

P E R S O N A L

COMPUTER

weekly

NEWS

JUNE 2nd · 1984 · No 63 50p

6502 BBC SPECIAL
Acorn's second processor
and Bitstick graphics

CUT-PRICE PRINTER
Canon cuts £100 off
dot matrix printing

ORIC PROGRAMS
Money matters,
and an assembler

SOFTWARE REVIEWS
... for Spectrum,
CBM 64 and Dragon



!PCN DOUBLE!

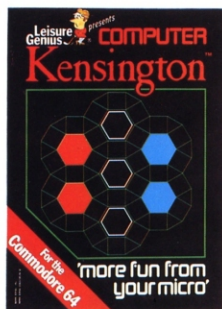
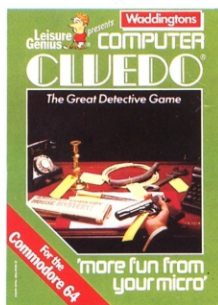
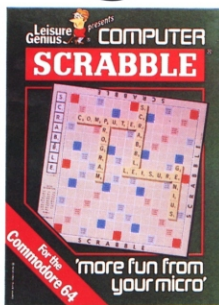
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PLUS
**Full Pro-Test of
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MENU

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Apple Computer has finally produced a portable micro to augment its II+/Ile series, and its compatibility is up to the usual standard. However, Bryan Skinner finds that a major change has taken place — the IIC does not possess the customary expansion slots because everything is built in.

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The official Oric disk drives have arrived in time to hook up to the new Atmos. David Janda gives the Microdisc a spin.

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Garry Marsh looks at Acorn's 6502 second processor and the Bitstick graphics system: high quality but is it worth the price?



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Software Automatic Mouth is the latest attempt to teach the Commodore 64 to speak, and it also shows Barbara Conway a few things about phonetics.



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The simplest games are often the ones that please most.

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Get out and about as guardian of a fishery, or head off domestic disaster with George the plumber.

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This assembler/disassembler will intrigue Oric owners with its unusual entry of the addressing mode.

Allez France

Bryan Skinner reports from Micro Expo in Paris

The 9th Micro Expo exhibition in Paris brought together the most important European suppliers of hard and software.

Many of the 150 stands were for foreign imports and the organisers hoped to see 150,000 visitors. There were parallel sessions of lectures and seminars on subjects like choosing a micro, using spreadsheets and so on—very relaxed.

The micro is seen in a different perspective in France. It's viewed in a more utilitarian light than in Britain and there were few hobbyists or games players in evidence.

The business micro market in France is some 12 to 18 months behind that of Britain. The home micro market is even further behind.

The commercial side of micros in France is dominated as elsewhere by international companies like IBM, Commodore and Apple, while the home market is so new it's more or less up for grabs.

Many of the British home computer companies were there, but the French market is not typified by the 'home hacker' as it is in Britain. The French are more interested in what a computer can do in terms of available software, rather than what they as programmers can do with it. Software and hardware are of equal importance, hence the large numbers of vertical marketing programs already available for the Apple II series.

British companies like Thorn-

EMI were showing off expensive CAD packages next door to home micro stands like Radofin's Aquarius, which gives you some idea of the mix.

It was interesting to see that Oric really does have a foothold here, as witnessed by the presence of 'Lorices', a company that produces games for the Oric, 64, Vic 20, Spectrum and ZX81. Some of the Oric/Atmos games were equal to, if not far better than many sold in the UK. It would be interesting to see some of these programs crossing the Channel. The Dragon and Lynx stands sported only British packages, which seemed to put off many potential buyers.

There are few French micros; the Hector, Goupil and Thompson TO-7 are top of the range and it's odd that we don't hear much about them in Britain. The Hector, in its upmarket guise, has a resident Fort as well as a very extended basic, built-in cassette unit and available peripherals like a robot arm.

At the bottom end of the French-made micro range is Alice. At 1,000FF (about £87) it has 4K user RAM, 8K ROM, a 64x32, 9 colour display, RS232 I/O and very little else.

One reason for the slow uptake of home micros in France may be the price. An Atmos costs 2,400FF (about £215), compared with the British price of about £170, a 'Peritel' Spectrum works out at £200 (Peritel is the French TV standard), a Dragon is £260, the Hector HRX will set you back some

£430 and software is similarly pricey: games cost upwards of £8.

Softsel, the USA's well-known software distributor, is to open a centre in Paris 'by September'. It hopes to expand its supply of software in France, much as it has been doing in Germany. The company will be employing local people for the centre and is looking to offer native language versions of top programs. This seems to be an important factor in European sales and one of the selling points of machines like the Hector is that its character set has 'minuscules accentuées', i.e. accents on lower-case characters.

There are no home computer weeklies and the monthlies are semi-glossy magazines like 'Votre Ordinateur', 'Ordinateur Personnel' and some specialised mags for the Sinclair and Oric micros. None of these could be called technical and the programs and reviews are pretty basic. There is a growing market for programming; there were a number of French language books on programming on offer from Sybex (the expo's sponsor).

Enterprise was there, with yet another 'pre-production' version of its supermicro, wires disappearing behind a monitor. The new brochure features Sony 3.5in disk drives, and a range of software including Lisp and Fort, as well as games and educational packages. A spokesman said that the machine was now scheduled for release 'in September', presumably meaning this year.

DR doses PC

Digital Research has beaten Microsoft to the post in delivering a multi-tasking operating system for the IBM PC.

Concurrent PCDOS won't be available until autumn but it should still be months ahead of the opposition. The operating system will allow users to run up to four PCDOS or CPM applications at a time. It also has windowing.

DR says that Concurrent will run most PCDOS applications including Lotus 1-2-3, dBase II, Wordstar, Multimate and Supercalc 3.

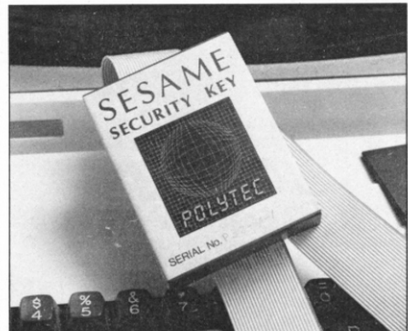
A menu system has been added to distance the user from the operating system and make it easier to use. A free-form screen allows users to create their own menus or help screens.

A communications capability enables information exchange with remote machines as a background task while the PC is being used for some other application. This feature also allows two people to use the PC at the same time. The person on the other end of a dial-up link can upload or download files while the PC is being used locally by somebody else.

Print spooling is a standard feature, so output from different programs can be put into a queue and printed out as a background task.

Also included is an indexing database system for keeping track of names, addresses or other information.

The European price of Concurrent PCDOS has not been set. All Digital Research is saying at this stage is that the price will be 'equivalent to the announced price in the United States of \$295.'



CLOSE SESAME—Sesame may hold the seeds of software security. The Sesame Security Key is a software protection system that fits into your micro's RS232 port, without interfering with the port's normal use, and has its own unique code with approximately 100 million possible variations. The software you write interrogates the Sesame for this code, and if this isn't forthcoming, hangs up. Polytec Engineering Services (Cambridge 312562) says that it would take around 20 years to crack the code, so piracy is basically uneconomic. The Sesame will work with any computer with an RS232, but you'll have to write your own software for it. It costs £49.95 for numbers under ten, varying to £39.95 per unit for 100-1000.

Oric tunes in

By Ken Garroch

Oric has revealed that it is producing a Prestel add-on for its Oric-1 and Atmos machines. It will also be producing a standard joystick interface and 'own-brand' software, including some additional utilities for its recently released disk system.

The Prestel adaptor and software will use the high-resolution screen to display the teletext characters. The Oric-1 and the Atmos do have a screen option called LORES which produces teletext look-alike characters but these are incompatible with the real thing. The system has to run in the high-resolution mode, taking up more of that extra memory that Oric is so proud of.

One of the drawbacks of the Oric has been its lack of a standard joystick interface. Oric intends to remedy this by producing an interface system that it hopes will be adopted as the standard for the machine. At the moment this is no more than a circuit diagram but Oric will probably be producing a

box to attach to the back of the machine, giving the option of one or two joysticks and the ability to recognise software written for different countries. This should allow software houses to produce programs for Oric's foreign markets.

The software available for both Oric machines has so far been fairly limited but Oric has decided to go into the software business, starting with the release of software with its disk drives. It is planning further titles in the near future under the Oric label. This software will not only be for cassette users but also for those Oric owners with the Oric disk system. I.T.L. disk users should note that most of this software will not work with their drives.

Oric is clearly not going to cast asidrift users of its current machines in favour of an upmarket business system. It is possible that a Concurrent CPM machine or add-on may eventually be produced, but this may be looking very far ahead, considering Oric's track record.

Aquarius rises again

By David Guest

Radofin Electronics is preparing a second dawning for the age of Aquarius after the first almost disappeared without trace.

The Aquarius 2 will be launched in the UK later this year with a real keyboard, 36K of RAM, and extended Basic. It will be followed eventually by an Aquarius 3 which may be an MSX machine, and Radofin also has ready for launch a number of peripherals for its own systems and for Commodore and Sinclair machines.

The company took on the Aquarius 1 when Mattel pulled out last year (Issue 34); it had designed and manufactured the machine for

Mattel and became the marketer 'almost by default', according to export manager Gary Lebof. It has had difficulty finding dealers and the supply of Aquarius software has been a thin trickle, but Mr Lebof says that Radofin is now emerging from the vicious sales/software cycle that afflicts many suppliers of micros that fail to take off.

The Aquarius 1 was intended to be the first of a line of home micros and the software and peripherals now available for it will also run on the 2. These are a cassette recorder costing £39 (an equivalent model for the Commodore 64 costs £29.95), a four-colour printer that is also compatible with the Spectrum

and costs £119.95, and a thermal printer.

