&E4    ;check for data
510         BNE  st      ;ignore if duff
520   \
530   \  Start of file
540   \
550         LDY  #11     ;set skip count
```

Listing (cont)

```
  .sk   JSR  getbyt :get a byte
        DEY         :drop count
        BNE  sk     ;jif not finished
  .nxst LDY  #0     ;using a post indexed store with Y
        LDA  #7     ;get seven bytes per string
        STA  chct%  :..which we count in chct
  .nex  JSR  getbyt :get a character
        CMP  #&F0   ;F0 means the end of the file
        BEQ  st     ;jif we have reached the end - go around again
        TAX         ;using X to index decode array
        LDA  decode,X;get the decoded character
        JSR  OSASCI ;display the character
        STA  (bpt%),Y:save in buffer area
        INY         ;move down to next hole in buffer with Y
        DEC  chct%  ;knock down our counter
        BNE  nex    ;go round if we are not at zero yet
  \
  \  When we get here we have reached the counter giving the length
  \  of the string and must find out how many of the characters we
  \  have grabbed are part of the string
  \
        JSR  getbyt ;get the string length
        LSR  A      ;shift to the left...
        LSR  A      :...to move the counter into the
        LSR  A      :...bottom four bits of A
        LSR  A      :...i.e. make a character counter
        CLC         ;stand by for some sums
        ADC  bpt%   ;move lo byte of counter up memory
        STA  bpt%   :...put it back with new value
        BCC  noc    ;jump if nowt to carry
        INC  bpt%+1 ;advance hi byte of counter
  .noc  JMP  nxst   ;go around to get another string

  .init
        SEI
        LDA  #baud
        STA  &FE08  ;baud rate
        LDA  #&AD   ;turn on motor..
        STA  &FE10  :..and tape tone
        LDA  #(buff% MOD 256)
        STA  bpt%
        LDA  #(buff% DIV 256)
        STA  bpt%+1 ;setup pointer
        RTS

  .getbyt
        LDA  &FE08  ;get status reg
        TAX         ;backup
        AND  #1     ;check for got
        BEQ  getbyt ;jif not there
        TXA         ;recover status
        AND  #&F0
        BNE  getbyt
        LDA  &FE09  ;get data value
        RTS

  ]
  NEXT p%
ENDPROC
DATA 32,43,45,42,47,94,33,38
DATA 35,36,62,0,61,0,60,0
DATA 48,49,50,51,52,53,54,55
DATA 56,57,46,0,41,40,0,0
DATA 65,66,67,68,69,70,71,72
DATA 73,74,75,76,77,78,79,80
DATA 81,82,83,84,85,86,87,88
DATA 89,90,0,0,0,0,0,0
DATA 97,98,99,100,101,102,103,104
DATA 105,106,107,108,109,110,111,11
DATA 113,114,115,116,117,118,119,120
DATA 121,122,0,0,63,44,59,58
DATA 0,0,0,0,64,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 37,0,0,91,38,95,39,0
DATA 93,127,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
DATA 0,0,0,0,0,0,0,0
```

Casio programs

The programs below occupy only a small amount of the memory inside the Casio computer. To store the maximum amount of text all the remaining program space is converted to data space using the DEFM command. This is followed by the number of extra variables you want to create.

If the only programs in the machine are data entry ones you can add 40 extra variables to the data array, (DEFM 40), giving space for 60 elements. If you have the RAM expansion pack you can add 168 variables, (DEFM 168) and should change all occurences of 60 in the programs below to 168. With an expansion pack you can store up to 1,300 characters, with just the machine you can buffer up to 420 characters.

Program 0 Data entry and storage

```
20 INPUT $
30 FOR C=1 TO LEN ($)
40 F$ (B)=F$ (B)+MID (C,1)
50 A=A+1:IF A<8 THEN 70
60 A=1:B=B+1
62 IF B<60 THEN 70
63 PRINT "**SAVE DATA**"
64 PUT F$(1),F$(60)
65 A=1:B=1
70 NEXT C
80 GOTO 20
```

Program 1 Display the stored text

```
10 FOR D=1 TO B+: PRINT F$(D);:
   NEXT D
20 STOP
```

Program 2 Clear data and begin entry

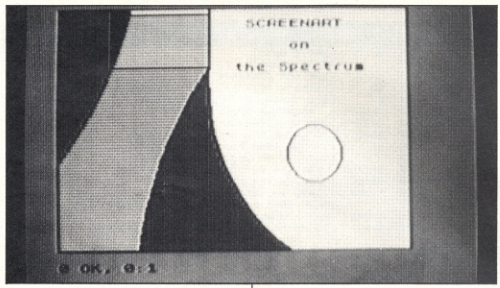
```
10 VAC
20 A=1:B=1:GOTO ≠379
```

Program 3 Put all the text to tape

```
10 PUT F$(1),F$(60)
```

FINE ART

Pretty pictures on the Spectrum with RG Luxton's *Screenart* program.



Feeling creative? Want to illustrate your latest 48K Spectrum educational or adventure program with some snazzy pictures? Well, help is at hand with our *Screenart* utility.

Screenart comes in two parts. The first, given in Figure 1, contains the meat of the matter: called *Draw*, it enables you to:

- PLOT and DRAW using cursor keys, and also draw circles and draw arcs.
- Fill any shape, in solid colour, dots or vertical or horizontal stripes as required; you can also alter colour and other attributes.
- Use either of two screens to save your drawings as you proceed, and to recall either instantly; plus a facility to add keyboard and UDG characters to your drawings.
- SAVE to SCREEN$, LOAD SCREEN$, SAVE data from drawings, LOAD data, and call a HELPSCREEN at any time.

With the second program, *Loader*, (to be published next week) you can load data from *Draw* and the program will transform this into DATA statements in program lines, which can then be MERGED or added to other programs to give an instant DRAW facility.

Draw

After typing in the listing and debugging, SAVE using "SAVE" draw "LINE 10". When *Draw* is run you will be presented with a menu. If the program returns to Basic from now on, for whatever reason, do not use RUN, but simply type in "GOTO menu" and ENTER.

To start, press 1 and go to a clear screen. When you press one of the cursor keys (5,6,7, and 8) the x and y coordinates of the single pixel in the middle of the screen will be displayed x=120, y=95. You can start drawing from here, or using the cursor keys, move to another position to start drawing.

When you are ready, press z and the 'Plotted!" legend will appear. This places the first PLOT coordinate into a string, (c$). Now, using the cursor keys, move in any direction and at the next point, press z again. Coordinates for this point will also be entered into the c$ string, but this time in the form of a DRAW statement. Each successive move move now should be followed by pressing the z key.

You can of course, plot your DRAW coordinates in any position on the screen, and although the pixel will draw its own route wherever it goes on the screen, the subsequent line will be drawn directly between plotted points.

At any time you can press c to clear the whole screen, and then press p to rapidly print whatever you have drawn, and then carry on drawing.

Press the h key and the HELPSCREEN will be displayed. This can be called at

Listing

```
  10 REM *    SCREENART       *
  20 REM *    (c) R.G.LUXTON. *
  30 REM *    DRAW            *
  40 CLEAR 44798: GO SUB 9500
  50 REM *MENU*
  60 BORDER 1: PAPER 1: INK 7: C
LS
  70 PRINT TAB 8;"SCREENART";TA
B 8;"********";AT 3,1;"s  To DR
AW using a";AT 4,5;"single spot.
";AT 6,1;"1  To DRAW using a";AT
 7,5;"continuous line.";AT 9,1;"
d  To DELETE any lines";AT 10,5;
"(before SAVEing";AT 11,5;"to SC
REEN$)"
  80 PRINT AT 5,25; INVERSE 1;"
CHOOSE";AT 6,25;"<A     ";AT 7,2
5;" LETTER";AT 15,3;"Press""h""t
o call HELPSCREEN";AT 16,3;"from
 main program.          "
  90 FOR i=3 TO 9 STEP 3: PRINT
AT i,8;">";AT i,2;"<": PAUSE 15:
 PRINT AT i,8;" ";AT i,2;" "
 100 LET s$=INKEY$: IF s$="" THE
N GO TO 120
 110 IF s$="s" OR s$="1" OR s$="
d" THEN GO TO 130
 120 NEXT i: GO TO 90
 130 IF NOT t THEN BORDER 7: PAP
ER 7: INK 0: CLS
 200 REM *MAIN LOOP*
 210 INK in: PAPER pa: BRIGHT br
: FLASH fl: INVERSE iv: CLS
 220 LET xx=x: LET yy=y: PLOT OV
ER 1; INK i;x,y
 230 PLOT OVER (1 AND s$="s"); I
NVERSE (1 AND s$="d"); INK i;xx
,yy
 240 IF INKEY$="8" OR INKEY$="5"
 OR INKEY$="7" OR INKEY$="6" THE
N GO TO 420
 250 IF INKEY$="" THEN GO TO 250
 260 IF INKEY$="e" THEN GO SUB 2
000
 270 IF INKEY$="g" THEN GO SUB 2
100
 280 IF INKEY$="z" THEN GO SUB 5
00
 290 IF INKEY$="p" THEN GO SUB 6
00
 300 IF INKEY$="w" THEN GO SUB 7
50
 310 IF INKEY$="b" THEN GO SUB 9
50
 320 IF INKEY$="h" THEN GO SUB 1
000
 330 IF INKEY$="q" THEN GO SUB 8
00
 340 IF INKEY$="t" THEN GO SUB 2
500
 350 IF INKEY$="f" THEN GO SUB 4
000
 360 IF INKEY$="o" THEN GO SUB 5
000
 370 IF INKEY$="y" THEN GO SUB 2
300
 380 IF INKEY$="j" THEN GO SUB 7
00: IF y$="y" THEN LET c$="": LE
T y$="": LET q=0: LET w=0
 390 IF INKEY$="r" THEN GO TO 50
 400 IF INKEY$="a" THEN LET fk=1
: GO SUB 530: LET fk=0: GO SUB 0
50
 410 IF INKEY$="c" THEN GO TO 21
0
 420 LET x=x+(INKEY$="8" AND x<2
55)-(INKEY$="5" AND x>0)
 430 LET y=y+(INKEY$="7" AND y<1
75)-(INKEY$="6" AND y>0)
 440 PRINT £0;AT 0,0; PAPER 5;"x
=";x1" y=";y;" ": GO TO 220
 500 REM *PLOT S/R*
 510 IF INKEY$<>"" THEN GO TO 51
0
 520 LET r=x: LET s=y: LET x=x-q
: LET y=y-w
 530 DIM e$(2,4): LET e$(1, TO 4
)=STR$ x: LET e$(2, TO 4)=STR$ y
: LET c$=c$+e$(1)+e$(2): IF fk T
HEN RETURN
 540 LET x=r: LET y=s: LET q=x: 
LET w=y
 550 PRINT £0; INK 2; INVERSE 1;
AT 0,15;"Plotted!": PAUSE 0: PRI
NT £0;AT 0,15;"          ": RETURN
 600 REM *PRINT S/R*
 610 IF LEN c$ THEN GO TO 650
 620 CLS : PRINT AT 10,4; PAPER
2; INK 7;"NO DRAWING YET IN MEMO
RY !";AT 12,6;"PRESS ""x"" TO ST
ART"
 630 IF INKEY$<>"x" THEN GO TO 6
30
 640 CLS : RETURN
 650 FOR val v$(1 TO 4),VAL c$(
5 TO 8)
 660 FOR i=9 TO LEN c$ STEP 8: D
RAW VAL c$(i TO i+3),VAL c$(i+4
TO i+7): BEEP .005,50: NEXT i: P
AUSE 0: RETURN
 700 REM *CURRENT SCREEN MEM*
 710 PRINT £0;AT 0,0; PAPER 5;"C
urrent screen into memory(y/n)?"
```

any time, and you can return to the program by pressing m. Pressing p will of course, redraw your artwork.

Options

a SAVE data. This saves your drawing as a character array for use with the *Loader* program.

b LOAD data. You can LOAD data back into the program from a previous SAVE. You cannot MERGE separate data tapes.

c CLS at any time.

j Will instantly load whatever is on the screen into screen A or screen B of your choice, clear the data string, c$, and enable you to start drawing again, using a new c$ string.

t Will instantly recall either screen.

Using these two facilities it is simple to add circles, arcs and keyboard or UDG characters into your drawings, items which are not easily programmable in simple PLOT and DRAW statements.

You can for example, load a drawing into screens A and B, add further drawing and keep loading this into screen B, and then if you do not like the way it is developing, simply recall screen a, load it into screen B, and start again.

It is important to remember that if the t option is used to recall either screen before the j option is used, or a SCREEN$ save has not been loaded into either screen, then garbage or a black screen will result (nothing in memory). To recover, simply press c and start again.

Further options

e Will draw circles at the last point plotted.

y Will draw arcs at the last point plotted.

The use of either of these will, when you are satisfied and press the y key in answer to the question 'Is this OK (Y/N)?, save everything on the screen automatically into the B screen, and clear the PLOT and DRAW string (c$). It is essential, therefore, that you press p before e or y, or recall either screen, if you want circles or arcs on the same screen as your drawing. You can start a fresh PLOT and DRAW string (c$) to add to your A or B screen, but this will not be permanently added until you use either the j,e, y or q facilities.