The Aquarius 2 will probably cost around £140 and the price of the Aquarius 1, now at £49, could rise to £70. 'I can't pretend that I'm happy with it at £49,' said Mr Lebof. 'There may be a credibility problem at that level. But what we've done is given people an introduction to computing and if they don't like it, it hasn't cost them too much.'

Where the 1 was almost swamped by the competition last year, Mr Lebof sees the 2 coming into an area being rapidly vacated as some suppliers pull out of home micro-computing and others, like Sinclair, move up into the business market.

Radofin promises to concentrate on supplying home micros and add-ons, but it has an interest in two other machines that may be marketed by other distributors.

These are the Triton 64, a home micro with an impressive spec and a price that should undercut the Commodore 64, and the Polo, a US IBM-compatible system that has attracted some very favourable reviews in US magazines. Radofin has a 25 per cent interest in Polo.

Radofin itself is part of the Fubel International group, which turned over almost £30 million in 1982. As a micro manufacturer it boasts stringent quality control — the return rate is 0.5 per cent.

Commodore users courted by Micronet

Micronet certainly believes in shutting the stable door after the horse has bolted.

In the wake of Commodore's decision to set up its own dial-up database service, Compunet (Issue 60), Micronet has announced that its Commodore 64 database will be up and running by August. It will offer the usual formula of downloadable software (some of which will be free) and news and information on the 64.

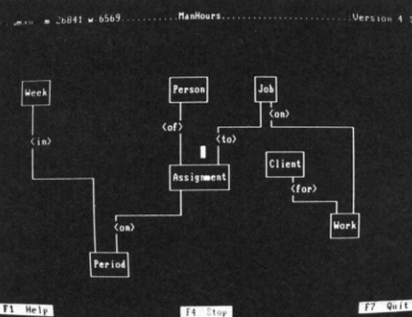
Commodore 64 users who sign up with Micronet will also have access to other services including Mailbox for communicating with other users. But they may view the Micronet deal as doubtful value for money compared to Compunet.

Micronet costs £52 a year compared to a projected subscription for Compunet of £25-30. In fact, Compunet could turn out to be even more keenly priced than that. The first year's subscription will come free with Commodore's communication pack for the 64 and Commodore has said that it hopes to reduce the subscription after the first year.

Everything now looks set for an interesting battle. After a year's operation Micronet has only managed to sign up 8,900 subscribers. Commodore is aiming to sign up 10,000 subscribers for Compunet after it goes public at the Commodore Computer Show next week.

If Compunet succeeds in offering full telebanking, teleshopping and computer conferencing services, Micronet may be left wondering where all the would-be Commodore 64 subscribers have disappeared to.

Meanwhile Commodore in the US is still going through senior management upheavals.



PICTURE SHOW — So you thought database design was a job for mad scientists with degrees in Applied Bit Slicing? Think again. Vector International is launching its Everyman database management system and, as the name suggests, it intends to get all of you involved. Everyman runs on the IBM PC and offers you the prospect of drawing your own data structures on the screen. There is no limit to the number of files, and the software takes care of all logical connections. Vector is on 01-943 1257.

Entré enters shops battle

A new chain of computer stores is about to open its doors in the UK.

Entre Computer Centres should start springing up around the UK from July. The company behind the Centres has been operating in the US for 22 months and has 165 stores open; it is currently advertising for people to take on franchisees here.

Entre's Michael Kelly said that it was aiming for national and European coverage. The Centres in the US stock the IBM PC line, including the PC jr, DEC's Rainbow and Professional, Televideo, Compaq and Grid. Mr Kelly said that UK Centres might carry an indigenous product, perhaps among its software lines.

All franchise holders will be given nine weeks' training before they open their doors, and Entre will continue training on a regular basis and with each new product they stock.

Brother goes dotty

By John Little

Brother is set to expand its range of printer/typewriters with a 14K variant priced around £1,350 in the next few months.

The machine is essentially a variant of the EP-44, and in addition to the larger memory has a full typewriter keyboard and slightly more flexible software.

A battery-powered 3.5in drive for it is also going to be available shortly. Specifications and price aren't known yet, but both should be competitive. The complete system won't be nearly as sophisticated as the NEC or the Tandy 100 — it will still have a relatively primitive text editor and a small LCD display. But like the EP-44 it can be used as a

terminal and has a built in thermal printer, so it will provide a low-cost alternative to portable computers for a number of purposes.

Brother says that a further variant with a Basic is hovering somewhere around the prototype stage, but it may not be seen in this country.

Two printers are also due for launch.

The 1009 is of the same build as the HR-5 — battery powered and around half the size of an Epson — but its impact dot-matrix rather than thermal.

It's an RX80 emulator and will cost around £200. It'll be sold in tandem with the HR-5, and will provide a useful alternative for

those who prefer to use cloth ribbon rather than carbon.

The 2024 is at the opposite end of the market, but again is dot-matrix. It costs about £1,000 and can achieve near letter quality print at 160 cps. At lower speeds it churns out classic 'can't see the dots' typeface.

It has around eight character sets, takes 160 column paper and appears to do everything short of writing programs.

Brother is better known for its letter quality daisy-wheel printers, but the 2024 promises to be the first of a line of dot-matrix efforts playing a similar role. At the same time the company is adding memory and functions to its units.

VIEW FROM AMERICA



The micros take over America

By Chris Rowley

American businesses are waking up to the benefits of the microcomputer-assisted lifestyle with a vengeance.

Car computerisation, for instance, is a hot buzzword in Detroit right now where the US auto industry is looking for ways to stay alive through the 1990s if consumer conscious Americans force an end to protectionism against Japanese imports.

Since the Big Three have virtually given up trying to make little cars that can compete with the Japanese, Detroit has to find something new on which to build sales.

At Chrysler's electronics division in Alabama they've developed an electronic navigation system for cars. All that's needed is a 16-bit micro and a laser disk system plus a monitor screen on the dash. The laser disk stores the maps and the micro will also take input from the signals of NAVSTAR, the global navigation satellite system now under development by the US Air Force and due to be in orbit by 1988.

The system can pinpoint the car's location to within a city block anywhere in the US. After that if you still don't know where you are you might have to punch in the coordinates manually on the car computer's keyboard.

In Detroit, the wave of computerisation is seen as being of enormous benefit to the US auto industry, at least in the beginning.

'The electronics explosion starts in 1986 and runs through 1989,' says John Bereisa of Buick.

But most US auto planners believe that the features that will be successfully incorporated into cars must provide real benefits. 'People don't want to watch mouse movies as they drive,' says John Telneck, Ford's design chief.

However, a computer that controls the suspension system, monitors fuel consumption and everything else that actually makes a car go will not only save fuel but probably lives too, since it will likely be better at driving than most humans. In fact, the anti-drunk driving wave here is now so strong that it may be quite impossible to get an American car to start in a year or two if you've drunk a snifter over the limit.

In which case you'll have to retire to your computer lounge in your 'intelligent' apartment building.

Yes, intelligent buildings is another big buzzword right now in the architectural/construction community. It does make sense, especially for office towers. A computer that controls elevator movement, warms and cools individual offices depending on occupancy, runs security checks, patrols etc, could well save its own installation costs within a year. One view from the realty community adds: 'The market value of a building may be based as much on the capacity of its telecommunications services as on its physical location.'

An example of the trend can be seen in Denver's new Tabor Center, a large mixed use development including office towers, a hotel, a shopping precinct and parking for 1,900 cars, will all be connected up by a 'data highway' of fibre-optic cable so that all building systems, ventilation, heating, energy management, fire safety, lights, security, even office 'electronic automation' will be linked together. The system will be built by United Technologies Corporation which recently completed a 38-floor office building in Hartford, Connecticut, that is described as 'in the upper echelon of the most intelligent buildings.'

A good argument for more of the same can be made. When you're paying \$40 a square foot for office space you want to make very good use of it. Mainframe computers, telephone and telecommunications equipment, can all take up a lot of space. If they're built into the building then the tenant will have more room for desks, people and things people like.

Perhaps even enough room for the new computerised exercise machines that are taking the gift catalogues by storm this spring. From Precor come such items as the Amerex Precision Runner which is guaranteed to save wear and tear on your knees and other important jogging paraphernalia. For \$3,000 you get a micro-driven treadmill of extraordinary sensitivity.

DR and MS on shopping spree

You should be able to look forward to improving service and a growing range from business software dealers as the big name suppliers home in on the high streets.

Microsoft is firming up its plans for retail sales of products like Multiplan and Word. At the same time Digital Research, with its long pedigree in retail trade, is reorganising its support of distributors and dealers.

Both companies are putting the emphasis on identifying their top dealers and improving the quality of the service they're able to give customers. Eileen Stroud, overseeing DR's retail support, said: 'We're got a very supportive group of distributors; I believe our products need support and they're doing it very well.' She added that the eight distributors would each be asked to nominate their ten best

dealers and that these dealers would then be invited to visit DR to talk about products and support.

Microsoft is also planning to add a group of 'major dealers' to its present network. The major dealers will come from Apple and IBM outlets, and from the high street multiples, and will have Microsoft's direct support.

DR sells Concurrent CP/M (now with windows), Logo, Graph/Draw, the CPM/Gold Card, and all its languages through retail outlets. Microsoft also intends to sell Interprosoft and compilers besides MS Word, Multiplan, Budget, and the Financial Statement Analysis.

Many specialist computer shops already provide training and support for customers, but any extra back-up from the manufacturers can only improve the quality of service you'll get.