g Enables you to enter a string of up to 32 characters from the keyboard, which can be moved about the screen into position. Initially, this will wipe away the part of the screen that it crosses, but a press of the p (park) key will reinstate the screen with the characters in position. If you then press y when asked, this too will be automatically saved into the B screen. Pressing n will clear the characters and reinstate the screen as it was.

f FILL. This subroutine will fill any area which is enclosed by lines, but will 'leak' out if the boundaries are broken. You will be given four choices to fill with a solid colour, with dots, or with one of two 'hatches' using either horizontal or vertical lines.

As any lines or dots within the area will affect the filling, before you press f you should press r to reset the drawing mode, press s to use a single spot, recall your drawing by p or t and the screen letter, and then move the pixel anywhere within the area to be filled, preferably two or more pixels away from the edge of the boundary line. Then press f to call the fill routine, y for yes, followed by one of the option letters, and filling will start.

If the area to be filled is irregular in shape then it may not be completely filled in one go. If so, then simply move the pixel to an unfilled area, and call the fill routine again, and filling will continue. If you are using the v (vertical), h (horizontal) or d (dot) options, then careful use of the x and y coordinates will help ensure that the 'seeding' pixel is placed in the correct position so that the pattern of a gap between each line is maintained.

When filling is completed you can decide if you want it permanently stored in the A or B screen before resetting the drawing mode to l for line to continue drawing.

d Inevitably, you will make mistakes and want to alter or clean up your picture before finally SAVEing to SCREEN$. The single pixel offered by the d option of the menu will delete any lines and this, coupled with the judicious use of the j (A or B screen), works wonders.

q Pressing this key will enable you to SAVE to SCREEN$, but remember that you can only save what is on the screen, so before using this option ensure that the picture you want to save is recalled to screen using t or p.

w LOADS recorded SCREEN$ images into the *Screenart* program, and offers you the choice of saving them in the A and B screens. This is useful if you want to use an existing SCREEN$ image as a sort of 'stencil' to trace or amend parts to use in a fresh drawing. A single spot option ('s') can be useful here.

o The o key enables you to reset the attributes, thus changing the colour of ▶

```
: GO SUB 1500: IF y$="n" THEN LE
T y$="": RETURN
 720 PRINT £0;AT 0,0;b$( TO 11):
GO SUB 3000: RETURN
 750 REM *SCREEN$ LOAD S/R*
 760 PRINT £0;AT 0,0; PAPER 5;"L
oad Screen$ (y/n)?": GO SUB 1500
: IF y$="n" THEN LET y$="": RETU
RN
 770 BORDER 7: PAPER 7: INK 0: C
LS
 780 INPUT ; PAPER 5;"Enter name
 of SCREEN$ "; LINE n$: PRINT £0
;AT 0,0; PAPER 5;"Start recorder
....": LOAD n$SCREEN$
 790 GO SUB 3000: RETURN
 800 REM *SAVE SCREEN$ S/R*
 810 PRINT £0;AT 0,0; PAPER 5;"S
ave Screen$ (y/n)?": GO SUB 1500
: IF y$="n" THEN LET y$="": RETU
RN
 820 INPUT ; PAPER 5;"Enter name
 of SCREEN$ "; LINE f$: IF f$="" 
OR f$=" " THEN GO TO 820
 830 SAVE f$SCREEN$
 840 RETURN
 850 REM *SAVE DATA S/R*
 860 PRINT £0;AT 0,0; PAPER 5;"S
ave data (y/n)?": GO SUB 1500: I
F y$="n" THEN LET y$="": RETURN
 870 CLS : DIM d$(LEN c$): LET d
$=c$: SAVE "data" DATA d$()
 880 CLS : PRINT INK 1; INVERSE
1;"Saved!";TAB 6; INVERSE 0;" To
 start a fresh drawing,        en
ter ""p"""'''''        To continue
 with this                one, enter
 ""m"""
 890 IF INKEY$<>"n" AND INKEY$<>
"m" THEN GO TO 890
 900 CLS : GO TO (910 AND INKEY$
="n")+(920 AND INKEY$="m")
 910 CLS : CLEAR : RUN
 920 LET c$=c$( TO LEN c$-8): DI
M d$(1): LET p$="": GO SUB 500: 
GO TO 200
 950 REM *LOAD DATA S/R*
 960 PRINT £0;AT 0,0; PAPER 5;"L
oad data (y/n)?": GO SUB 1500: I
F y$="n" THEN LET y$="": RETURN
 970 CLS : PRINT £0;AT 0,0; PAPE
R 5;"Start recorder.....": LOAD
 "data" DATA d$(): LET c$=d$: DIM
 d$(1): LET p$=""
 980 LET x=VAL c$(LEN c$-8 TO LE
N c$-5): LET y=VAL c$(LEN c$-4 T
O LEN c$): LET c$=c$( TO LEN c$-
8): LET xx=x: LET yy=y: CLS : LE
T q=x: LET w=y: GO TO menu
1000 REM *HELPSCREEN S/R*
1010 IF INKEY$<>"" THEN GO TO 10
10
1020 BORDER 5: PAPER 5: INK 0: C
LS
1030 PRINT TAB 10;"HELPSCREEN";T
AB 10;"**********": PRINT TAB 4;
"PRESS KEY REQUIRED...."
1040 PRINT "a = Save data""b = 
Load data""c = CLS""e = Draw c
ircles""g = Add keyboard charac
ters""f = Fill"
1050 PRINT "j = Load existing sc
reen into""      memory and CLEAR
 data string""m = Return to mai
n program""o = Attributes""p =
 Print drawing so far""q = Save
 SCREEN$""r = Reset drawing mod
e""t = Recall Screen$""w = Loa
d SCREEN$""y = Draw arc"
1060 PRINT "(z= Plots each point
)""(GOTO""menu"" restarts from
 BASIC)""TAB 8; INK 1; FLASH 1;"D
O NOT USE ""RUN""": PAUSE 0: BOR
DER 7: INK in: PAPER pa: BRIGHT
 br: FLASH f1: INVERSE iv: CLS :
 RETURN
1500 REM *Y/N S/R*
1510 IF INKEY$<>"y" AND INKEY$<>
"n" THEN GO TO 1510
1520 GO TO (1530 AND INKEY$="n")
+(1560 AND INKEY$="y")
1530 PRINT £0;AT 0,0;b$: LET y$=
"n"
1540 IF INKEY$<>"" THEN GO TO 15
40
1550 RETURN
1560 LET y$="y": IF INKEY$<>"" T
HEN GO TO 1560
1570 RETURN
2000 REM *PRINT CIRCLES*
2010 INPUT ; PAPER 5;"Enter radi
us"; LINE r$: IF r$="" OR r$=" "
 THEN GO TO 2010
2020 FOR i=1 TO LEN r$: IF CODE
 r$(i)<48 OR CODE r$(i)>57 THEN G
O TO 2010
2030 NEXT i: IF y+VAL r$>175 OR
 y-VAL r$<0 OR x+VAL r$>255 OR x-
VAL r$<0 THEN PRINT £0;AT 0,0; P
APER 5;r$;" is too big!";AT 1,0;
"Press any key and try again.": 
PAUSE 0: GO TO 2010
2040 INK in: PAPER pa: BRIGHT br
: FLASH f1: INVERSE iv
```

OUTPUT: SPECTRUM

PAPER and INK, and setting FLASH, BRIGHT and INVERSE on or off. This will change the colours, etc currently on screen which can often be most striking, or you can use the **t** option to recall screen A or B with its original colours, and then continue drawing on that with the new attributes.

If you want to use your own user defined graphics (UDGs) in your drawings it is only necessary to prepare them on tape using one of the many published program, stop *Screenart* running, load the UDGs into the area of memory reserved for them, and restart *Screenart* by typing in GOTO menu. Then, by using the **g** option, your UDGs can be called in the usual way. A joystick can be used with the program, using the 'fire' button to operate the key.

Listing

```
2050 CIRCLE x,y,VAL r$
2060 GO SUB 5510
2070 IF y$="y" THEN GO SUB 5520: GO SUB 5530: RETURN
2080 IF y$="n" THEN GO SUB 5540: RETURN
2100 REM *PRINT CHARACTERS*
2110 INPUT ; PAPER 5;"Enter characters";a$: IF a$="" THEN RETURN

2115 IF LEN a$>32 THEN PRINT #0; AT 0,0; PAPER 5;"Too long! (Max. 32 characters).";AT 1,0;"Press any key and try again. ";: PAUSE 0: GO TO 2110