DK MARK II — The revised dk* Tronics Spectrum keyboard, incorporating space bar and with provision for Interface 1, is now available. It uses the same basic case as the earlier version and has a separate numeric keypad, but will include DELETE and decimal point keys where the previous case's keypad had extra SYMBOL and CAPS shift keys. The sharp-eyed among you may note that our picture shows the previous version of the keypad, but we're assured that the new version is in production. Interface 1, incidentally, fits to the base of the Spectrum just as it would normally, and the whole shooting match fits into the case. For £45 it all looks quite painless. dk* Tronics is on Saffron Walden (0799) 26350.

Ceedata ties telex to CP/M



Ceedata's Telex Micro — message centre and CP/M machine.

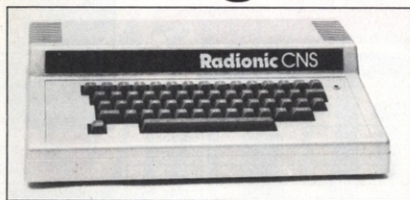
Telex is the lure that Ceedata is offering to draw you to its newly-launched Telex Micro.

The system, which runs Telex 2000 software and has a Telexbox 11 interface, is also a CP/M micro. You can prepare and edit messages on the screen or use Wordstar; dialling and retrying busy numbers is automatic.

It is sold as a package with the processor, monochrome screen, twin floppy disk drives, telex attachments, a dot-matrix printer and a one-year guarantee costing £3,995 all-in.

Users of the Ceedata (01-941 4889) range of micros — the 8000, 8200, 8300, and 81ED — can upgrade to the system for £2,145.

Bouncing back



Radionics CNS micro—turning the corner with off-beat applications.

One of the UK's most original micro suppliers has escaped financial disaster and is offering its off-beat systems as an alternative style of computing.

Radionics Micro-systems (0272 603871) was almost wound up last year (Issue 35) when the money to keep it going couldn't be found. At the time managing director John Bowring reckoned that £65,000 was needed to rescue it, but perhaps its utilitarian home control and 'practical' subsystems lacked the hi-tech gloss that would have attracted backers.

'We soldiered on for some three months,' he said last week. Even-

tually a bank obliged with a personal overdraft and the company has resumed trading; now it looks forward to developing the range of systems it offers.

Radionics' aim is to produce systems that can serve such functions as burglar alarms, house-plant watering mechanisms, and fire detectors.

Its CNS micro, a Tandy-compatible 16K unit built in Hong Kong, has ten control and sensing sockets to run robotics and time functions.

The CNS micro costs £230 and the peripheral devices are built to be cheap.

Mac week heralds first shipments of Apple's baby

Apple Computer is marking Mac Week by starting volume deliveries of the Macintosh.

The company is currently holding 300 to 400 machines ready to go out. The price has been set at £2,064—in the US a Mac costs \$2,495 so Apple has at least avoided the iniquitous £1=\$1 conversion rate, but for a single-disk system it looks

pricey in comparison with less ambitious micros.

Apple has suffered some delay in its first deliveries of Macs but nothing on the scale of the Lisa last year, and a spokesman commented: 'Supply will no longer be a problem.'

Mac Week is an Apple promotion that begins on June 4.

Competitions galore put prizes on line

Do you find that PCN doesn't always take an entire week to read? Are you left with long lonely hours and nothing to fill them?

You could try playing with a micro, but that isn't going to keep the wolves from the door. What you need is some kind of profitable diversion. One possibility is to enter competitions, and in the micro business there's never been a better time than the present.

These are the latest competitions organised by suppliers. We'll update it as and when we hear about new ones.



Obeday Singh, a Hurg finalist, accepts £250 from Melbourne House.

Organiser	Prizes	Type of Contest
Newtech Publishing, 8 Forge Court, Reading Rd, Yateley, Surrey GU177RX.	Two Epson HX-20s Five Maplin modems in Basic	Write puzzles or games
Apple, Eastman Way, Hemel Hempstead, Herts.	Six Macintoshes	Details from Apple dealers
Arcade software, 32 Chiselhurst Rd, Orpington, Kent BR6 0DG.	Up to £5,000	Discover the secret of Midas in a new game, The Prize
Melbourne House, Castle Yard House, Castle Yard, Richmond TW106TF.	£3,000 first prize £250 runners-up	Design a game using Hurg games designer
Stell Software and Boots.	Sinclair Spectrum plus games	Entry forms from Boots
Eclipse Software, 4 Oxford Rd, London N9 runners-up £50 and ONA.	Gratpad £25 software	Answer questions on new game, Carnival

SOFTWARE

The new releases



Infocom presents Sorce code.

Games

Games You will find yourself well and truly up the creek if things go wrong while playing Krocatic Waltz from Superior Software (0532-450879). The company also offers a space rescue game called Lunar Mission.

Commodore 64: The game of the film. Palace Software (01-278 0751) are bringing the horror of *The Evil Dead* to the micro with a game that closely follows the plot of the film. Terminal Software (061-761 4321) has gone down under to acquire the rights to a program that offers three games in one. Triple Tournament features West World (OK Corral shootout), Space Race (through an interstellar cavern) and Kamikaze (shoot down the plane before it sinks your ship).

BBC/Electron: Plunder, the game of swashbuckling adventure on the high seas, has been translated from the original Spectrum version by Cases Computer Simulations (01-858 0753).

Apple/Atari/Commodore 64/IBM PC: Softsel (01-844 2040) now has Sorcerer, the follow-up adventure to Enchanter from Infocom.

As usual with Infocom products you get more than just the game. With the disk comes Popular Enchanting Magazine (actually it's the players' manual) and something called the Creatures of Frobozz Infotator.

Apricot: Want a rest from word processing or financial planning? Try *The Isles of Artau*, a text-based adventure from Kuma (07357 4335).

Amstrad: You may not be able to buy the machine yet but you can soon buy the software. Terminal Software (061-761 4321) is translating some of its best selling games to run on the new micro. Star Commando will be first out.

Spectrum: Also from Terminal comes Carpet Capers, a fun action game that has you trying to lay down carpets in a house while a number of other people are trying to do the same thing.

Education

BBC: Fernleaf (0474 59037) will launch in September a package of four programs around the theme of Viking England. Dial Software (0272:569812) has released two new packages: the *Childs Play Pack* is aimed at young children and contains four programs using funny characters and speech if a speech chip is fitted. *Spellwell* is suitable for all age groups and offers five levels of difficulty.

Commodore 64: Griffin Software (021 236 2552) is converting its educational software for 4-8-year-olds to run on the 64. Available now is *Wordspell*, *Numberfun* and *Tablesums*. *Shards Software* (01-514 4871) is also converting its *Fun to Learn* series and has added a new title—*Frac Attack*.

PCN CHARTS

GAMES



	GAME TITLE	PUBLISHER	MACHINE	PRICE
▲	1 15 Trashman	New Generation	SP	£5.95
▲	2 — Psytron	Beyond	SP	£7.95
▼	3 1 Jet Set Willy	Soft Projects	SP	£5.95
▲	4 8 Code Name Mat	Micromega	SP	£6.95
▼	5 3 Fighter Pilot	Digital Integ	SP	£7.95
▼	6 2 Space Pilot	Anirog	64	£7.95
▲	7 — Blade Alley	PSS	SP	£5.95
▲	8 16 Flight Path 737	Anirog	VIC.64	£7.95
▼	9 4 Atic Atac	Ultimate	SP	£5.50
▼	10 5 Manic Miner	Soft Proj/Bug Byte	SP,64	£5.95
▼	11 11 BlueThunder	Willcox	AT,SP	£5.95
▼	12 6 Hunchback	Ocean	64	£6.90
▲	13 23 Forbidden Forest	Cosmi	64	£8.95
▲	14 24 The Boss	Peaksoft	64	£6.95
▼	15 14 Scuba Dive	Durell/Martech	SP,64,OR	£6.95
▲	16 20 Blogger	Aligata	64,BBC	£7.95
▲	17 7 Night Gunner	Digital Integ	SP	£7.95
▲	18 — Solo Flight	Microprose	64,AT	£14.95
▼	19 9 Chequered Flag	Psion	SP	£6.95
▲	20 — Zodiac	Anirog	64	£7.95
▲	21 — Millionaire	Incentive	SP	£5.50
▼	22 17 Rev Of MCs	Llamosoft	64	£5.95
▼	23 10 Fred	Quicksilva	SP	£5.90
▲	24 — International Football	Commodore	64	£8.95
▲	25 — Aztec Challenge	Cosmi	64,AT	£8.95
▲	26 12 Ant Attack	Quicksilva	SP	£6.95
▲	27 — Football Manager	Addictive	SP	£6.95
▲	28 — Sheep In Space	Llamosoft	64	£5.95
▲	29 — Fortress	Amcom	BBC	£8.95
▼	30 18 Pilot 64	Abbex	64	£7.50



MICROS

Top Ten over £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▲	1	Apple III	£2,280	AP
▼	2	IBM PC/XT	£2,390	IBM
▼	3	ACT Sirius	£2,525	ACT
▲	4	ACT Apricot	£1,760	ACT
▶	5	Wang Professional	£3,076	WANG
▲	6	— Kaypro	£2,595	CKC
▲	7	Olivetti M20	£2,180	OL
▲	8	Televideo TS1603	£2,640	TH
▼	9	DEC Rainbow 100	£2,359	DEC
▼	10	NCR Decision Mate V	£1,984	NCR

Top Ten up to £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
▶	1	CBM 64	£199	CBM
▶	2	Spectrum	£99	SI
▶	3	BBC B	£399	AC
▲	4	7 Electron	£199	AC
▼	5	4 Vic 20	£140	CBM
▲	6	8 MTX 500	£275	MTX
▲	7	— Oric Atmos	£175	OR
▼	8	Dragon 32	£175	DD
▶	9	9 ZX81	£40	SI
▶	10	Atari 600XL	£150	AT

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the fortnight up to **May 25**. The games chart is updated every other week. Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month. PCN Charts are compiled exclusively for us by RAMC, who can be contacted on 01-892 6596.

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As reviewed in Issue 62 of this magazine.

QUICKSILVA TOP 20

THE FASTEST MOVING GAMES!

APRIL/MAY 1984

1. FRED (48K Spectrum) - Paco & Paco/Indescomp	£6.95	<input type="checkbox"/>
2. ANT ATTACK (48K Spectrum) - Sandy White	£6.95	<input type="checkbox"/>
3. THE SNOWMAN (48K Spectrum) - David Shea	£6.95	<input type="checkbox"/>
4. BOOGABOO (CBM 64) - Paco & Paco/Indescomp	£7.95	<input type="checkbox"/>
5. DRAGONBANE (48K Spectrum) - M. Preston/ P. Hunt/R. Rose/D. Moore	£6.95	<input type="checkbox"/>
6. ULTISYNTH (CBM 64) - Nalin Sharma	£14.95	<input type="checkbox"/>
7. SKYHAWK (Vic 20) - Steve Lee/Chartec	£7.95	<input type="checkbox"/>
8. BUGABOO (48K Spectrum) - Paco & Paco/ Indescomp	£6.95	<input type="checkbox"/>
9. LASERZONE (48K Spectrum) - Jeff Minter/ Salamander	£6.95	<input type="checkbox"/>
10. STING 64 (CBM 64) - Anton Hinxman	£7.95	<input type="checkbox"/>
11. RING OF POWER (CBM 64) - F. J. Preston	£9.95	<input type="checkbox"/>
12. AQUAPLANE (CBM 64) - John Hollis/Steve Hickman	£7.95	<input type="checkbox"/>
13. PURPLE TURTLES (CBM 64) - Mark & Richard Moore	£7.95	<input type="checkbox"/>
14. QUINTIC WARRIOR (CBM 64) - Terry Watts	£6.95	<input type="checkbox"/>
15. TORNADO (Vic 20) - Steve & Dave Lee/Chartec	£5.95	<input type="checkbox"/>
16. SUBSPACE STRIKER (Vic 20) - Joe Gillespie/Pixel	£7.95	<input type="checkbox"/>
17. MINED OUT (Lynx) - I. Andrew/Incentive	£6.95	<input type="checkbox"/>
18. AQUAPLANE (48K Spectrum) - John Hollis	£6.95	<input type="checkbox"/>
19. QS SCRAMBLE (ZX81) - John Hollis	£3.95	<input type="checkbox"/>
20. TRAXX (48K Spectrum) - Jeff Minter/Salamander	£6.95	<input type="checkbox"/>

Chart compiled from sales figures through CBS Distribution for April 1984.

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Dragon 32 should continue

I was sorry to read of the possible phasing out of the Dragon 32 — in my view a much underestimated, underpromoted machine. For over a year I have been using mine, with a TRS80 tape-recorder, an Epson RX80 FT printer, and a 'Teletwriter' program, and the only problems have been due to my own carelessness.

Hence I read with constant amazement, and sympathy, the neverending stream of complaints and queries from your less fortunate readers.

As a septuagenarian to whom pounds count if not pennies, I would have liked a BBC machine, but the price was double the Dragon's. As for interfaces and add-ons — what are they?

A final word of praise for Microdeal, not only for their 'Teletwriter' but for their excellent customer back-up service with its prompt and courteous replies.

PCN £10 Star Letter



I am often tempted to upgrade, particularly when reading of the new Advance, but am sorely tried in finding good reason. Until such time, I remain what seems to be a rare bird, a satisfied customer.

F Brown,
Orpington, Kent.

County Court is not the answer

In general I agree with Mr Arkieson's suggestions in response to my letter about the problems with Access (Issue 61).

However, in this circumstance, I do not believe that the situation lends itself to the use of the County Court, particularly for the reasons outlined here.

Since the contract was cancelled (and the cancellation acknowledged by the supplier) well before my Access account was charged and before the goods were supplied I doubt if I had a claim against the supplier.

In any case one advantage of buying using a credit card is that the credit card company is also liable under the sale of goods act (and is not likely to cease trading overnight).

I made no payment to Access because this might have legally compromised the cancellation of the contract (an important point since the law tends to be precise rather than fair in these cases).

With regards to my credit rating — if it were influenced by this



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matter I would most certainly take legal action.

In conclusion, it seems to me that a much better action was to write to Random Access — since, in cases like this, the power of the media is much greater than the courts and also, and more importantly, other mail order buyers should be warned of the possible problems and suppliers should be 'encouraged' to act responsibly.

J Hall,
Chorleywood, Herts.

Unfair bias against Atari

I must take you to task for your magazine's constant downgrading of the Atari as just a games machine.

The latest case of this downgrading is in the Routine Inquiries page (Issue 61). Whoever wrote the reply is obviously biased towards Commodore, and obviously ignorant about the Atari. To set the record straight:

The Atari has a very easy-to-use Basic. It corrects any spacing errors on input. It reports any syntax errors on input. It may not have enough commands for the advanced programmer, but for the beginner it's excellent.

For the advanced programmer there are alternative Basics, including Microsoft. Also available are Forth, Pilot, Logo, and Pascal, and a whole range of special languages and compilers.

As for saying that Commodore games are cheaper — may I suggest your writer gets himself up to date with prices?

K Ward,
Norwich Users Group,
Lakenham, Norwich.

A useful address for Oric owners

I have just upgraded my Oric 1 to an Atmos. From the day I saw the news of the upgrade in PCN my father

rang Oric Products regularly until eventually, after several weeks of stalling, Oric released the address of its service depot where the upgrade was to take place and I went and upgraded my Oric.

To my surprise, they didn't start opening my Oric 1 but instead gave me a brand new Oric Atmos hot off the assembly line.

Although I am very pleased with my Atmos and the brisk, friendly service of the staff at the Oric Service Depot, I am surprised Oric hasn't advertised the details of the upgrade yet, but seems to be leaving it to people to use their own initiative.

So here's the address of where you can upgrade your Oric 1: Unit 11, Hampton Farm Industrial Estate, Hampton Road West, Hanworth, Middlesex. Tel: 01-755 0188. I Barret,
Prestwood, Bucks.

Let's get the Microdrive straight

In Issue 61 Steve Kramer incorrectly stated a number of points about my Cassette to Microdrive article (Issue 58).

The routines will work on machine code which contains CALLS, absolute JUMPS, and absolute addressing. Flags and defined bytes are also taken care of.

My article also stated that the Basic Loader Program will have to be changed and instructions were given. Mr Kramer stated in his letter that a better method of converting programs would be to move the code up, save it to Microdrive, then move it back down after loading.

This is what my routines do.
Gavin Monk,
Bloomsbury, London WC1.

Switch on to switching off

Andrew Guest is certainly right in pointing out that many personal

computers lack the obviously necessary ON/OFF or RESET switch (Issue 61). I have the same problem with mine, but I don't want to modify it, and suggest that there may be an even simpler solution.

My computer runs off a small AC power unit, which plugs into a 13-amp wall socket. I never dream of removing the weak little power-input plug from the case of the computer, unless I am dismantling it for some other purpose. I simply switch off the mains, which happen to be within easy reach. But even if no mains switch is fitted, or the socket is too remote or serves other equipment as well, it is very easy to fit an extension using a switched socket. One could even sink so low as to fit one of those ghastly little pear-switches in the AC supply line at a convenient position.

It is always safest to switch off the mains supply to any form of electrical equipment when out of use for almost any purpose. When a fault does occur, it is nearly always somewhere in the connecting or supply leads, which enjoy a harder life than does the rest of the equipment.

Ernest Gardiner,
Torquay, Devon.

Calling Mr Greg Turnbull

Could I appeal through your column for Mr Greg Turnbull to get in touch with me. He replied to an advertisement requesting a print-out of his program statistics but neglected to include his address.

As a general point on buying by mail order, and to help in identification in general, I use small, self-adhesive name and address labels that are advertised, via mail order, in most Saturday editions of the national daily papers. They cost only £2.50 per 1000 and can be used on the backs of cheques, cassette boxes and even under PCBs.

D A Holding,
Orton Brimbles, Peterborough.

Wanted — girls keen to compute

I would like to hear from girls keen to start learning assembler language and with a good idea of Basic.

Anyone interested, between the age of 14-17, write to me at the address shown.

Simone Aspis,
Delamere Forest School,
Norley, Nr Frodsham,
Cheshire.

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Mysterious voices from a BBC

Q I own a BBC Model B, OS 1.2, which I have had for about a year. All this time it has worked perfectly, with no problems whatsoever. That is, until recently.

I was playing *Rocket Raid* and opted for sound off. All of a sudden, I started to hear whispering, like a radio turned right down. I checked my radio — it was off. Then I put my ear to the BBC loudspeaker. Most definitely, that was where the talking was coming from — my micro.

Amplified on an extension speaker it sounded very much like a CB radio. Often I can make out words. I do not have a speech chip so could you tell me why my micro is doing this.

L D Timms,
St Neots, Cambs.

A The most likely cause of this interference is, as you say, CB radio. Unfortunately there is very little that can be done about this. Even wrapping up your computer in tin foil and earthing it may or may not work and will depend on where the interference is leaking into the system.

If you have ever taken off the top of the machine some dirt or dust may have crept in and started causing a small short in the amplifier section. The best cure for this is to take off the top again and give the insides a good blow and then make sure all the socketed chips are firmly seated. Check the amplifier at the bottom left hand of the case, under the keyboard, to see if there is anything obviously wrong. This could be difficult for untrained eyes and if your machine is still under guarantee, take it to your local Acorn dealer.

The final possibility is that if you are using your computer with a television set which has the sound turned slightly on, the speech may be coming from the television loudspeaker. On the TV channel where the BBC puts its computer picture, it is possible to just pick up sound

from a local transmitter of BBC1 if the TV is not properly tuned in.