2120 INK in: PAPER pa: BRIGHT br: FLASH fl: INVERSE iv
2130 LET a=1: LET b=a
2140 LET aa=a: LET bb=b: PRINT AT a,b;a$
2150 IF INKEY$="" THEN GO TO 2150
2160 FOR i=1 TO 3: NEXT i
2170 LET a=a+(INKEY$="6" AND a<(22)-(INKEY$="7" AND a>0)
2180 LET b=b+(INKEY$="8" AND b+LEN a$<(32)-(INKEY$="5" AND b>0)
2190 PRINT AT aa,bb;b$( TO LEN a$)
2200 IF INKEY$="p" OR INKEY$="P" THEN POKE 23658,0: GO SUB 5540: PRINT AT a,b;a$: GO SUB 5510: GO TO 2220
2210 GO TO 2140
2220 IF y$="y" THEN GO SUB 5520: GO SUB 5540: PRINT AT a,b;a$: GO SUB 5530
2230 IF y$="n" THEN GO SUB 5540
2240 PRINT #0;AT 0,0; PAPER 5;"Another char ?": GO SUB 1500: IF y$="y" THEN GO TO 2110
2250 IF y$="n" THEN LET y$="": LET r=2: GO SUB 2530
2260 INK 0: PAPER 7: BRIGHT 0: FLASH 0: INVERSE 0: RETURN
2300 REM *DRAW ARC*
2310 LET c=x: LET d=y
2320 LET cc=c: LET dd=d
2330 PLOT OVER 1; INK inicc,dd: PLOT OVER 1; INK inic,d
2340 PRINT #0;AT 0,0; PAPER 5;"Move cursor to finish & press i."
2350 IF INKEY$="" THEN GO TO 2350
2360 IF INKEY$="i" THEN PRINT #0;AT 0,0;b$: INPUT PAPER 5;"Enter arc ";e: LET e=e/10: GO TO 2400
2370 LET c=c+(INKEY$="8" AND c<(255)-(INKEY$="5" AND c>0)
2380 LET d=d+(INKEY$="7" AND d<(255)-(INKEY$="6" AND d>0)
2390 GO TO 2320
2400 PLOT INK inix,y: DRAW INK inic-x,d-y,e
2410 GO SUB 5510
2420 IF y$="y" THEN GO SUB 5520: GO SUB 5530: LET x=c: LET y=d: RETURN
2430 IF y$="n" THEN GO SUB 5540: GO TO 2310
2500 REM *SCREEN$ DISPLAY
2510 INPUT ; PAPER 5;"Display screen A or B?";i$: IF m$<>"a" AND m$<>"b" THEN GO TO 2510
2520 LET r=(1 AND m$="a")+(2 AND m$="b")
2530 GO SUB 3100: RANDOMIZE USR (z+12): RETURN
3000 REM *LOAD A/B SCREEN S/R*
3010 INPUT ; PAPER 5;"Store in A or B screen?";i$: LINE n$: IF n$<>"a" AND n$<>"b" AND n$<>"" THEN GO TO 3010
3020 IF n$="" THEN RETURN
3030 LET l=(1 AND n$="a")+(2 AND n$="b")
3040 GO SUB 3080
3050 RANDOMIZE USR z: RETURN
3060 REM *SCREEN$ LOAD POKES*
3090 POKE p1,(127 AND l=1)+(191 AND l=2): POKE p2,(228 AND l=1)+(201 AND l=2): RETURN
3100 REM *SCREEN$ DISPLAY POKES*
3110 POKE p3,(127 AND r=1)+(191 AND r=2): POKE p4,(228 AND r=1)+(201 AND r=2): RETURN
4000 REM *FILL*
4010 PRINT #0;AT 0,0; PAPER 5;"Fill (y/n) ?": GO SUB 1500: IF y$="n" THEN LET y$="": RETURN
4020 INPUT ; PAPER 5;"Full,Dot,Horiz,Vert? (f/d/h/v)"; LINE x$: LET g=(1 AND x$="f")+(2 AND x$="h")+(3 AND x$="d" OR x$="v"): IF g<1 OR g>3 THEN GO TO 4020
4022 IF x$="d" OR x$="v" THEN GO TO 4200
4025 REM *HORIZONTAL+FULL FILL*
4030 PRINT #0;AT 0,0;b$: LET a=x: LET b=y
4040 IF POINT (x,y)=0 THEN PLOT INK inix,y: LET x=x+1: GO TO 4040
4050 LET x=a: IF g=2 AND POINT (x,y+1)=1 THEN GO TO 4070
4060 IF POINT (x,y+g)=0 THEN LET y=y+g: GO TO 4040
4070 LET y=b: LET x=a-1
4080 IF POINT (x,y)=0 THEN PLOT INK inix,y: LET x=x-1: GO TO 4080
4090 LET x=a-1: IF g=2 AND POINT (x,y+1)=1 THEN GO TO 4110
4100 IF POINT (x,y+g)=0 THEN LET y=y+g: GO TO 4080
4110 LET y=b: LET x=a
4120 IF POINT (x,y)=0 THEN PLOT INK inix,y: LET x=x+1: GO TO 4120
4130 LET x=a: IF POINT (x,y-1)=1 THEN GO TO 4150
4140 IF POINT (x,y-g)=0 THEN LET y=y-g: GO TO 4120
4150 LET y=b: LET x=a-1
4160 IF POINT (x,y)=0 THEN PLOT INK inix,y: LET x=x-1: GO TO 4160
4170 LET x=a-1: IF POINT (x,y-1)=1 THEN GO TO 4190
4180 IF POINT (x,y-g)=0 THEN LET y=y-g: GO TO 4160
4190 RETURN
4200 REM *VERTICAL+DOTTED FILL*
4210 PRINT #0;AT 0,0;b$: LET a=x: LET b=y: LET v=(1 AND g=3)
4215 IF POINT (x,y)=1 OR POINT (x-1,y)=1 THEN GO TO 4260
4220 PLOT INK inix,y: LET y=y+1+v: IF POINT (x,y)=1 OR (POINT (x,y-v)=1 THEN GO TO 4240
4230 GO TO 4220
4240 LET x=x+2: LET y=b: IF POINT (x,y)=1 OR POINT (x-1,y)=1 THEN GO TO 4260
4250 GO TO 4220
4260 LET y=b: LET x=a-2: IF POINT (x,y)=1 OR POINT (x+1,y)=1 THEN GO TO 4310
4270 PLOT INK inix,y: LET y=y+1+v: IF POINT (x,y)=1 OR POINT (x,y-v)=1 THEN GO TO 4290
4280 GO TO 4270
4290 LET x=x-2: LET y=b: IF POINT (x,y)=1 OR POINT (x+1,y)=1 THEN GO TO 4310
4300 GO TO 4270
4310 LET y=b-1-v: LET x=a: IF POINT (x,y)=1 OR POINT (x-1,y)=1 THEN GO TO 4360
4320 PLOT INK inix,y: LET y=y-1-v: IF POINT (x,y)=1 OR POINT (x,y+v)=1 THEN GO TO 4340
4330 GO TO 4320
4340 LET x=x+2: LET y=b-1-v: IF POINT (x,y)=1 OR POINT (x-1,y)=1 THEN GO TO 4360
4350 GO TO 4320
4360 LET y=b-1-v: LET x=a-2: IF POINT (x,y)=1 OR POINT (x+1,y)=1 THEN GO TO 4410
4370 PLOT INK inix,y: LET y=y-1-v: IF POINT (x,y)=1 OR POINT (x,y+v)=1 THEN GO TO 4390
4380 GO TO 4370
4390 LET x=x-2: LET y=b-1-v: IF POINT (x,y)=1 OR POINT (x+1,y)=1 THEN GO TO 4410
4400 GO TO 4370
4410 RETURN
5000 REM *ATTRIBUTES*
5010 INPUT "Ink? ";in: IF in>9 THEN GO TO 5010
5020 INPUT "Paper? ";pa: IF pa>9 THEN GO TO 5020
5030 INPUT "Bright? ";br: IF br>1 THEN GO TO 5030
5040 INPUT "Flash? ";fl: IF fl>1 THEN GO TO 5040
5050 INPUT "Inverse? ";iv: IF iv>1 THEN GO TO 5050
5060 DIM z$(704): PRINT AT 0,0; OVER 1; INK in; PAPER pa; BRIGHT br; FLASH fl; INVERSE iv;z$: RETURN
5500 REM *SET POKES ETC*
5510 PRINT #0;AT 0,0; PAPER 5;"OK (y/n) ?": GO SUB 1500: RETURN
5520 PRINT #0;AT 0,0; PAPER 5;b$( TO 11): LET y$="": RETURN
5530 POKE p1,191: POKE p2,201: RANDOMIZE USR z: RETURN
5540 POKE p3,191: POKE p4,201: RANDOMIZE USR (z+12): RETURN
9500 REM *SET VARS S/R*
9510 LET in=0: LET pa=7: LET br=0: LET fl=0: LET iv=0: LET z=653 43: LET menu=50: LET fk=0: LET c$="": LET x=120: LET y=95: LET t=0: LET q=0: LET w=0: LET p1=(z+4): LET p2=(z+5): LET p3=(z+13): LET p4=(z+14): LET b$="
                                                    "
9520 FOR i=z TO z+23: READ j: POKE i,j: NEXT i
9530 DATA 33,0,64,17,0,0,1,192,26,237,176,201
9540 DATA 33,0,0,17,0,64,1,192,26,237,176,201
9550 RETURN
```

GANG OF 3

Bob Chappell makes a flying visit to *Upper Gumtree*, the setting of Richard Shepherd Software's latest adventure, to explore quirky goings-on in the capital of Wallydom

If you thought life was bad as an urban upstart in Scarthorpe, wait till you visit *Upper Gumtree*. At least there was a bit of action in grimy old Scarthorpe, with its friendly football muggers and vigilant police, but action in Upper Gumtree means beans on toast for tea or taking the dog for a walk.

Yes, it's a quiet place all right. Or it was till Professor Blowitovitz moved in. So what's wrong with the Prof? Well, this is an adventure game so he can't be sane, can he? He has to be a mad professor. He causes strange events to start happening, like making people's noses glow in the dark and causing Tuesdays to disappear completely.

His ultimate aim, naturally, is total world domination. Your ultimate aim, naturally, is to stop him ... well, you and Emma and Wally, the gang of three.

If you sampled *Urban Upstart*, and lots of people did, you'll know author Peter Cooke has a marvellous sense of humour, and *Upper Gumtree* is a similarly styled follow-up, allowing for the quick visit he made to Dante's Inferno in between.

While down there he seems to have been won over to the Commodore 64, as *Upper Gumtree* is only available for that machine (from February 20) at £6.50 from Richard Shepherd Software (06286-63531). A disk version is on its way, for £9.50. The company sent me an early disk copy of the adventure for *PCN*, though playing without instructions didn't make things any easier.

Gumshow

Those have now arrived, though, so let's look at features first, then try taking *Gumtree* by storm. If you don't like the text colours then the F1 key will run through a variety of options till you find one that suits you, while F7 can be used to repeat your last command.

Inputs can also be linked together using AND, THEN or +, they can be printed out at fast, medium or slow speeds, and you can also have graphics on or graphics off.

If your picture starts to look a little funny, don't worry, it's probably only night falling. *Gumtree* is played in real time, and the events reflect this . . . no good battering on the pub door in the middle of the night, it's closed. Though why you should want to in view of what happens when you go there during the day, I don't know.

You can also hold the game, to prevent time marching on and Emma getting impatient, and talk to the other two main characters by saying WALLY DROP GLOVES. Wally will probably tell you to naff off, but never mind, that's just another hurdle to overcome.

I found *Gumtree*'s hurdles generally tougher than those of *Urban Upstart*, and the adventure a lot more interesting because more is going on. The humour this time round was a little less sparkling — probably because Scarthorpe offers more scope than the town and country mix of *Upper Gumtree* does.

But there are still lots of laughs to be had. I loved the local bobby PC Plod, who has a tendency to fall off his bicycle and pops up to interrogate you when you take something you shouldn't. Be careful what you say to him — remember he's not the Brain of Britain. He's not even the Brain of Upper Gumtree.

Below the belt

You begin, though, in a quiet country lane, a typical rural scene: bees buzzing, birds singing and a Ford Anglia quietly rusting by the roadside. You're also accompanied by Emma and Wally, Emma being by far the more co-operative of the two.

She's not *that* co-operative, though. Try getting too friendly and you're reminded that she has a judo black belt. She also has a pair of scissors, and will carry things when your arms are full, but she won't give them back to you till you've carried out a particular task.

She wanders around, usually close at hand, though Wally initially remains immobile for reasons not unconnected with the above-mentioned Ford Anglia and gloves. I haven't figured out how to get the badly-needed gloves off Wally, but this adventure is planned so that there's lots of roaming about you can do without getting held up by a particular problem.

It helps considerably, however, if you can figure out how to stop the bull chasing you when you find yourself outside its field ... unfortunately the bull's outside the field, too. I was gored to death a few times before figuring it out, not to mention being pitchforked to death by Farmer Giles till I discovered something that took his fancy. I was also lured into blowing myself up, so I recommend making full use of the save feature.

The Score command gives you a percentage, as well as telling you what time and day it is, and after a few hours of compulsive playing I'd managed 46 per cent, with the problems at that stage getting tougher and tougher.

I enjoyed my wanders round Upper Gumtree, despite the hazards on the golf course, and was pleasantly surprised to find that the railway station sports a sign saying it's the Best Kept Station of the Year. Closer inspection reveals that the year was 1923. Oh well. But the game will be getting closer inspection from me, and I recommend you give it one too. Highly enjoyable.

Tome stone

There's just room to mention one of Romik's new titles, *Aliard's Tome*, also for the C64. Romik has released two text-only adventures, but *Animal Magic* I found silly and sloppily laid out on the screen.

Aliards Tome, though, was an excellent atmospheric romp round underground caverns . . . not that I romped very far. Just enough to discover ten chests, then a sleeping orc holding a bunch of keys. EXAMINE KEYS. There are ten of them — I might have known. But the orc wakes up every time I make a move. Drat. And the giant's no use, he just sits round moping, even after I'd gone to the trouble of finding his belt for him.

Alliard's Tome I'd recommend, but you should certainly get *Upper Gumtree* first — and don't blame me if you can't get down again.

GETTING DOWN TO BUSINESS

Want to upgrade your Commodore 64 to use it for business? Unsure of whether it is possible, or how to go about it? Peter Worlock explains how easy this can be and give some some hints and tips of products to look for.

There are many proud owners of multi-thousand pound computers who will laugh at the idea of using a £200 computer for business applications. There are many Commodore 64 owners who will laugh right back — because they're already doing it.

There are no hard and fast rules about what you can do with your machine. Spending a couple of thousand pounds on a computer system will buy you extra speed and convenience and very little else. Most dedicated business computers feature faster processors, larger memory, greater disk speed and capacity, and more sophisticated software.

So it's up to you whether you want or can afford to pay for those extras. If not, rest assured that the 64 can perform adequately as a business machine, as many small companies and professional users can testify.

To get your 64 doing something a little more profitable than playing games you need to look at two areas: peripherals and software.

Peripherals

We can take peripherals first because the same advice will apply whatever application you are considering, something obviously not true of software.

First and foremost you'll require a disk drive. There are two reasons for this: the extra speed and storage capacity, and the fact that most serious applications packages are available only on disk.

With the 64 you're limited to two choices. First, you can go with the 1541, Commodore's drive dedicated to the 64. The advantages are that it simply plugs in and runs, you don't need to worry about disk compatibility, and it's the cheapest. The disadvantages are that it's extremely slow as disk drives go, offers only about 170K of storage, and it's a single drive.

Having two drives makes a considerable difference. It allows you to keep program and data disks instantly available but separate, eliminating the constant swapping necessary with one drive. The difference between having one and two disk units is as great as the difference between using disks and cassettes.

The second choice is to use one of Commodore's parallel drives for its range of business machines. These the IEEE interface which is faster but forces you to buy an additional interface since the 64 doesn't have true IEEE.

The drives are more expensive than the 1541 and an IEEE interface will add another £50 to the cost. On the plus side, storage capacity is generally greater, and double units are available.

A third option would be to buy two 1541s. This adds considerably to the tangle of spaghetti wiring but is a cheaper and still workable solution.

Your next question is the choice of printer. Again, the printers Commodore sells specifically for the 64 leave a little to be desired. They are aimed at the home user, a fact reflected both in price (low) and facilities (limited).

Looking at third-party printers is more rewarding but, as usual, involves the purchase of another interface. Your choice between dot matrix and daisy-wheel printers will depend on what you want to do and who will be looking at the output.

If you need any kind of graphic output daisywheels are eliminated immediately but dot matrix printers have other benefits. They are usually quieter, faster and much more flexible, allowing

you to print a variety of typestyles and graphics through software. While daisy-wheels allow changes of typestyle you'll usually have to stop printing, change the print wheel, then continue.

The only merit in daisywheels is that their output is indistinguishable from electric typewriters so if your intended readers are died-in-the-wool snobs, it's a daisywheel for you.

However, it really is time this nonsense was dispensed with. Once upon a time typewritten letters were frowned on and all correspondence was done in quill and ink. An epidemic of dot matrix print will haul the business world into the present day. Condensed, emphasised dot matrix output is perfectly acceptable.

So, which to buy? Start looking at Epsons, the Rolls-Royce of the printing community. The RX80F/T offers a host of facilities including friction and tractor-fed paper (tractor-feed is useful for general applications but friction-feed is a must for letters) for around £250. The FX80 and FX100 are faster with a few extra 'extras' for about £400.

Slightly cheaper, but without sacrificing much in the way of quality, are Star's range of Gemini printers, and machines from Mannesmann Tally and Smith Corona are also worth checking out.

Daisywheels? Well, if you must, have a look at the Brother HR5 at £250 and the Juki 1600 at £500.

There's a wide choice of interfaces ranging from about £35 to £120. For most purposes the cheaper ones will perform perfectly well. There are only two rules: get a hardware model and insist that it's 'system transparent', which means simply that it won't interfere with any of your software.

The last major peripheral you need consider is a monitor. Clients won't be impressed by the sight of your portable telly and the extra definition of a dedicated monitor is worth the expense. A related topic is the question of 80-column cards. The answer, for the moment anyway, is that they're not worth considering.

Most display only monochrome, if they do offer colour they won't work with any colour monitor costing less than £400, and they don't work with most software packages.

Software

In a sense, software should have been discussed first since that's the way you should go about things. First find your software, then arrange your system to accommodate it. The main potential trap is buying software that won't work at all with your system (see the comments about interfaces above), or software that doesn't use your system to the full.

For example, many word processor packages simply ignore the possibility that you might have two disk drives. Other packages may not work with your chosen printer. Beware!

Since most business applications will require writing in some form or another it's not surprising that word processors are the most common applications package available for the 64. This is good news because you can find a program that will do what you want at a price you can afford.

Many 1541 owners will have received *Easy Script* free with the drive and for most purposes you should find it adequate. The best alternatives include *Vizawrite* from Viza Software, and *Paperclip* from Kobra. The former is easier to use, the latter more powerful. If you really need an easy-to-use package for limited use, try *Homeword* from Sierra On-Line.

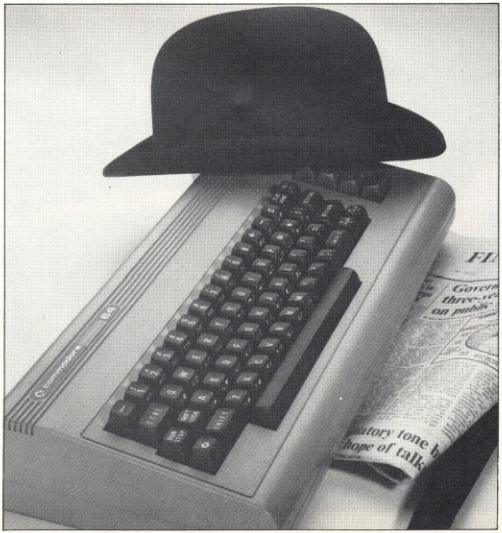
For manipulating figures, your starting point must be *Multiplan*, Microsoft's spreadsheet — usually more at home on the IBM PC and the like, it's a near-miracle on the 64 for £95. Recommended alternatives include *Easy Calc* from Commodore (£40), Handic's *Calcresult* (£95), *Busicalc 3* From Supersoft (£50) and Practicorp's *Practicalc* (£45).

Databases also come in a variety of sizes and prices. For a combination of simplicity and flexibility, Commodore's own *Easy File* is hard to beat. It will accommodate straightforward filing to report generation of invoices, reminders etc. Good value too at £50.

For more specialised needs *Superbase 64*, costing £90 from Precision Software, is a powerful, programmable database. The power comes at the expense of ease of use but if you really depend on information manipulation, *Superbase* should be your first choice.

In the general purpose category, you might also like to check out Viza Software's *Vizastar*. This is an integrated package featuring spreadsheet, database and business graphics at £100. It's also compatible with *Vizawrite*, which might be a worthwhile feature for you.

For more specialised applications, there are many companies offering dedicated packages including stock control, payroll, VAT and accounts.



The following is a much-restricted list of retailers and manufacturers of business-related products for the 64.

The Six-Four Supplies, PO Box 19, Whitstable, Kent — 64 software specialist.

Calco Software, Lakeside House, Kingston Hill, Surrey — software retailer.

Computerama 64, 11 Market Square Arcade, Stoke-on-Trent, Staffs — 64 specialist for software, peripherals and hardware.

64 Software Centre, 1 Princeton Street, London WC1 — name says everything — large range of business software.

Electronic Aids (Tewksbury), Drysdale Close, Wickhamford, Evesham, Worcs — producer of financial and accounts packages.

Fieldmaster Software, 107 Oakwood Park Road, Southgate, London N14 — producer of business software.

Dialog Software, 293 Copperfield, Limesfarm Estate, Chigwell, Essex — database, book-keeping, stock control and invoicing packages.

LITTLE BROTHERS

Brendin Lewis investigates two Brothers that offer a range of facilities, taking them beyond the scope of a normal typewriter.

When is a typewriter better than a typewriter? — When it's a TC600 Teleprocessor, or for that matter a BP30 personal printer/plotter — two new models in the range of Brother portable peripherals.

Brother first hit the market with the popular EP44 portable typewriter/printer — a long way from the multi-functioning, interfaceable machines with full-travel keyboards that the BP30 and TC600 are.

Both machines offer some interesting features in their own right. The TC600 is really the bigger Brother, offering full word processing facilities built in, including storage of up to nine named files within its in-built 14K RAM memory. Optionally, an external 3.5in micro floppy disk drive (FB100) can be added allowing an additional 100K of file storage. Also included is a standard RS232 serial port for connecting the TC600 as a computer printer or terminal.

The BP30 on the other hand, is designed for a totally different purpose. It can only be described as a portable graph plotter for the executive to instantly (well almost) display, graphically, lists of numeric data. It is capable of plotting in four different colours, and three different text sizes which may be plotted in three directions (up, down or across the paper).

Eight different types of graph are available at the touch of a button, thus offering a high degree of flexibility. The main drawbacks associated with the BP30 are first that the typeface is unsuitable for business letters etc, and second that no means is available to connect the system to any external devices.

Features

The TC600 is similar in some respects to the EP44. It uses the same electro thermal print head assembly, and thus the same types of paper and ribbon cartridges. It also contains a built-in RS232 port. What it does not contain is a built-in calculator. What sets it apart immediately from the EP44 is its matt black appearance.

Good looks are maintained under the cover too. Inside is contained a 69 key keyboard which is very comfortable to use. Above the main keyboard are 15 calculator style function buttons, two side switches, and of course the LCD panel.

The function buttons carry the operations shown in Figure 1. The two slide switches are used to set line spacing (1, 1.5 or 2 lines), and also select typewriter, word processor or terminal operating modes. The LCD screen, now almost essential on these machines, is clear and easy to read at any angle by using the rotary contrast control positioned on the left of the machine. The display is made up of 24 characters (made up of a 7 × 5 matrix) in text mode; also indicated are a low battery voltage, and whether or not auto underline is enabled.

In addition to the normal shift and shift lock keys, the keyboard contains two other function control keys, 2nd shift and 'code'. The 2nd shift key enables a wide variety of extra printable characters ranging from various letters from foreign alphabets to currency symbols (see Figure 2). In all, 44

Figure 1

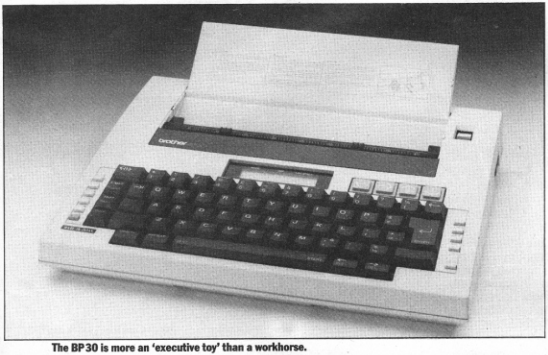
TC600 key desciptions	
Key	**Description**
Hot Z	Set Hot zone
RMF	Print text flush to the right margin
CTR	Centre line of text
xxx on/off	Auto underline on/off
Mode	Select print mode
Up arrow	Cursor up
Right arrow	Cursor right
Down arrow	Cursor down
Left arrow	Cursor left
Ins	Insert at cursor
Print	Print a file
Exit	Exit from a file
Del	Delete character
Cont	Continue printing stopped file
Esc/on	Cancel errors, stop printing a file

Surrogate family: the TC600 (right) is big brother, the BP30 is a graph plotter.

extra characters are made available.

The second function control key affects far fewer keys than does the 2nd shift (20 in all). All 'code' key functions are printed in green on the keytops and deal mainly with the word processor and disk file handling. For example, REPLACE, DELETE, FIND, and COPY are used with the word processor, while LOAD, SAVE, KILL, and JOIN are used when disk-based work is done.

The typeface provided on the TC600 is excellent, producing near daisywheel quality. With the BP30 printing is achieved using miniature, water soluble ball point pens. Four of these (red, blue, black, and green) are mounted within the head assembly on a revolving carrier. When the plotter needs to change the pen colour (either by user request or while plotting a graph), it simply moves to the right-hand side of the carriage where a ratchet mechanism advances the holder by one position.



The BP30 is more an 'executive toy' than a workhorse.

Characters are plotted when a bar running along the back of the carriage is pressed against the currently active pen. This process does make the plotting process quite noisy when compared with the TC600, but is no louder than a standard electric typewriter. To replace worn out pens, the actuator bar must first be moved away from the pens by pulling a lever designed for the purpose. Care must be taken during this operation to prevent the pens being dropped underneath the pen assembly. A spare set of pens is included with the machine.

The keyboard of the BP30 is exactly the same as that on the TC600, though with fewer keys (58 as opposed to 69). Also, 11 calculator-style keys are included, and it seems fitting that six of these are in fact used as a calculator; the remaining five keys are for printing direction, manual colour change, character size selection, and mode selection. The three modes available are Normal Print, Delayed Print, and Calculator. Delayed Print simply means that the LCD screen fills before any printing takes place, allowing the user to modify a screen of information before it is printed.

The speed at which the BP30 plots its characters varies depending on the size of the characters being plotted, as does the number of characters per line: small = 160 characters at ten cps (characters per second); medium = 80 characters at six cps; large = 40 characters at three cps. This may seem quite slow, but is quite fast enough to keep up with all but the fastest typists, even with the large print font. At any rate, the very fast typist is unlikely to use this type of equipment.

As mentioned above, the main disadvantage of the BP30 is that it is purely a stand alone personal plotter, unable to connect to an external micro or mainframe. The reason for this is that, unlike the TC600 and EP44, it does not contain a serial port (or any port for that matter). The presence of this facility would have greatly enhanced the marketability of the product by opening up the market of low cost graph plotting for micros; in its present form it is unlikely to break out of the 'executive toy' type market. It is nonetheless, a remarkable 'executive toy'.

As well as the features already mentioned, the BP30 has facilities to draw up to eight different graph types (two pie charts, four bar graphs, and two line graphs), all of which are accessed at the touch of a button. All the user need then do is enter the data. Bar and line graphs are automatically scaled within the numeric limits of zero and 7,500,999, though the smallest number allowed is 0.000076. Because all graphs are plotted at or above the zero line, it is not possible to enter negative numbers. This will limit the machine's scientific value, though not necessarily its business potential.

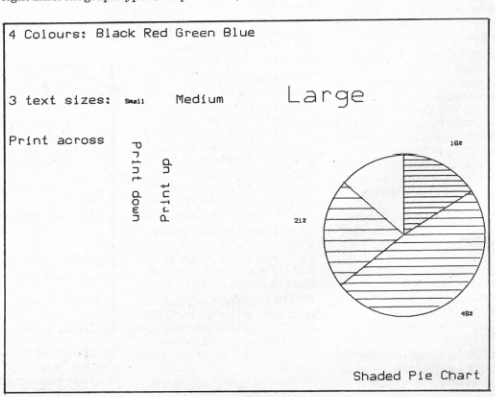
The pie chart options allow for either normal unshaded or shaded with the relevent percentage figures printed alongside. The bar chart options allow for multiple unshaded or multiple shaded bars, and dual multiple unshaded or shaded bars for comparing two different years for example. The final group, line graphs, offers the options of a limited number of lines or an unlimited number of lines on the graph. Most graphs are plotted in different colours.

Documentation

Two manuals are included with the TC600, the instruction manual and the connecting applications guide book. The instruction manual is a 71 page A4 tome which details almost all the aspects of the TC600 modes. Photographs and illustrations are used throughout, showing the user with commendable clarity exactly which keys need to be pressed to obtain all the diverse functions of the machine.

The connection guide book is a bonus not normally included with most printers (or for that matter most micros) and deals with hitching the TC600 to a wide range of micros and printers (the Apple II, IIc, IIe; the Atari 400, 800; the Commodore 64, Vic 20; the Texas TI99/4A; the TRS80 Model 100; the Epson HX20, HC20; the NEC PC8201, PC8801, PC8801 mkII; and the IBM PC, PC Jr). There is even a section on connecting it to another TC600 via a modem link. Also included is a section on using the TC600 as an output device to various daisywheel printers and typewriters — a bonus indeed.

Documentation for the BP30 is under- 27▶



The BP30 features four colours, three text sizes and can print in more than one direction.

New - the official Spectrum Upgrade!

Turn your Spectrum into a Spectrum + for just £20

- Professional full-size keyboard – includes 17 extra keys.
- Responsive typewriter-style action.
- Accepts all current Spectrum software and peripherals.