Correspondent's Spectrum crashes

Q I installed a Fuller keyboard on my Spectrum, including Interface 1 and Microdrives, and using Tasword 2 started to type. Alas, when writing letters, I soon found myself up to my ears in crashes — right in the middle of a line my Spectrum hung up.

I investigated. One thing was easy — when, on the Fuller, you hit the extra symbol shift and the A key at the same time, the program flips into Basic. Then when you hit L, all is lost.

But in other sections too these crashes persisted. Typing with pinpoint accuracy, hitting the keys head-on, even reducing my typing speed to a mere 60 per minute, the program crashed before I could save it to Microdrive.

Can you tell me why this is? I am feeling hung-up myself, because I fitted the mains transformer, shortened the leads, added another Microdrive and thought I had quite a cosy outfit. Now I have to reinstall the old Spectrum.

Dr B J Kam,
Zwolle, Netherlands

A Your problem isn't really the fault of Tasword. A number of Fuller keyboards have had this problem, and it seems to have been caused by Fuller trying to do too much with the FDS.

The main difference between Fuller's and other Spectrum keyboards is in the power supply. Most keyboards simply run the power through the usual socket at the rear of the Spectrum's circuit board, but Fuller takes the power into the FDS's circuit board first, runs it through this, then takes it into the Spectrum circuit board's input.

So far so good, but in some cases, it seems, the powered keyboard interferes with the running of the Spectrum. It may be something to do with the keyboard, but it could also be something to do with variations between individual Spectrums. The upshot is that certain combinations of keyboard and Spectrum malfunction to

varying degrees.

The problem you specify isn't Tasword's fault. You're just hitting the keys that drop you into Basic normally. The crashes, however, will probably operate with a lot of machine code software. Try hitting both function keys at once — this is a common method of obtaining a crash on demand from an FDS.

Your only option, unfortunately, is to send your FDS back to Fuller. Should you want your money back rather than a replacement you're perfectly within your rights to ask for it under UK consumer law.

Which to buy, Atari or Commodore?

Q Could you tell me the better computer out of the Commodore 64 and Atari 800 XL covering all aspects such as sound, graphics, peripherals and the quality of software?

Does the Commodore need Simons Basic if you want to write programs and does it help to make things easier for a learner? Is there any other cheaper Basic which can do more or less the same?

Has Atari converted any of its arcade classics like Pacman, Centipede and Defender, on to the 64?

Steven Templeton,
Blyth, Northumberland

A No, we can't tell you which is better — you're the only one who can decide that. What you must do is draw up a checklist of the things that are important to you and then make your choice. Both machines have excellent graphics facilities including sprites, the Atari has a more flexible colour system and the 64 has the better sound.

Your first question should be what you want to do with the machine. Although Atari loyalists will scream at this, if you want to play games and nothing else, go for the Atari (which is not to say that the Atari can only play games). The Atari range has an enormous selection of very high quality games software available. On the other hand much of it is being converted to the 64 anyway.

If you want to learn Basic programming buy the Atari. The biggest single criticism of the 64 is the archaic and

abysmal dialect of Basic which does not cover the excellent hardware aspects such as sound and graphics.

If you need go — or may go — further than that, the 64 has the edge in terms of the number and range of products: business applications, utilities and peripherals.

As to your other questions, the 64 does not need Simons Basic at all, it just makes life a little easier (although it can also make some things more complicated). See Issue 58 for a round-up of alternative Basic extensions.

Finally, Atarisoft has converted many of its classics to run on the 64 — and the Vic 20, TI99/4a, Apple and others — and more are expected including the superb Pole Position.

The choice between the 64 and 800XL is a difficult one — try both, and consider things like software, disk drives, monitors, light pens etc. The first law of microcomputing says that a month from now, whatever you have won't be enough.

Pascal for the Commodore 64

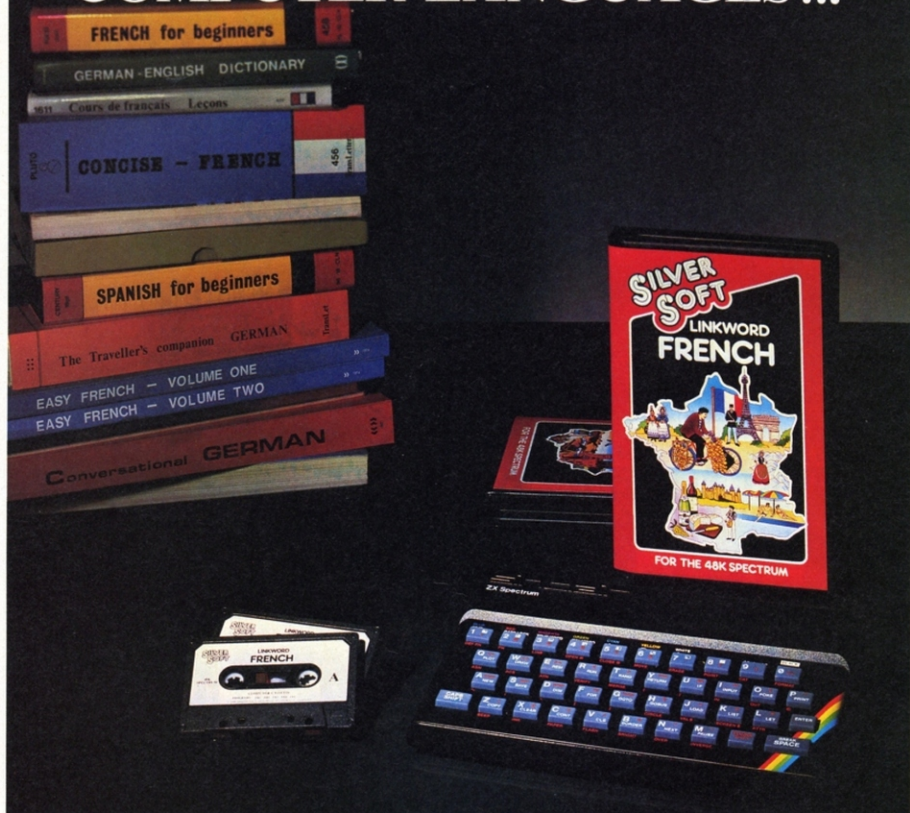
Q I own a Commodore 64 and am interested in obtaining a version of Pascal for it. I know that both Commodore and Oxford Computer Systems are due to release their own versions shortly but would I be correct in thinking that these will both be disk based? For reasons of expense I would prefer a cartridge or cassette version. Do you know of any such product?

Failing this I would be grateful if you could give me the address of Oxford Computer Systems.
Ian Yull,
Aberdeen

A Whether or not Commodore is planning a Pascal, other companies are already moving in. As you say, Oxford Computer Systems has one forthcoming but your fears are correct — it will be disk-based. The only other we know of may fit the bill, however.

Adamssoft has a product called Zoom Pascal: give them a call on Norwich 524304. If that fails it's back to Oxford Computer Systems who are at Hensington Road, Woodstock, Oxford, phone (0993) 812700.

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MICROWAVES

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

Alphacom printer paper perplex

The Alphacom 32 printer is suitable for listings, etc — but it does have the drawback that the thermal paper used by the Alphacom gives blue print on a white background. This combination is unsuitable for photocopying.

However, the paper for Tandy's TP10 thermal printer gives black print on a white background. The paper is about 3/8 of an inch narrower, but this merely results in a narrower 'margin'. It is only about 20p per roll more expensive, but still a great deal less than shiny Sinclair paper.

*Graeme Brown,
E Lothian, Scotland.*

Oric can work with any cassette

To beat problems in loading Oric programs with a cheap cassette recorder try:

- Convert the 3.5mm jack-plug to a 6.3mm headphone plug.
- Connect it to any hi-fi or mini-stereo component system.
- Set the volume lever at level one or between one and one-and-a-half.

You should now be able to load the program by using this method.

*Paul Newton,
Clayton,
Victoria, Australia.*

Save machine code on the Vic and 64

An easy way to save machine code programs on the Vic 20 or Commodore 64 without the use of a long machine code

program is to type in a couple of direct commands.

For a program starting at address S and ending at address E the following commands should be typed:

- First: PRINT (S/256-INT (S/256))*256, INT (S/256)
- This produces two numbers we will call LS and HS respectively.
- Next: PRINT (E/256-INT (E/256))*256, INT (E/256)

Two more numbers we will call LE and HE will appear.

- Finally: just enter the line
POKE 43,LS:POKE44,
HS:POKE45,LE:
POKE46,HE:SAVE"program
name", I,I inserting the
values for LS,HS,LE and HE.

The program can then be verified with the verify command and the Vic or 64 returned to normal by SYS64824 for the Vic or SYS64738 for the 64.

*M J Davies,
Llandelo, Dyfed.*

3D sine wave on Oric or Atmos

Running this program on an Oric 1 or Atmos produces a sine wave with a three dimensional appearance.

```

10 HRES
20 FOR A=0 TO 5*PI STEP 0.1
30 B=B+1
40 CURSET B,0,1
50 DRAW 20, INT
(SIN(A)*100+100), 1
60 NEXT A

```

Changing the multiple of PI in line 20 alters the number of waves, and changing the increment results in different densities.

Another number at the start of line 50 changes the angle from which you view the waves. The two numbers after the SIN(A) can be changed under certain conditions.

If the second number is greater than or equal to the first one the waves will be longer. If it is less, an illegal quantity error message appears.