- Complete with 80-page User Guide and Companion Cassette.

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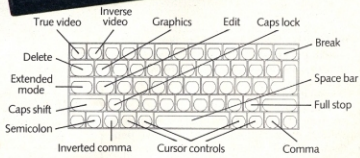
Included – the new Spectrum + User Guide and Companion Cassette

The new User Guide has over 80 pages of information, including a handy BASIC dictionary. The Companion Cassette provides an interactive tour of the new keyboard, and includes three entertaining arcade games.



TO ORDER BY MAIL:

When ordering the Upgrade Service, send off your 48K Spectrum to the address below, carefully wrapped, together with the completed coupon and appropriate payment. (Please do *not* return the mains adaptor, manual or other ancillaries.) Your upgraded computer will be despatched to you within 10 days of receiving your order.

When ordering the Upgrade Kit, simply complete the coupon, enclosing the appropriate payment and post it to us at the address below. Please allow up to 28 days for delivery.

BY PHONE: Access or Barclaycard holders can call Camberley (0276) 685311 for personal attention, 9am to 5pm Monday to Friday. Only the Upgrade Kits can be ordered by phone.

Please note: the upgrade offer applies to working 48K Spectrum models in the UK only.

To: Sinclair Research Limited, Upgrade Dept., Stanhope Road, Camberley, Surrey, GU15 3PS.

All prices include VAT, post and packing, User Guide and Companion Cassette.

☐ Please send me the Spectrum + Upgrade Kit. I enclose payment of £20.
OR
☐ Please upgrade my 48K Spectrum for me. I enclose my computer together with payment of £30.

I enclose a cheque/postal order payable to Sinclair Research Limited for £_____
OR
Please charge my Access/Barclaycard no.

Signature_____

PLEASE PRINT

Name: Mr/Mrs/Ms_____

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Sinclair Research Limited,
Upgrade Department,
Stanhope Road, Camberley,
Surrey, GU15 3PS.

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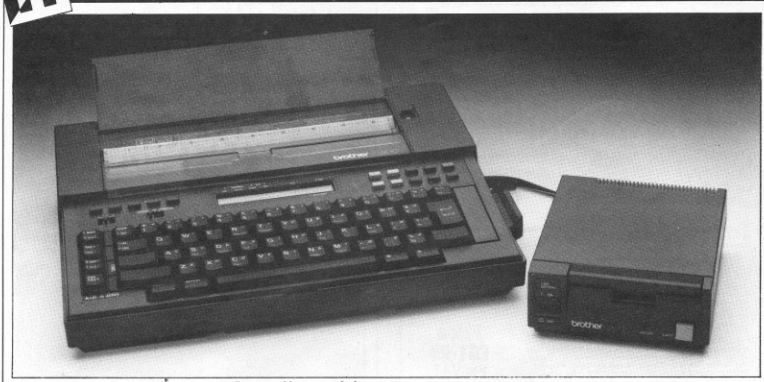
HARDWARE PRO-TEST: BROTHER



The small battery operated disk drive is an excellent portable storage device.

◀25

standably smaller due to the limited functions of the machine. The layout is very similar to that of the TC600 instruction manual, in that it uses photographs and illustrations/diagrams throughout. Again the standard is high, covering all graph modes as well as the normal typing modes.

In use

Very little can be said about using the BP30 other than that it is remarkable easy to operate. The various graphs are selected by pressing a key marked 'GRAPH', pressing one of the numbers 1-8, and entering the data. A small diagram of each graph type is printed on the case above the relevant number, so there is no need to refer to the manual.

When all the data has been entered, two options are available to the user: plot the graph, or dry run the graph. A dry run traces the periphery of the graph without actually plotting, and is very useful for positioning the paper correctly.

There are a number of things which the BP30 is not good at. It's not very accurate when shading the interior of the graphs, though the quality isnot unacceptable for this level of graph plotting. The other problem concerns the plotting of shaded pie charts, the final segment is left blank, and has no percentage figure beside it.

This forces the poor human operators to calculate the percentage value themselves (the built-in calculator could probably be used though). Both these problems appear trivial and seem easily overcome, so why haven't they been?

As a typewriter on its own, the TC600 would be good; with the built-in word processor, it's excellent. Needless to say, the word processor is not up to the standard of the larger, commercially available packages (mainly due to the limited LCD size), but it does have a great many facilities.

Though not part of this review, I was able to get my hands on the optional 3.5in disk unit (model FB-100). It runs on four 1.5 volt, penlight batteries, plugs into the serial port on the TC600, and increases the on-line memory by 100K to 114K. It may, like both the TC600 and the BP30, be driven from a mains adapter; you can't run both pieces of equipment off the same adaptor, though.

The best way to learn about a product is to use it, so initially I started to write this text using this machine — which proved to be a near fatal mistake. After using the machine for a week or so, I saw that the battery low indicator was flashing, and soon afterwards the printer became corrupted.

The battery life on the TC600 should be 400,000 characters, but in this case it was nowhere near this figure. Was it the batteries or the machine? To my surprise, I realised that the 'beast' draws 1 amp of the batteries. So, as a recommendation to all would-be buyers, make sure that you buy the mains adaptor (it only draws 25mA from the mains), and only use the batteries when the mains is inconvenient. This also goes for the BP30, as this draws even more. (This would also prove economical in the long run, as the adaptor costs about £14.)

Verdict

Excluding the power drain problems, the TC600 rates highly, and offers good value when compared to other typewriters. It can be used for anything from a school child writing an essay to the Chancellor preparing the budget (except he has to supply his own calculator).

The BP30 on the other hand is a strange piece of equipment, its uses limited by its very nature as a personal plotter. It even has its shortcomings as a plotter; however, I cannot tell a lie — I loved it.

```
QWERTYUIOPASDFGHJKLZXCVBNMqwertyuiopasdfghjklzxcvbnm
1234567890×"/@£_&'()?½-!¢;=,.½,.≈:+$?½

Characters enabled with the 2nd shift key.

×÷+\°²{}‹›µ$¢£₧¥ÇçÅåiß;'¶#|ÆæØø¿&!@§¤
```

The character set on the Brother TC600 is both readable and versatile.

SPECIFICATIONS

Product	Brother TC600
Price	£415 + VAT; adaptor £11.95 + VAT; disk £175 + VAT
Description	Portable typewriter/printer, with word processor
Features	Serial port, 14K RAM for file storage
Options	3.5in micro floppy (100K capacity) mains adaptor
Print Method	Electro thermal, carbon ribbon cartridge
Product	Brother BP30
Price	£199+VAT; adaptor £11.95+VAT
Description	Portable, personal graph plotter
Features	Eight graph types, three text sizes, four colours
Options	Mains adaptor
Print method	Hammer actuated ink pens
Distributor	(for both TC600 and BP30) is Brother 061-330 6531.

An Epson in Commodore clothing

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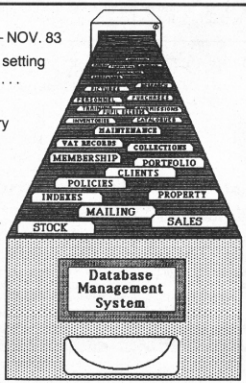

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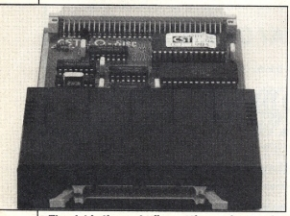
THE QL IN A SPIN

The QL grows up at last with this floppy disk system, says Leon Heller.

The lack of a fast and reliable storage system is one of the major drawbacks of the Sinclair QL; however, a remedy is now at hand. Cambridge Systems Technology has developed a floppy disk interface, which is probably the most significant peripheral development for the QL yet.

Hardware

The interface uses the Western Digital WD1770 disk controller chip, one of the new generation of disk controllers, and requires little support circuitry. The necessary controlling software is contained in an on-board EPROM, which means that the interface uses a negligible amount of RAM. About a third of the printed circuit board is empty, and CST is thinking about putting an additional 128K of RAM into the vacant space as an optional extra.



The slot in the controller neatly matches the QL.

The standard of construction is first class, except that the crystal (for the disk controller clock) is mounted vertically, making it look rather vulnerable. Connection to the QL is via a 64-way female connector at one end of the interface, which plugs into the expansion port at the left of the machine; a 34-way male connector at the other end is used for connection to the disk drive(s). One or two disk drives may be used, and they may be 3in, 3.5in or 5.25in, 40 or 80 track, single/double-sided. If two drives are used, they need not be of the same type. The interface is configured for double-density operation.

Software

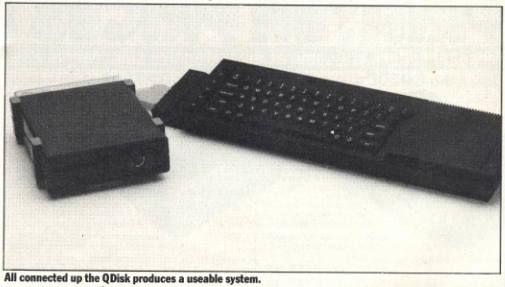
Tony Tebby (the author of QDOS) was responsible for the software in the EPROM which is very well integrated with QDOS. The disk drives are treated in the same way as Microdrives, except that they are called flp1 or flp2.

As with Microdrives, 512 byte sectors are employed, and Tebby has used some clever software techniques to enable QDOS to ascertain whether the drives are 40 or 80 track, single or double sided. The optimum stepping rate is also determined automatically by the software, so virtually any drives may be used.

There was a lot of room left in the EPROM, and this has been used for the addition of some of the functions provided in Sinclair's forthcoming 'QLkit' toolkit for the QL.

Documentation

The 27 page manual contains detailed fitting instructions, information on the use of the interface with SuperBasic and the Psion packages, and details on the additional functions provided. It is well-written, with plenty of examples.



All connected up the QDisk produces a useable system.

In use

Installing the interface is simply a matter of ensuring the QL is disconnected from the mains, removing the cover over the expansion port, and sliding the interface in until the connectors mate. The disk drive(s) may then be connected to the interface (power to the drives should first be removed), and the power restored. The usual initial display is the result, inviting the user to press F1 or F2, except that the message 'CST QL disk interface v1.04 1984' is displayed at the top of the screen.

When F1 or F2 has been selected, a disk may be inserted, and the disk formatted by the usual format command, eg: 'format flp1_fred'. I used a 40 track double-sided drive, and the message '720/720 sectors' was returned when the formatting finished, indicating that 720 sectors each holding 512 bytes were available. In fact, 'dir flp1_' indicated that 714 sectors were free, since QDOS needed some of the available space. Anyway, I was left with over 300K of reliable disk storage.

I can't say very much about the actual use of the interface, as it behaves exactly like a Microdrive — except that it is about three times faster at loading and saving programs, and completely reliable. I successfully patched the Psion *Archive* software to run on disk, and there shouldn't be any problems doing the same to *Quill*, *Abacus* and *Easel*. I understand that version 2 of the Psion packages will work 'as is' from disk, when Sinclair releases them.

The interface and matching 5.25in drives will cost about £250 and when large-scale production gets under way, the interface will be available on its own for about £145.

Verdict

The addition of this interface to the QL transforms it into a perfectly viable small business system. A total price of under £1000 (including VAT) for a QL, monochrome monitor, disk interface, twin disk drives and printer, which, with version 2 of the Psion software when it becomes available represents excellent value for money.

REPORT CARD: 1 TO 5

Features	●●●●●
Documentation	●●●●●
Performance	●●●●
Overall value	●●●●●

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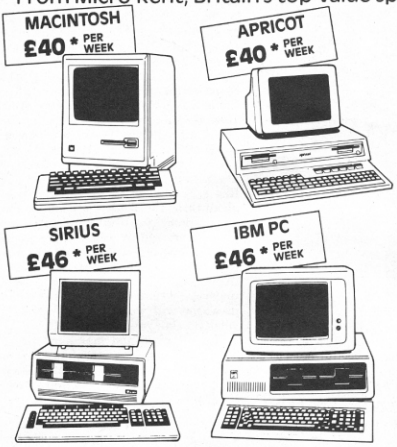

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GAMEPLAY

SPECTRUM

JEWEL OF POWER

Concealed in unpromising packaging, *The Jewel of Power* turns out to be an excellent animated graphics adventure. As you'd expect, doors open by means of redrawing the picture for each location — and in some places there are animated effects.

Having explored my house and discovered the purpose of my quest (look for fragments of a wand), I was walking in the countryside when a goat suddenly appeared at one location, only to disappear again almost as quickly. It emerges every time you arrive there, but I haven't yet figured out why. Elsewhere I got caught by a giant and placed in a cage to await my fate, the giant's face appearing to leer as he did so.

There is a picture for each of the 120 locations, and with the animated touches as well, it's astounding to see how it's all been squeezed into the memory,

with the pictures appearing instantly rather than drawn.

But this does have its snags. For instance, one way of saving memory is by restricting the parser that analyses the commands, and this does prove a nuisance in places. When you see a box of matches you can't GET BOX or GET MATCHES, but must GET SIX OF MATCHES, and similarly in one place OPEN TRAP DOOR works, but OPEN TRAPDOOR doesn't.

You have to study the objects in each picture, not only the text, so having spotted a mirror in the bedroom I tried EXAMINE MIRROR. I was told 'All that is here you see,' implying there was nothing more to be found; yet if you STUDY MIRROR, something happens, and this was only discovered by studying the solution provided.

The other major fault is that there's no automatic restart to the game. You're told you must reload the data, yet when loading the game you're not told where the data files start so that you can mark it on the tape and rewind. This is soon overcome by saving the game as soon as you've started, but it is still annoying.

Complaints apart, I enjoyed *Jewel of Power* thoroughly, especially trying to figure out the Escher-like monument I ventured into, where you can continually go up or down in a never-ending circle. It's perhaps best to SAVE your achievements before you step into here, believe me.

With castles, desert, forests, prison cells, lanterns, dungeons, mazes and even trolls on bridges, this is definitely for the traditional adventurers.

Mike Gerrard

Rating 8/10
Price £9.50
Publisher Slogger Software
0634-811634

BBC

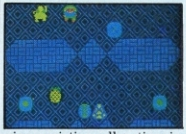
LABYRINTH

This maze-chase stars Mork, whose task it is to find seven crystals deposited about the labyrinth of the title. Mork's a well-animated little character, and well need he be to keep clear of the many creatures of the labyrinth.

You can always try to dispatch the creatures rather than dodge them, of course, and Mork is armed with a laser that fires in the direction of movement, and an even more devastating weapon: a creature-crushing boulder. This is a handy thing to have, though it's cumbersome to move about.

Each room of the labyrinth takes up one screen, with maybe a dozen or so rooms interconnected to make up the first level. One of the exits is barred by a portal, only opened when you've collected the magic crystal. At first you can bob about without worrying too much about maps, but as soon as you're through the first portal you need to try to keep a track of your progress otherwise you find yourself returning to the first level face to face with some of the creatures you thought you'd left behind.

To give you strength to keep all this up you need to eat the fruit that's lying around the labyrinth. Unfortunately, you also look tasty to the nasty inmates, of which there are



nine varieties, all acting in different ways. Some can only be bashed by the boulder, others are seen off with one shot, some with two shots, while one or two seem to be indestructible. One problem is that the beings on screen bear little resemblance to their mug-shots in the instructions, but at least you can pause the game to check, as well as switch the sound on and off; control is via keyboard or joystick.

Labyrinth is a simple but enjoyable game: nothing stunningly original, but well-done with nice sound and graphics.

Mike Gerrard

Rating 7/10
Price £9.95
Publisher Acornsoft
0223-16039

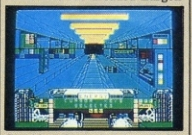
SPECTRUM

BUGGY BLAST

'Blast' is the operative word in this space shoot-'em-up game. The graphics and movement are extremely impressive, but the game has a serious flaw — no joystick option.

The game starts inside a detailed mothership where your buggy is being prepared for launch. At this point you are given the option of using either the cursor or another set of predefined keys.

The buggy is powered up, launched into space, and then down into the dreaded Lurgon



Corridor, the enemy stonghold.

Your buggy will zoom along the wire-frame Corridor under its own steam (sorry, Argon Crystal Converter). What you have to do is point and fire your lasers at the various approaching aliens.

The laser sights are twin prongs that move up, down, left and right. For really mean aliens, you may need to fire a Xion Phaser instead. The Lurgons have a wide range of defences in their six sectors: cytrax cannons, helibombs, orbital suacers and doomships (most impressive), and argon magnets. As if that wasn't enough, there's also time spinners, radiations storms, reverse gravity zones, time zones and mine jammers. Alternatively, you can jump from the Corridor back into space and try to dock with the mothership.

The whole game is graphically superb: colour, movement, and sound are all used effectively, and there's enough variety of action to keep you interested.

Bob Chappell

Rating 8/10
Price £5.95
Publisher Firebrand
01-379 6755

AMSTRAD

CRYSTAL THEFT

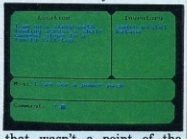
Crystal Theft is one of the first adventures to appear for the Amstrad, and is text only.

The screen layout is well organised, with four separate windows showing the location description, inventory, messages from your character and your latest instruction to the program.

The scene is set on a minor Vegan colony world, presumably populated by eccentric vegetarians. You play the part of a Field Captain in the Intruder Battalion, whose assignment is to penetrate a Vegan temple and recover a vital FTL crystal. All this is carried out against the clock, and the elapsed time may be displayed at any stage.

According to the program notes, the Semantic Analyser module can understand complex instructions of the form GO SOUTH THEN TAKE THE KEY AND CLIMB THE ROPE.

I have my suspicions, however, that it has either been tampered with by a Vegan infiltrator or is programmed to understand Vegan rather than English. I was hard pressed to evoke a response other than 'Pardon?' to any instruction



that wasn't a point of the compass. If you have produced a 'Pardon?' response to a recent instruction, it can then take several repeats to get the Analyser to understand a simple GO NORTH.

To my mind, a good adventure should start with simple problems and progress to the harder stuff as you work your way into it. This one offers too many dead ends and I've just deserted the Battalion. The Vegans can keep their crystal.

Simon Williams

Rating 5/10
Price £7.99
Publisher Wiccasoft
0625-72988

COMMODORE 64

MONOPOLY

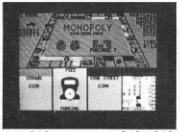
Leisure Genius is well known for its skill in faithfully translating the most popular board games, such as Scrabble, Kensington and Cluedo, to the home computer. Now it's turned its attention to the Big Daddy of them all, Monopoly.

Up to six players can take part, any one of whom can be taken by the computer. You may opt to play out the game or set a time limit. Board, border and token colours may be changed at any time. You get to choose your favourite token and deciding who goes first is accomplished by the computer — cast dice rolled across the board.

The familiar Monopoly board occupies the top half of the screen. Pressing D rolls the dice again, and the player's token advances around the board. The lower half of the screen scrolls to the right and shows, in large size, the square you are currently on, plus the next three.

Making all the usual Monopoly transactions is very simple. Pressing a single initial letter (*eg* M for Mortgage), and following the prompts, allows you to find out who owns what, and enables you to trade, mortgage properties, buy and sell houses and hotels, and so on.

Auctioning of properties is handled very neatly. The current bid appears and the bidder's number is highlighted. A new bid is made by entering your player number and then your bid. A time limit is set, the end of which is denoted by the words 'Going . . . Going . . .', and an auctioneer's gavel thumping down, making the board shake!



The computer looks after all the player's property records, and finances, but you must make your own claims for rent — just like the board game. Community chest and Chance cards are displayed and acted upon at the appropriate time. Well recommended. **Bob Chappell**

Rating 9/10
Price £12.95
Publisher Leisure Genius 01-935 4622

SPECTRUM

WITCH'S CAULDRON

Mikro-Gen's *The Witch's Cauldron* is a graphics adventure in which you begin life as a 'plucky toad', and must restore yourself to human form. The reason for your reptilian resemblance is that you've upset the wicked witch Hazel, who has imprisioned you in her lair. She doesn't seem to be around in the early stages of the game, though her mad assistant Moctuper keeps interfering in your attempts to de-toad yourself.

Naturally you're on the lookout for spells, and the instructions tell you that there are strange ingredients scattered about the 100 or so locations, some of which must be put into Hazel's cauldron . . . if you can find it.

You begin in a different location each time, but always in and around the witch's parlour: under the armchair, in the fireplace, under the couch, and suchlike. Each location has its accompanying picture, and

very good they are too, including you yourself 'doing the toad', so to croak. So good is this impression that you merely have to type the word up, and there you are, perched on top of the armchair or half-way up the chimney. As you hop about you must look and examine everything, including objects that are depicted but not necessarily in the text which occupies a dozen or so lines beneath the picture.

There are some objects that you're unable to get in your initial form, such as a bottle of whisky, but there are clues written in various places to try to help you metamorphose. So far I've managed it several times, turning into a bat or a cat, but each time my efforts were thwarted: Moctuper seems to find batburgers particularly tasty, and it doesn't do to change into a cat if you're in a location you'll then be too big to get out of again. I've been caught in a mousetrap, where typing help produces a mouse who asks you a riddle. One of these I could answer, another I couldn't, and I was dead again, having scored a feeble 200 out of a possible 10,000.

Despite the deaths, and only having uncovered 11 locations so far, the game is proving to be great fun, with a little more uncovered each time. You can save the game, as you'll need to, and full sentences can be entered as well as abbreviated commands. Keyboard response is brisk, and adventures shoud well enjoy being under this particular witch's spell.

The standard of Mikro-Gen's software has certainly rocketed over the six months.

Mike Gerrard

Rating 9/10
Price £6.95
Publisher Mikro-Gen 0344-427317

SPECTRUM

POTTY PIGEON

Potty Pigeon is an average arcade game which uses a good variety of colours, but unfortunately hasn't the graphics to go with them.

Percy, dad of three very hungry chicks, has to keep his greedy family supplied with worms which are scattered at random around the screen. But alas, there are dangers involved, for although Percy is blessed with three lives he has to face horrific obstacles.

He has to avoid speedy cars, noisy planes, paratroopers, dogs, cats, creepy spiders, killer Venus snapdragons, frogs, Unidentified Flying Objects and humans — all of which may prevent him from performing his paternal duties. Doing the worm rounds saps Percy's energy and to restore his fading strength he has to eat a Mayfly which hovers at the top of the screen.

With all these dangers it's lucky that Percy is equipped with exploding eggs which he may utilise in several ways. As he ploughs through the eleven sheets, he may bomb a Red Bird

(which, incidentally, steals worms from Percy at every opportunity) or he may confuse drivers by dropping these eggs and dirtying the car windscreen.

This effect makes them crash and enable Percy to snatch up the wriggling worm and rush back (carefully) to feed his young chicks.

Compared with the Commodore 64 version this is, I'm afraid, a decidedly poor substitute.

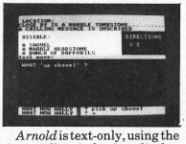
Karen Isaac

Rating 5/10
Price £6.95
Publisher Gremlin Graphics 0742-753423

AMSTRAD

THE WISE AND FOOL OF ARNOLD BLACKWOOD

Arnold goes to somewhere else yet again, in the third of his quaintly named adventures, which are gathering quite a few fans. *The Wise and Fool of Arnold Blackwood* has to be the first adventure where the purpose of your noble quest is to find a Wimpy Bar in Rochdale. His Lordship has a treat for you and he'll hand it over in the said Wimpy Bar. But first, explains the introduction in typical style: 'I must earn a few bob,' cos I'm on a Whisky Diet. I lost three days last week.'



Arnold is text-only, using the Amstrad's windowing display to give location descriptions, directions, prompts, responses, inventory, *etc*, and it's certainly a colourful game. Responses are reasonably quick, but unfortunately the claim that it understands a wide vocabulary is not absolutely true. For example, in the encounter with Mexican Pete (this being just one of Rochdale's strange inhabitants), he has three objects, and offers to sell two of them to you for $500, asking you if it's a deal. I answered 'Yes', only to be told to come back with the money, which I already had.

That apart, there's a lot of fun and legitimate brain-teasers in the adventure. I still haven't worked out how to wake the bugling busker, though a foray into Rochdale's underground (*ie* the cemetery) was successful, leading to subterranean tunnels and a hilarious routine with a small box.

So despite its faults, *Arnold* an enjoyable romp for those with a sense of the ridiculous, and patience to cope with the responses.

Mike Gerrard

Rating 7/10
Price £5.50
Publisher Nemesis 0933-623967

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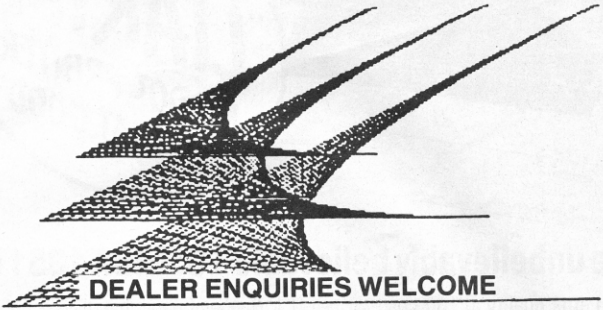

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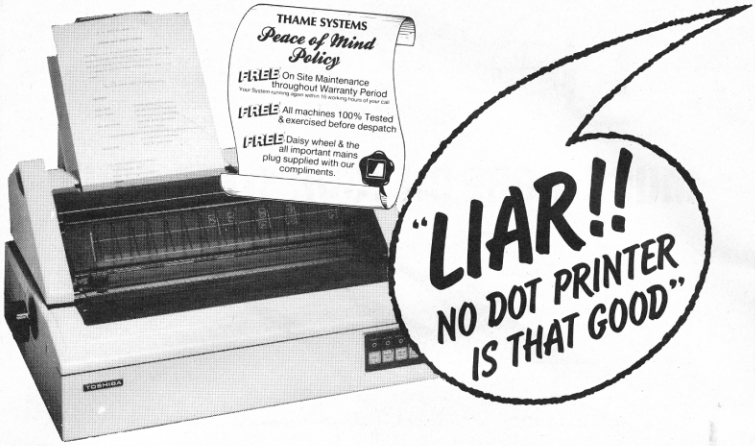

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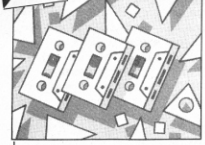

We check out the latest contenders on the software market, and cast an eye to the future. Don't forget, if you want your company's package to be included on this page, send your latest releases to Bryan Skinner, *PCN*, 62 Oxford Street, London W1A 2HG, along with prices and 'phone numbers.