*David Webb,
Putnoe, Bedford.*

Basic improvement to Spectrum BEEP

Many Spectrum owners may have been disappointed with the machine's Beep command when they first tried it. Many machine code routines have been published to make the

sound more interesting, but here is a simple Basic program that creates an illusion of grandeur.

```

10 READ B:RESTORE
20 FOR I=1 TO 32
30 READ A
40 BEEP0.2,A:BEEP
0.025,B:BEEP0.1,ABEEP0.05,A
50 LET B=A
60 NEXT I
70 DATA 13,11,13,9,4,9,1,1
80 DATA 13,11,13,9,4,9,1,1
90 DATA 13,15,16,15,16,13,15,13
100 DATA 15,11,13,11,13,15,16,
16

```

*Andy Goodsell,
Kenley, Surrey.*

Spectrum refined and redefined

This routine for the Spectrum allows every character to be

redefined, over and above the 20 user-defined characters provided.

Type this line at the beginning of the program:
CLEAR 63999:FOR A=0 TO 767:POKE
64000+A,PEEK(15616+A) :NEXT
A:POKE23607,249

Then use LET A=8("CODE" character"-32):FOR B=0 TO 7:READ C:POKE 64000+B,C:NEXT B to read in the data for each character.

These POKE data the original and new characters over the original Sinclair character set.

To return to the original set type POKE 23607,60 and then back to the redefined set POKE 23607,249.

*Martin Watson,
Muswell Hill,
London N10.*

Pulling up the shades on the Oric

Colourful listings using the Oric and the Tandy CGP-115 printer are possible using the program below.

First, add the coding from line 1000 onwards to the end of your program and run this part of the program (renumber if needed).

You will be asked for a line number and two ASCII codes. If you enter 999,1,1 the program will list itself and end; if you enter a non-existent line you will be told.

To change colour on the printer enter 29,32 or 29,29 for the ASCII codes — to change colour once or twice. Note that 29 is the control code for protecting the left-hand screen columns so used once it will toggle the column protect on or off.

To change screen colour enter '27,A' where 27 is the escape code and A is an attribute code — see Appendices C and D in the Oric 1 Manual. For example, for red writing use 27,65 (ASCII code for A); for magenta background use 27,85 (for something different try 27,13).

Note that the codes should only be used in a 'REM' statement, unless you want a syntax error when running. Also, the 'colour' will be removed if the line is amended, but otherwise it may be saved and loaded.

S Lowe, Stourbridge, W Midlands.

```

10 REM-----COLIST-----4/3/84-----
20 REM--S,LOWE-----
30 REM---PROGRAM FOR CHANGING COLOUR IN
(L)LISTING-----
1000 REM---CLEVER BIT---
1010 CLS
1020 INPUT "LINE NUMBER & ASCII CODES";L
,A,A1
1030 IF L=999 THEN LIST
1040 GOSUB 1100
1050 GOTO 1020
1100 REM---SUBROUTINE---
1110 F=1281
1120 REPEAT
1130 F=DEEK(F):B=DEEK(F+2)
1140 UNTIL B>=L
1150 IF B>L THEN PRINT "NO LINE NUMBER"
;L:GOTO 1170
1160 DOKE F+5,A+256*A1
1170 RETURN

```


Bishopston Computer Club, celebrating its first year, aims to inform and to innovate.

If your association has something special on the agenda or if you've just started a new one, contact us at Clubnet, Personal Computer News, VNU, 62 Oxford Street, London W1A 2HG.

Opening doors

Now about a year old, the Bishopston Computer Club has been keeping itself busy running courses in computer awareness for the public as well as holding open days and staging competitions.

Its most recently completed course, lasting ten weeks, was held at a local secondary school. Organised for the adult education group, 'Computers for Beginners' had six club members providing tuition on the club's micros at the school. BBCs, Spectrums, Vic 20s and an Electron were in use.

Students paid £10 each for the course, while the adult education group paid the club £100 or so for the tuition.

The club unleashed itself on the general public with a couple of open days so that people could come to the church youth centre where the club meets.

Club organiser Alasdair Law certainly hasn't forgotten about

his members, though. He's been busy devising competitions for the club, the latest of which involves writing your own game. 'We want innovation at the club and want to encourage more program design,' he said.

Prizes are normally gift vouchers, and the club's committee say that with entries of special merit, every effort will be made to assist the author in marketing or publishing their work. Can't be bad...

Apart from holding a club birthday party, they also have a tent at the village's annual gala where they will demonstrate programs and do horoscopes for the public.

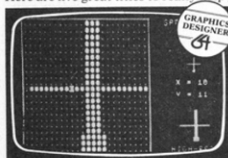
Wendie Pearson

Name Bishopston Computer Club
Venue Church Youth Centre,
Greenock Road, Bishopston,
Renfrewshire, Scotland Meetings
Twice monthly Contact Alasdair
Law, Bishopston 863137.



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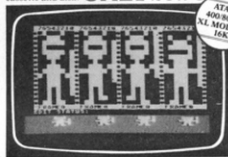
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The Atari Graphics Wizard introduces you to the wonderful world of Atari Player (Sprite) and Character Graphics. Written totally in Machine Code, it contains Player Editor (Sprite Maker), Character Editor and Multicolour Character Editor. Operates via keyboard or joystick, full documentation supplied with each program. Soon, animated graphic capability will be at **ONLY £9.95** your fingertips!

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ENGLISH SOFTWARE
THE POWER OF EXCITEMENT

'Designs From Your Mind: With Atari Graphics' by Tom Rowley, published by Reston at £13.45 (paperback, 226 pages).

The Atari's graphics potential is often laboured as an argument to defend its costly software, but the fact remains that the machine can produce exceptional displays.

Unfortunately, it is not easy to master the techniques to produce them, mainly due to Atari's confusing Setcolor and Color commands and the work involved in the Player-Missile sprite system — rewarding though it is.

Tom Rowley makes a brave attempt to unravel some of the mysteries, and succeeds — up to a point. But given the subject and the enormous scope for reproducing tantalising colour illustrations to draw you through the book's tutorial approach, the black and white diagrams provide the sort of bland appearance that made me want to lighten them up with a set of felt pens. Still, real screen illustrations would have added to the already inflated price.

The book's question-and-answer style becomes irritating after a while and I tired of seeing the same grumpy cartoon character staring at me with every new challenge to devise a program to produce a given result.

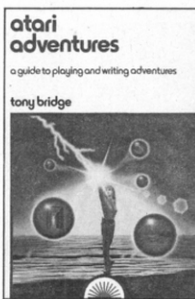
All this detracts from the real meat of the book which, though good, solid theory, is found better explained and better illustrated elsewhere.

SC



'Atari Adventures' by Tony Bridge, published by Sunshine at £5.95 (paperback, 146 pages).

Tony Bridge was an obvious candidate to produce a comprehensive 'map' to help adventurers through the maze of games available and to teach the



techniques required to solve them.

His advice columns are well-written and well-read and he has not disappointed with this book.

It kicks off with a clear, highly readable appraisal of the way in which computer adventures developed from early war-gaming, through Dungeons and Dragons to the Crowther-Woods mainframe breakthrough and then on to the dazzling array of text, role-playing and arcade-style games now on offer to all Atari models.

The first section also discusses the nuts and bolts of playing the adventures and the selection of foes likely to be encountered.

In the second half of the book Tony Bridge joins forces with Gary Radburn to provide a type-in-and-run graphics adventure with some clearly explained routines which can be easily adapted.

SC

'Adventures With The Atari' by Jack B Hardy, published by Reston at £13.45 (paperback, 356 pages).

Atari owners have long been privileged to enjoy some of the best adventures available for home micros — happy to revel in the wit and logic of such classics as the Scott Adams series and Infocom's complex brain-stretchers.

But there's always been a nagging frustration for would-be puzzle setters who bought the machine for its game playing rather than as a hacker's training ground. How, they wonder, can they emulate the skills of the adventure programmer without getting a mortgage for a 300-piece weekly part-

work on 'Basic For Idiots' or an Open University course?

Well, help is at hand in Jack Hardy's superbly set-out guide to DIY adventure creation. It has much to commend it and only one thing against — the price. But that will come as little surprise to Atari owners.

However, this is worth the money. The book provides an easily understood explanation of the steps involved in adventure writing before taking the reader through six programs — two each in Atari Basic, Pilot and Microsoft — resulting in more than acceptable text and graphics adventures.

But the real attraction comes in two linked programs — both Basic — which allow the most inexperienced programmer to design and create elaborate adventures with a few keystrokes and as much imagination as can be fitted into the liberal constraints of the framework provided.

The only snag with these utilities is that they are disk-based, though the theory will help cassette users too.

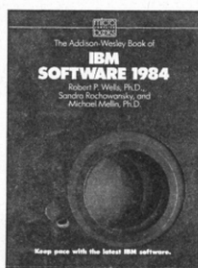
All programs in the book are broken down into working subsections, allowing easy understanding of each phase, and the style is clear with good use of diagrams and flow-charts. The last part gives useful hints on improving the techniques.

Overall, it is an excellent buy — fun and instructive. So, 'get book; examine book; go Atari' — and give Scott Adams something to worry about.



'IBM Software' by Wells, Ruchowansky and Mellin, published by Addison Wesley at £17.25 (paperback, 442 pages).

The front flash on this book says 'Keep pace with the latest IBM software'. Unfortunately, the contents don't quite live up to this. However, what you do get



is a fairly comprehensive index of the best of the most important applications software packages available for the IBM and IBMulators.

The nine chapters cover the standard areas: business, communications, graphics, utilities, personal/home, education, entertainment and hardware. Most of the chapters are subdivided — for example, under Business there are sections on integrated office systems, word processing, modelling, tax planning and so on.

Each package is given ratings from A (superior) to F (unacceptable), in eight categories. However, the authors have only included above average programs so there are very few E and F ratings. This rather makes a nonsense of including these categories at all and one or two ratings are missing.