AMSTRAD

Amsoft seems to have an inexhaustible supply of conversions for its micro. Best of the bunch this week is Micro-Gen's *Pyjamarama*. The hero Wally is in the throes of a nightmare and you must help him find his alarm clock and wind it up. As you move round the house you have to find various objects to help you attain your goal.

The graphics are among the best I've seen on the machine and even though the price is steep I'd recommend it.

Not so *Dragon's Lair*, another Amsoft product, but originating from the Romik stables. This is a rather slow and dull little number that would be overpriced at a fiver.

Frank'N'Stein is PSS's translation from its Spectrum game and looks nice. *Battle For Midway* is 'an accurate computer version of the Second World War battle in the Pacific Ocean'. PSS reckon to have improved on its original versions — full reviews to follow.

Camel Micros is one of the few producers of non-games software for the Amstrad. Its *Flexifriend* is a home budget package, but with a few extra facilities, such as a calculator you can call up at any point.

Flexifriend	**£7.50**	**Camel Micros 0392-211892**
House of Horrors	**£6.95**	**Solid Software 0253-58634**
Pyjamarama	**£8.95**	**Amsoft 0277-23022**
Classic Racing	**£8.95**	**Amsoft 0277-23022**
Frank 'N' Stein	**£8.95**	**Amsoft 0277-23022**
Dragon's Lair	**£8.95**	**Amsoft 0277-23022**
Battle For Midway	**£9.95**	**PSS 0203-667556**
Software Star	**£7.95**	**Addictive Games (Chacom) 418297**

SPECTRUM

Brian Bloodaxe takes the oft' favoured Norse theme, with a platform-type format, whose appeal looks set to rival classics like *Jet-Set Willy* and *Manic Miner*. There are 104 screens, over 300 monsters (including pints of lager, bishops, scissors and the like), hidden traps — you name it, it's got it, and we'll be reviewing it shortly.

Afghan Attack may be an inexcusably tasteless title, more so than *Raid Over Moscow*, but it's just a rather poor Quilled adventure. Our adventure reviewer reports that although it's in two parts, neither is really worth the effort, and it seems unlikely that its author(s) travelled much further than the lavatory in search of inspiration.

Following Ocean's *Gift From The Gods* (and others), Melbourne House is borrowing from legend in the search for new game scenarios. Ulysses, the Gorgon, and the Minotaur all appear here. There are three frames, the first being a sort of *Kong* game — climb Mount Olympus, and avoid the tumbling boulders. Screen two is a pillar puzzle, replete with trampoline and Minotaur, and the third's a maze job in which you have a monster-bashing mace. Nice graphics (no sound), but not really a classic.

Software Star comes from Addictive Games who brought you *Football Manager*. You take control of a software house and have to take it to financial success, successfully handling problems with staff, advertising, finance and launches. Could be some MDs will find a use for this in 1985 (it's noticable that there doesn't appear to be any facility for buying yourself Ferraris).

Heroes of Karn is an illustrated adventure, *Hobbit* style. Your brief is to enter the land of Karn and free it from the powers of darkness by releasing the four heroes — Beren, Istar, Haldir and Khadim — from captivity.

The program allows you to instruct the other characters, and once you've visited a location you don't have to wait for its picture to be re-drawn if you don't want it.

Now the snow's gone you'll be able to turn to a ski simulation to relive all those wild moments of glory in your local park. *Ski Star 2000* gives you a 3D skier's eye view of an obstacle course through snow-flecked goggles. You're guided by the horizon, a route map and control panel. The press release boasts an infinite number of obstacle course designs which you can generate with the Course Designer section of the package.

There are fixed modes so you can compete with friends on these for best times and highest scores. A 64 version will be released shortly and Richard Shepherd claims that 'this program bears no resemblance to any ski program on the market'.

Brian Bloodaxe	**£7.95**	**The Edge 01-240 1422**
Heroes of Karn	**£5.50**	**Interceptor 07356-71145**
Halaga	**£5.50**	**Interceptor 07356-71145**
Hellfire	**£6.95**	**Melbourne House 01-940 6064**
Monty Is Innocent	**£7.95**	**Gremlin Graphics 0742-753423**
Afghan Attack	**£9.95**	**Southern Software 0705-374349**
Finders Keepers	**£1.99**	**Mastertronic 01-935 4944**
Software Star	**£6.95**	**Addictive Games (Chacom) 418297**
Ski Star 2000	**£7.95**	**Richard Shepherd 06286-63531**

COMMODORE 64

Automan is a two-part arcade game based on the TV series of the same name. One part is a sort of 3D car chase, and the other is a platform affair. Despite the promotion and packaging, it's rather a disappointment, although a full review will appear soon.

Imports from US Gold still dominate the value for money stakes. Its latest, Synsoft's *Sentinel*, is no exception. It's a 3D starship game, and you must defend the planet Jaraloba.

Although Orpheus is better known for its Oric software, its latest release is a C64 database called *Megabase*.

It uses a sentence type retrieval language, giving greater flexibility than standard menu-driven approaches. What puzzled me was where the press release states, 'Machine code drivers make *Megabase* substantially faster than other comparable database programs'. So just what's a machine code driver in this case? Answers, please, on a postcard — to Orpheus.

Simulations are going through a phase of bubbling under. The latest is a glider simulation from CRL. Written by an experienced competition glider pilot, *High Flyer* has you floating on thermals, and checking the 'View from Cockpit' instrumentation. There are four speeds, and a selection of weather conditions to add zest to the program.

Sentinel	**£9.95**	**US Gold 021-359 3020**
High Flyer	**£9.95**	**CRL 01-533 2918**
Automan	**£9.50**	**Bug-Byte 051-709 7071**
Megabase	**£24.95**	**Orpheus 0767-51481**
Software Star	**£7.95**	**Addictive Games (Chacom) 418297**

MSX

Activision is one of the few software houses producing MSX software is any quantity, but unfortunately not in any much quality, (if you want really good MSX software, look to Konami, but be prepared to fork out over £15 per game). *Pitfall II* and *River Raid* are fair products, but are based on rather old game concepts. Overpriced they may be, but they should give Activision a head start in the MSX software rush that is sure to come soon.

River Raid	**£11.99**	**Activision 0628-75171**
Pitfall 2	**£11.99**	**Activision 0628-75171**

PASCAL AT A PINCH

Amstrad owners who want to do serious work with a compiled langauge could do worse than to try HiSoft's version of Pascal, says Simon Williams.

The Amstrad CPC 464 has one of the fastest Basics (Locomotive) available on a home computer, but you may still want to use a compiled language. You want the extra speed without programming in machine code.

Pascal is a strong contender for the job: for instance, it resembles Basic in many respects, though it's a bit more fussy about syntax, and the language is favoured by schools and universities because of its 'structured' characteristics. A Pascal compiler has been brought out by HiSoft, which has already issued a version of Pascal for the Spectrum, as well as *DevPac* for the Amstrad.

First impressions

The Pascal 4T compiler comes on cassette with a thorough 96-page, ring-bound manual. This is a User Reference Manual for the compiler itself and makes no pretence of teaching you Pascal. Hisoft does produce a tutorial guide, but this isn't included.

The reference manual covers the syntax of the various Pascal 'parts of speech', a description of the extensions made to the language to take account of the CPC's features, and a description of the commands available within the text editor. It also contains a series of appendices which offer a list of error messages, a description of the turtle graphics package included with the language, a number of example programs and a set of useful library routines. Sadly, there's no index.

In use

Pascal 4T uses about 19K of RAM, leaving about 20K for programs and data. Once loaded from cassette, the language takes over from Basic and the Amstrad is a Pascal machine.

A help menu is displayed before you start, consisting of a number of single character commands which are used mnemonically to perform different actions. For example, to list a number of lines of program you would type 'Ln,m', where n is the start line number and m the end line. Line deletion is similarly done using 'Dn,m'. You soon adjust to the abbreviated instructions.

Editing the text file (the lines of your Pascal source program) is achieved the same way as in Basic. You use either a copy cursor or a single line editor with Microsoft-like delete and insert commands. Line numbers are used purely for reference when inserting or editing text, and the editor provides them automatically if asked. Renumbering is also possible. If you type in a line of source code with the same number as an existing line, the old line is renumbered one higher — a useful safety net.

A completed program may be compiled by issuing the 'C' command. A number of compiler options are available, governing such things as a print-out of the compilation and the internal checks made as the code is compiled. There is a sensible set of defaults for all these options, so you need only use those you require.

HiSoft Pascal compiles straight to Z80 machine code, and the object code may be executed on any CPC by loading it as a binary file. Any errors occurring during compilation are signalled and you can switch back into the editor to correct each one. Error codes are given, which must be looked up in the manual — with over 70 different error messages, it would have taken a lot of memory to include them with the compiler. The compilation is quickly over, and you're prompted to run the object code. All you have to do is press 'R'.

HiSoft Pascal is fast by micro standards for the language, partly because it runs as Z80 code rather than an intermediate code, such as that used by the Acornsoft ISO Pascal compiler for the BBC Micro.

This Pascal would have been faster if it were not for the Amstrad's firmware, which makes time-consuming keyboard checks using a long-winded ROM call. This may turn out to be one of the biggest drawbacks: well-documented ROM calls may be a boon to the novice programmer, but may prove a headache for commercial software houses.

The turtle graphic routines are a welcome bonus. They are the routines everyone remembers as the spectacular part of the educational language *Logo*.

They're loaded separately from the compiler, from the other side of the cassette. A set of 15 commands includes the usual backwards, forwards, turn, penup and pendown, and combined with the speed of Pascal, routines using them run much faster than under the more stately Logo environment.

Comparative timings (sec).

	HiSoft Pascal 4T	Acornsoft ISO Pascal
Magnifier	2.4	2.8
Forloop	29.4	29.6
Whileloop	33.8	120.0
Repeatloop	30.4	119.7
Literalassign	30.0	52.3
Memoryaccess	30.4	53.1
Realarithmetic	19.8	61.2
Realalgebra	21.0	58.3
Vector	40.4	202.1
Equalif	33.4	105.6
Unequalif	33.4	105.2
Noparameters	18.6	30.7
Value	19.3	37.9
Reference	19.4	34.8
Maths	84.8	346.1

See *PCW* (Dec 84) for Pascal benchmarks.

Verdict

HiSoft Pascal is a very usable implementation of the language, and runs with commendable speed. The editor should be no surprise to anyone who has used the Basic editor on the Amstrad, but has a number of extra facilities.

The package sensibly compiles directly to machine code, and this may be run independently from the compiler, making it likely that individuals and software houses will use it to write their own commercial software.

The language has been well integrated with the facilities of Amstrad, so it's much more than a simple translation of HiSoft's Spectrum Pascal. The company is at work on a version of C, and if the implementation is as good as this one, the Amstrad will soon be well endowed with efficient, compiling languages at reasonable prices.

REPORT CARD: 1 TO 5

Features	●●●●●
Documentation	●●●
Performance	●●●●●
Overall value	●●●●

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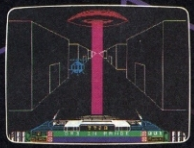

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BBC B with DFS £300. 3in disk drive with disks £160. Cosmos printer £200. All in excellent conditon. Plus original software for sale (sae for list). Paul Barry, 20 Southdown Road, Hornchurch, Essex.

Electron game: Savage Pond, bargain, £5 ono. Also network stereo, radio cassette, level meter, all functions etc. Unwanted Xmas present. Cost £90; accept £30. Tel: 303 7091 (061).

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Exchange: Cheetah Speech Upgrade and two cassettes for Acorn DFS chip. Tel: (041) 946-9110 after 7.00pm.

Ultracalc 2 (latest ROM spreadsheet for BBC model B). Unused ROM + all manuals, retails for £79. Quick sale: £65. Tel: 01-659 1303 (after 7pm).

BBC B + manual + advanced user guide + RH electronics lightpen & dust cover & games, £320. Worth £470, good eh? Contact Keith, 22 Sinclair House, Clifton Rd, Bristol.

Acorn DFS upgrade kit including 16K DNFS ROM and fitting instructions £90. Tel: Tony, 041-636 1239.

Wanted BBC model A or B. Non-working (ie cheap) model preferred for experiments/projects. Cash available to purchase two machines. Tel: 0244 675717.

Wanted Electron in exchange for Prakti cca B200 35-70 zoom 28mm W/A. 135mm Tele. Tripod, Flash Gun. All mint. Tel: 061-962 4348 evenings after 6.30pm.