Each package gets a fairly detailed review which gives a good idea of what it's like to use the program, a welcome change from simple descriptions of features.

Under some of the sections there's a handy quick reference table which gives information about the number of commands, error recovery, windowing and the like. There is also a useful index of American software publishing houses.

While there's little new here, the book brings together a mass of information which should be of great value to those with a PC but without much software. It will, however, need updating very shortly as the volume of IBM software increases.

Indeed, IBM itself has just announced a portfolio of low-priced software which, coupled with recent Peachtree releases, makes the book out-of-date already. This happens when books try to be directories.

BS

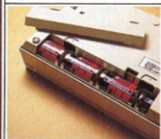
Little Brothers should be seen but not heard.



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Andy Newham's handy budget program for the Oric is easily convertible to other micros.

More money matters

You probably think you know how rich (or poor) you are, but the various factors you have to check to confirm this are really quite complex. You could find yourself in the position of thinking you're a lot better off than you were last year when you're actually not, or vice versa.

The Budget program here is intended to help you calculate where you stand from one financial year to the next. It's written for the Oric 1 but should be fairly easy to convert for other micros.

The program is specifically geared to the Government's Budget, which is the major financial change that happens every year, but it could just as well be used if there are any other sudden changes in exterior financial influences.

Once you've got it up and running it will ask you a lot of personal questions about your tax status and spending in order to calculate how much tax you'll be paying, and how much you'll be spending in relationship to your tax and spending position in the previous tax year.

The tax is worked out at the basic rate, so it will be accurate only for incomes up to £15,400 in the current tax year (£14,600 in the previous tax year). The sort of information you'll get from the program can be seen in the sample printouts for Fred and George.

To produce these I've assumed that both are single and earn £7,800 gross per annum. George is £82 better off because he heats his flat with paraffin (*this is bound to cause damp problems in the long run* —

Ed), does not smoke or drive a car, drinks only wine and eats out infrequently.

Fred is £5 worse off because he smokes 40 cigarettes a week, drinks ten pints a week, eats fish and chips once a week and taxes two cars.

If you want to convert the program you'll find most of the non-standard lines with REM statements. The display section will need the most changes, especially the colour and double height codes, but the best policy is, if it looks cosmetic leave it out.

The program will run on the Atmos provided the two call routines at lines 1022 and 1029 are left out. If you want to expand it so that it calculates tax bills for higher earners the information in table 1 might be useful.

```

10 REM *** BUDGET '84 RICHER OR POORER
?
20 REM * BY A.J.NEWHAM - MARCH 1984
30 REM ==== Set-up variables =====
==
40 REM Old/New Tax Allowances
50 DIM DAL(4),NAL(4),C(9),OB(5),NB(5)
60 DAL(0)=1785:NAL(0)=2005 'Single U65
70 DAL(1)=2360:NAL(1)=2490 'Single O65
80 DAL(2)=2795:NAL(2)=3155 'Married U6
5
90 DAL(3)=3755:NAL(3)=3955 'Married O6
5
100 DAL(4)=1785:NAL(4)=2005 'Wife's E.
I.
110 T1=.3 'Basic rate Tax
130 DEFFNR(N)=INT(N*100+.5)/100 '2 dec
.place nos.
140 REM ==== Title page =====
==
150 TEXT:CLS:PAPER0:INK2
160 FORX=1TO11:PRINT:NEXT:REM Title in
doublehght.
170 PRINTSPC(3)CHR$(4)CHR$(27);
180 PRINT"JBUDGET '84 FOR BETTER OR WO
RSE?"CHR$(4)
190 PRINT:PRINT
200 PRINT"If you would like to know pr
ess a key."
210 GETA$:CLS
220 REM ==== Input information =====
==
230 PRINT"For each of these questions
just"
240 PRINT"type one of the letters in b
rackets"
250 IF PEEK(524)<255 THEN PRINTCHR$(20
)'Caps on
260 PRINT:PRINT:PRINT"Are you married
or single (M/S)?";
270 K$="MS":GOSUB1030:A$(0)=A$
280 CLS:PRINT
290 PRINT"Are you under or over 65 (U/
D) ?";
300 K$="UD":GOSUB1030:A$(1)=A$
310 IF A$(0)="S" THEN 400
320 CLS:PRINT
330 PRINT"Do you both work (Y/N) ?";
340 K$="YN":GOSUB1030:A$(2)=A$
350 IF A$(2)="N" THEN 400
360 CLS:PRINT
370 PRINT"Do you declare your wages se
parately"
380 PRINT"or together (S/T) ?";
390 K$="ST":GOSUB1030:A$(3)=A$
400 IF (A$(0)="S"OR A$(3)="S") AND A$(1)="
U" THEN T=1
410 IF T=1 THEN DA=DAL(0):NA=NAL(0)
420 IF (A$(2)="S" OR A$(3)="S") AND A$(
1)="O" THEN T=2
430 IF T=2 THEN DA=DAL(1):NA=NAL(1)
440 IF (A$(2)="N" OR A$(3)="T") AND A$(
1)="U" THEN T=3
450 IF T=3 THEN DA=DAL(2):NA=NAL(2)
460 IF (A$(2)="N" OR A$(3)="T") AND A$(
1)="O" THEN T=4
470 IF T=4 THEN DA=DAL(3):NA=NAL(3)
480 CLS:PRINT
490 PRINT"What is your main gross inco
me p.a."
500 INPUT I1
502 IF A$(2)="N" OR A$(0)="S" THEN T=3
:GOTO600
505 CLS:PRINT
510 INPUT"What is your second income p
.a.":I2
520 REM ==== Calculate Old/New Tax ====
==
530 IF A$(2)="Y" AND A$(3)="S" THEN T=
1
540 IF A$(2)="Y" AND A$(3)="T" THEN T=
2
600 TI=I1+I2
603 DWT=(I2-DAL(4))*T1:NWT=(I2-NAL(4)
)*T1
604 IF DWT<0 THEN DWT=0
605 IF NWT<0 THEN NWT=0
606 IFT=1 THEN OT=(TI-2*DA)*T1:NT=(TI-2*

```

BUDGET

```

NA)*T1
607 IF T=2 THEN OT=(I1-0A)*T1
608 IF T=2 THEN NT=(I1-NA)*T1
609 IF T=3 THEN OT=(TI-0A)*T1:NT=(TI-N
A)*T1
610 IF OT<0 THEN OT=0
612 IF NT<0 THEN NT=0
613 OT=OT+OWT:NT=NT+NWWT
615 C(1)=NT-OT
620 REM ==== Indirect Tax Changes ====
==
630 CLS:PRINT
640 PRINT"Estimate the following as be
st you can"
650 PRINT"e.g. if you buy 1 gall of pa
raffin on"
660 PRINT"average per week, enter 52 g
alls/year"
670 PRINT
680 INPUT"How many galls paraffin do y
ou buy p.a.":FA
690 C(2)=FA*-.18 'Paraffin down as no
VAT
700 CLS:PRINT
710 INPUT"How many cars do you tax eac
h year":CA
720 C(3)=CA*5 'Car tax up 5 pounds
730 CLS:PRINT
740 INPUT"How much petrol each month (
galls)":PE
750 C(4)=PE*12*.045 'Petrol up 4.5p
760 CLS:PRINT
770 PRINT"What is your monthly takeawa
y food"
780 PRINT"bill":INPUT TF
790 C(5)=TF*12*.15 'VAT on takeaway f
ood
795 CLS:PRINT
800 PRINT"How many pints of beer per m
onth"
810 PRINT"do you drink":INPUT BE
820 C(6)=BE*12*.02 'Beer up 2p
825 CLS:PRINT
830 INPUT"How many bottles of spirits
per month":SP
840 C(7)=SP*12*.10 'Spirits up 10p
843 CLS:PRINT
845 INPUT"How many bottles of wine per
month":WI
850 C(8)=WI*12*-.18 'Wine down 18p
855 CLS:PRINT
860 PRINT"How many packets of 20 cigar
ettes"
870 PRINT"do you smoke per month":INP
UT CI
880 C(9)=CI*12*.10 'Cigarettes up 10p
890 REM ==== Display changes =====
=
900 CLS:PRINT
910 PRINT"ITEM"SPC(13)CHR$(129)"UP/"CH
R$(132):
915 PRINT"DOWN/"CHR$(135)"NO CHANGE"
917 PRINTSPC(18)"( POUNDS PER YEAR )
920 FORX=1TO38:PRINT"-":NEXT
930 FORX=1TO9:READ C#:PRINTC#:
940 PRINTSPC(17-LEN(C#)):
945 IF C(X)=0 THENC=135:GOTO960
950 IF C(X)>0 THEN C=129 ELSE C=132
960 C(X)=FNR(C(X)):PRINTCHR$(C)ABS(C(X
))
970 PRINT:TC=TC+C(X):NEXT
980 IF TC>0 THEN C=129:M$="WORSE":F$="

```

```

J":GOTO990
985 F$="N":M$="BETTER"
990 PRINT:PRINTCHR$(4)CHR$(27)F$"YOU A
RE ";
995 TC=ABS(FNR(TC))
1000 PRINTTC:M$ " OFF NEXT YEAR !"CHR$(
4):PRINT
1010 PRINT"Would you like a print-out
(Y/N) ?":
1020 K$="YN":GOSUB1030:IF A$="N" THEN
CLS:END
1021 CLS:PRINT"CHECK PRINTER IS ON":WA
IT1000
1022 CALLEE6CA 'Turn off keyboard
1023 LPRINT"ITEM"SPC(13)"CHANGE (POUND
S P.A.)"
1024 FORX=1TO40:LPRINT"-":NEXT
1025 RESTORE:FORX=1TO9:READ C#:LPRINTC
#:
1026 LPRINTSPC(17-LEN(C#)):C(X):LPRINT
1027 NEXT:LPRINT:LPRINT
1028 LPRINT"YOU ARE "ABS(TC)M$ " OFF NE
XT YEAR !"
1029 CALLEE804:END
1030 BETA#
1040 IFA$>LEFT$(K$,1)ANDA$<>RIGHT$(K$
,1)THEN1030
1050 PRINTA$:WAIT20:RETURN
1060 DATA DIRECT TAX,PARAFFIN,CAR TAX,
PETROL
1070 DATA TAKEAWAY FOOD,BEER,SPIRITS,W
INE
1080 DATA CIGARETTES

```

GEORGE'S 1984 FORECAST

ITEM	CHANGE (POUNDS P.A.)
DIRECT TAX	-66
PARAFFIN	-6.3
CAR TAX	0
PETROL	0
TAKEAWAY FOOD	3.6
BEER	0
SPIRITS	0
WINE	-12.96
CIGARETTES	0

YOU ARE 81.66 BETTER
OFF NEXT YEAR !