BBC software. All original, Snowball, Hobbit, Fortress, Meteors etc. Replica disk graphics, 3-8 yrs, educational wizard joystick interface. Tel: Basingstoke 51623.

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Acorn Electron plus data recorder plus books worth £20. Tel: 01-520 6301 offers considered.

Apple

Apple II Europlus 64K, 12in green monitor, manuals, £325 ono. For quick sale. Tel: 01-602 1530.

Wanted: Apple IIe or Europlus. Must have 2 disk drives, c/pm and extended memory cards, monitor, all manuals leads and some software. Tel: 01-724 3681.

Apple 2e complete with drive and controller. In original packing £510. Tel: 01-527 2350 ext 27 office hours.

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Atari swap software with users in Germany, France, USA, GB, etc. Disk preferred. Send list to T. Smith, 15 Tansley Hill Ave, Dudley, West Midlands.

Swap Atari 600XL + cassette recorder, joysticks software on cartridge and cassette + books & listings for your 48K ZX Spectrum + cassette unit. Tel: (0705) 734434 after 6pm.

Atari cartridges — reactor & amidar for VCS systems. £5 each or £8 for both. Tel: Robert on 01-520 0199 after 5pm.

Atari 400 1010 recorder £300; games on ROM and cassette including Pac-man, Preppie, Basic — sell £120. Tel: (0329) 287684.

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Atari 400 16K cartridges £8 each, (Centipede and Basketball). Cassettes £4 each. (Mutant Camels, Danger Ranger, Shatablast, Dambusters) exc. cond. Tel: Jeremy in evening 01-954 6399.

Atari Interface 850 and Nightingale modem, with cable for Atari interface. Both hardly used. Cost £250; sell £200 ono. Tel: (0792) 470766.

Atari Software for sale or swap. Zepplin, Pharoah's Curse, Burce Lee, Solo Flight, plus disk drive wanted. Tel: 0904-791067.

Commodore

CBM 64 6502 Development package, text-editor + assembler, by Hesware (cassette but transferable to disk) + help to beginner: £15. Tel: Adam: 485 8823.

Commodore MPS 801 printer, little used plus paper: £190. Tel: Daryl 01-727 2614.

CBM Pet software for sale. Petsoft, Petpack, original cassettes. Games, Educational etc. approx £100 worth. Accept £30 ono. Will post if required. Tel: Chester 675177.

CBM 64 Games — Pakacuda £3, Trojan Lightpen £10, Music Composer £7, Mastermind £7, Matchmaker £7 (all ono). More you buy, less the cost. Tel: Robert on 01-520 0199, after 5pm.

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New Commodore 1541 disk-drive to swap with a MPS 801 or MPS 802. Will pay the difference. Tel: (021) 429 9587.

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Commodore 64: owners, HELP! Can anyone send me instructions for 'Worms' by Electric Arts? Steve, Mossley, Trent Drive, Liverpool 25.

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CBM 64 software: Data base (practifile) and accounts, system, (Gemini cashbook), ideal for small office. Both on disc originals with manuals: £75. Tel: Tony 01-693 9680.

White Lightning for Commodore 64: £15, one only. Tel: 01-274 4363, ask for Sjan.

CBM 64: Logo by Commodore, 1 disk with language, 1 disk with utilities + tutorial manual + help to beginner, £20. Tel: Adam 485 8823.

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Oric-1 joystick interface and Quickshot 1 joystick. Cost £25; sell £12. Will sell separately. Tel: Matthew Lavender (0222) 842817 after six.

Oric 16K, with 7 tapes, mags, books, plus Acetronic Console incl. Invaders cartridge — two for price of one: £105. Tel: 041 946-4930 (eves).

Unwanted Oric software 7 titles, guaranteed originals. £2.50 each, inc P&P. P. Wilson, 107 Bollington Rd, Bollington, Macclesfield, Cheshire SK10 5EL.

Oric-1 48K Tandy lineprinter II (Centronics 730-2) sheet, roll/fanfold; Oricstar work processor program; Database, Forth, monitor & disassembler programmes. Manuals. Sanyo cassette, leads. £225 the lot ono. Tel: (0803) 212320.

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AP100-A Printer graphics, enlarged print, parallel Interface (ie. BBC B). Free paper plus manuals £80 ono. Tel: Luke 01-589 8801. Perfect condition.

Seikosha GP100A Mark 2. Graphics printer (Centronics) for sale. Costs £220 new; will accept £150. Only 2 months old. Tel: 01-699 4830 (eves) 01-639 0257 (days) & ask for Ray.

Kaga RGB colour monitor 12in. Unused with wires. Best offer over £200. Contact Ben after 6pm. Tel: 01-485 7663 (new).

Epson MX-80 printer type III. ROMS, £150 ono, also Apple parallel printer interface card £30 ono. Tel: Tony, 01-578 7704 after 7pm.

Kaga RGB. Vision-1 colour moniter, unused Christmas present, all leads etc, still boxed. Quick sale: wanted only £170 ono. Tel: 485 7663 after 6pm.

Swap: VTX5000 modem with user — user software and AGC & Kempston interfaces, for TTX2000 teletext adaptor; or sell £65 the lot. Tel: (0745 75425) 425 (Bodfari).

100K Cumana 5.25in disk drive and PSU £95.00 ono. Includes disks with Acornsoft, etc, s/w. Tel: 01-858 2449.

Sinclair

Spectrum penpals wanted to exchange tips, ideas and s/w. Write to Oliver Muoto, PO Box 2509, Kano, Nigeria.

48K Spectrum DKTronics keyboard, Kempston interface, cassette recorder, selection of games inc Match Knight Lore, Underwurld etc, £150 ono. Can deliver in London area. Tel: John 01-520 5203.

Wanted Spectrum software originals only. Anthony Marshall, 41 Loders Green, Eastfield, Scarborough, N. Yorks.

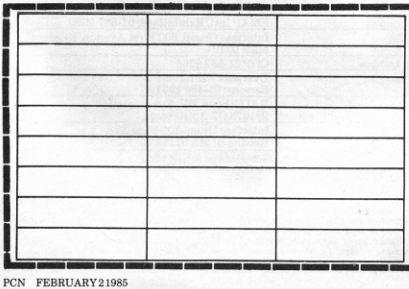
48K Spectrum, + Alphacom 32 printer, + Currah Speech. All in mint condition. Also included is lots of software. All for £225. Tel: 01-942 5053 anytime.

Spectrum software — Cyrus IS Chess (48K) £5, Psion Scrabble (48K) £8; Microgen Chess, (48K) £2.50. All originals. Tel: 051-430 6504.

Spectrum software sale — originals lowest prices — old classics from 75p, new titles less than half price. Details from Steve on 0753 884473 after 6.

48K Spectrum, Interface, Interface 2, Microdrive + 2 carts. ZX printer, Beep amp. 17 original software. Books + magazines. Semi-working cassette recorder. £310 ono. Tel: 01-202 8602 after 6pm, all day at weekends.

Spectrum software to swop. Titles like Kung Fu, Drive In, Airwulf and many more. Tel: Wilmslow 0625 524284. Ask for Robert (Microdrive wanted too).



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QUIT

Chris Curry admits that Acorn's attempt to enter the US market was 'a signal failure' but still has high hopes for overseas sales. 'We are succeeding in other markets, for example India,' he said with a flourish.

Well it was certainly an interesting variation on an old theme. Normally when UK manufacturers attempt to contradict stories of poor sales they refer to good overseas sales. When asked where, they always say France. C'est la vie.

It's a turn up for the books. In the old days we just supplied them with civilisation, now it's BBC Micros as well. But former colonies are not alone.

At a recent exhibition in Moscow, Acorn was there again, along with Sinclair — in name at least. Burly citizens by the name of Boris and Olga were able to ogle the latest UK hi-tech offerings.

The presence of our leading micro makers in Moscow is hardly likely to be of much interest over here, except to such people as PPS, the Coventry software supplier, which announced that it had ceased trading with the Soviet Union after the shooting down of a certain Korean airliner.

But one extraordinary feature of the Soviet scene, according to reports, is that Russia has 64,000 secondary schools that need to be supplied with micros. It shows how far behind the times they are. Nothing less than 128K will do in the West this year.

This presumably explains Sinclair's decision to cease production of the ZX Spectrum. 16K is a flea-bite and 48K doesn't exactly make the blood course through the veins. But will Sinclair stop building and selling the machines altogether? Of course it won't. There are hundreds of thousands of people out there (Out where? Well, Ulan Bator, for example, or Chittagong) who don't even have two bytes to rub together.

Finally, congratulations are due this week to Oberon International, which makes the Omni-Reader optical character recognition device (issue 95). The Omni-Reader won a Rita Award at the *Which Computer?* Show last week as Newcomer of the Year. The year at that time was just 15 days old, and the Rita Awards themselves are little more than a tedious punctuation mark in the life sentence that show coverage can become. But we shouldn't let that detract from Oberon's achievement.

AIRY FAIRY — Since the dawn of time man has sought to conquer the air. Early attempts with Lockheed Starfighters might have deterred a lesser breed, but man pressed on as he dodged the dodgy jet aircraft dropping out of the sky all around him. Here is a photographic testimonial of his most recent and most noble effort. Man is turning conquest of the air into a handicap race. As you can see, the fearless pioneer photographed is attempting to sever his links with Mother Earth while carrying unnecessary weight in the form of a Texas Instruments Pro-Lite microcomputer.

SYNTAX ERROR

Last week's issue compiled perfectly first time. There are no Syntax Errers. Err, there are no Syntacks Errors. Let's try that again . . . nothing went wrong.

NEXT WEEK

Protek Pro-Test
Micro comms come under the microscope as we check out the Protek modem — is the software keeping pace with the hardware in the race to get you on-line?

Après Apricot
As the new crop of Apricots comes on stream from ACT, cast your eyes over the F1e model.

Attic Attack
Dust the cobwebs off your Spectrum and send it into action with this game.

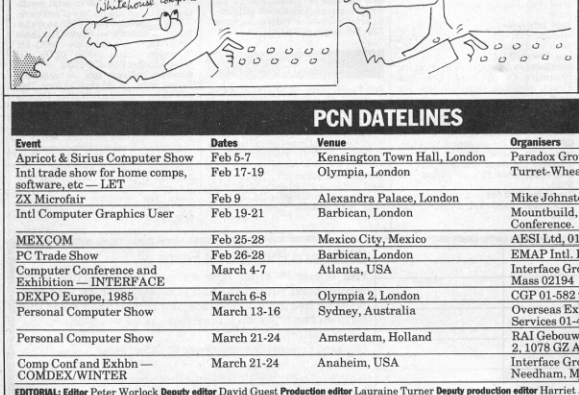
Vic ball point
How do you rate Vic 20 as a word-smith? Raise its game with our routine to send its hard-won hard copy to an MPS801 printer.

Amstrad dance
Twinkle your toes or tinkle the ivories, whatever takes your fancy with this tuneful addition to your CPC464's repertoire.

Spoctrum palette II
Part two of the listing that will let you look at your Spectrum through rose-tinted screens.

Crazy Caverns II
The second installment of our Tony Crowther exclusive hits the screens next week.

Abbeydale Road
Not a Beatles album or the Sheffield to Chesterfield highway, but a Pro-Test of the latest (and from the software point of view) most promising disk units for the Spectrum.



PCN DATELINES

Event	Dates	Venue	Organisers
Apricot & Sirius Computer Show	Feb 5-7	Kensington Town Hall, London	Paradox Group, 01-241 2354
Intl trade show for home comps, software, etc — LET	Feb 17-19	Olympia, London	Turret-Wheatland, 0923-777000
ZX Microfair	Feb 9	Alexandra Palace, London	Mike Johnston, 01-801 9172
Intl Computer Graphics User	Feb 19-21	Barbican, London	Mountbuild, 01-486 1951 Show and Conference.
MEXCOM	Feb 25-28	Mexico City, Mexico	AESI Ltd, 01-379 7628
PC Trade Show	Feb 26-28	Barbican, London	EMAP Intl. Exhibitions, 01-837 3699
Computer Conference and Exhibition — INTERFACE	March 4-7	Atlanta, USA	Interface Group, 300 First Avenue, Needham, Mass 02194
DEXPO Europe, 1985	March 6-8	Olympia 2, London	CGP 01-582 9256
Personal Computer Show	March 13-16	Sydney, Australia	Overseas Exhibition Services 01-486 1951
Personal Computer Show	March 21-24	Amsterdam, Holland	RAI Gebouw BV, Europaplein 2, 1078 GZ Amsterdam
Comp Conf and Exhbn — COMDEX/WINTER	March 21-24	Anaheim, USA	Interface Group 300 First Ave, Needham, MA 02194

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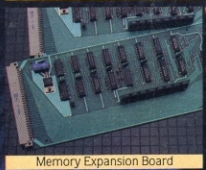
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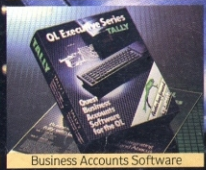

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