FRED'S 1984 FORECAST

ITEM	CHANGE (POUNDS P.A.)
DIRECT TAX	-66
PARAFFIN	0
CAR TAX	10
PETROL	10.8
TAKEAWAY FOOD	27
BEER	9.6
SPIRITS	1.2
WINE	0
CIGARETTES	12

YOU ARE 4.6 WORSE
OFF NEXT YEAR !

Table 1 — Tax rates and rate bands

Tax Rate	1983-4	1984-5
30%	0-14,600	0-15,400
40%	-17,200	-18,200
45%	-21,800	-23,100
50%	-28,900	-30,600
55%	-36,000	-38,100
60%	over 36,000	over 38,100

Data is on the move in part four of Keith Hook's series on assembly language programming.

Stacks and stores

No matter what type of program you're writing, be it an arcade game or a word processor, much of the program will involve moving data, either from one memory area to another or from the CPU registers to memory. Most of the time, the CPU registers are involved in moving data or temporarily storing it.

One important area in memory is the stack area, where the CPU stores data temporarily to retrieve the values when needed. Understanding how the stack operates is useful in assembly language programming; if the stack gets overwritten or destroyed, your program will crash.

The stack can reside anywhere in memory, and setting it up involves loading the stack pointer with the correct memory address. Obviously, this must be in RAM memory, eg LD SP, 478A Hex.

The stack is organised as a last in first out sequential structure, which means that the first piece of data placed on the stack is the bottom of the stack, and the current data value is at the top of the stack. Remember that the stack always builds down in memory.

The CPU uses the stack to store return addresses when branching to a subroutine.

The program counter keeps track of the instruction to be executed and is automatically updated before the instruction is carried out. The CPU updates the counter by adding the number of bytes in the current instruction to the value in the counter and this then points it to the next instruction.

In the following example, the counter points to address 5AF7. The instruction at 5AF7 is 3 bytes long, add these 3 bytes to 5AF7 and the result is 5AFA. This value is put into the PC.

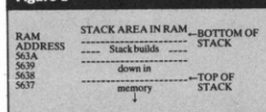
The CPU then detects that the current instruction is a CALL and places the value on the stack before the call is made. When the CPU detects a RET instruction it takes the value from the stack and places it into the counter and the computer then executes the next instruction following the CALL. You can see how disastrous it would be if the return address was destroyed or overwritten.

High memory	
5AF5 3620 LD (HL),20H	SP before call points here . . .
5AF7 CD005B CALL DELAY	SP When call is executed points here . . .
5AFA next instruction	
Lower memory	

You will notice in the example of stack action (figure 1) that the return address is

stored the opposite way round. All 16-bit data is stored this way in the Z80-based systems, ie LSB MSB. When the return address is pulled off the stack, the pointer will point to its original address before the CALL.

Figure 1



The programmer uses the stack with PUSH and POP instructions. Used carefully, they represent a really powerful tool. PUSH will place a value on to the stack and POP will retrieve a value. The two instructions can only be used with register pairs, such as in HL, DE, BC, AF, IX, IY. PUSHHL will save the contents of the register pair HL on the stack. POPHL will place the value at the top of the stack into the HL registers.

The two instructions are useful for getting a value from one register pair into another. Consider the following:

```
LD HL, 4AFF
LDB H ; Place value of H reg into B
LD C, L ; Do same to Reg C
.....
LD HL, 4AFF
PUSH HL ; Place value in HL registers
          on stack
POP BC ; Get 4AFF off stack.
```

This code does exactly the same thing but faster.

Pushes and Pops can generally only be used on the same level. For example:

```
PUSH HL ; save value in HL
CALL DELAY ; branch to subroutine
POP HL ; get value back.
```

This is correct. The return address will be the last value in the stack so it follows it will be the first value popped off by the CPU to find the return address. HL will then pop its original value from the stack.

```
PUSH HL
CALL DELAY
RESTORE PROGRAM
DELAY: POP HL
OTHER CODE
RET
```

This would lead to a program crash if you had not done it intentionally, because the HL registers would have popped the RET address off the stack and the program would eventually try to return to whatever value was placed on the stack with PUSHHL. You can, of course, use this to good advantage in some of your programming.

But be aware of what values are contained on the stack.

Pushes leave the value of the registers unchanged. If HL contained 3C00 after PUSH HL the stack would hold the value 3C00 and the same value would still be contained in the HL pair. Since the stack operates on a last in — first out basis, to restore registers to their original values they must be popped off in the reverse order:

```
PUSH AF
PUSH BC
PUSH DE ; save registers on stack
LD DE, 3A00 ; put 3A00 into DE
SBC HL, DE ; subtract with carry DE
             from HL
POP DE ; all registers contain their
POP BC ; original values.
POP AF
```

This ideal method of saving data helps you use the registers for another calculation, yet retaining their values.

Other instructions concerned with the use of the stack include EX (SP), HL which loads the HL registers with the value at the top of the stack and places the value in the HL pair onto the top of the stack.

A call instruction can be directly compared with Basic's GOSUB statement and RET equivalent to Basic's RETURN command. In machine code, however, you can also use these commands with conditional statements similar to the IF statement.

```
LD A, L ; get value of L
          into A reg.
CP 20 ; does L = 20
CALLNZ, DELAY ; if isn't gosub
              DELAY
" ;
" ;
" ; other code
DELAY: LD A, 20
LD L, A ; put 20 into
         L reg
INC C ; increase value
         of C reg by one.
CP C ; does C = 20
RET Z ; yes it does so
      return.
10 LET A = L: IF A > 20 THEN GOSUB 100
100 LET L = 20: LET C = C + 1
110 IF C = A THEN RETURN
```

All of the conditional statements can be used: NC, C, M, P, PO, PE. Assembly language subroutines are far more flexible than in Basic. However the same rule applies: for every call there must be a ret instruction and you must be sure that the return address has not been corrupted by misuse of the stack.

LD is one mnemonic concerned with transferring data to and from memory or between registers. The first register in the instruction is always the receiving register. LD A, C means load the A register with the value contained in the C register.

Syntax rules to be applied when using the 'LD' group are easy to memorise. LD A,(BUFFER) means: load the A register from memory location named buffer. LD A,(HL) means load A register from memory location pointed to by the HL registers. So if HL = Address 15360, and address 15360 contained the value 100, after LD A,(HL) the A register would also contain 100. In Basic:

```
20 LET HL = 15360
30 LET A = PEEK (HL)
LD A,2A
LD (HL),A
```

Load the address pointed to by HL with the value contained in the A reg.

```
LD (BUFFER),A
```

Load memory location BUFFER with the value in A register. In Basic:

```
20 LET HL = 15360
30 LET A = 49 : POKE HL,A
The brackets ( ) mean from where or the contents of.
```

If you want to load any of the single, working registers from a memory location, the HL pair must be used by loading them with the required address. This does not, however, apply to the A register.

```
LD A,(BUFFER) ..... This is correct
LD C,(BUFFER) ..... Wrong!
LD HL,BUFFER ; HL now holds address
LD C,(HL) ; C now holds value
from buffer.
```

In the above example: LD HL,BUFFER: if BUFFER is located at address 4A70 then

after LD HL,BUFFER, HL = 4A70.

Registers are loaded with 8-bit data and register pairs can be loaded with 16-bit data (immediate addressing).

Figure 2

ORG 8700	;	anywhere in RAM
SCREEN: EQU 3C00	;	Start of your screen address
SCRNFN: EQU 3FA0	;	The very last screen location.
BEGIN:		
LD HL,SCREEN		
LD DE,SCREEN+1		
LD BC,	;	put total number of screen locations.
LD (HL),2AH	;	Asterisk
LDIR		
LD HL,SCRNFN		
LD DE,	::	Put last screen location next to bottom line.
LD BC,320	;	for 40 locations per line put 420
LDIR		
JP BEGIN	;	infinite loop.
END BEGIN		

LD C,56

LD BC,37650

Always remember that 16-bit data is stored LSB MSB. If BUFFER is at address 47A0 then:

```
LD HL,36A0
LD (BUFFER),HL
```

Address 47A0 will contain A0 and address 47A1 will contain 36. The same applies with LD HL,(BUFFER). The HL registers will be loaded in reverse order:

```
L...(A0).....47A0
H...(36).....47A1
```

The Z80's very powerful set of commands can be classed under the load group called block transfers. These are LDI, LDIR,LDDR,LDD.

LDIR = Load,increment and repeat.

LDI = Load,increment, you can then do

some other task before repeating.

LDDR = Load,decrement, and repeat.

LDD = Load,decrement.

To use these commands, three register pairs are used and they are very easy to memorise.

HL points to the from address

DE points to the Destination address

BC holds the Byte Count

LD HL,3C00 ; From address

LD DE,57A0 ; receiving address

LD BC,500 ; move 500 bytes.

LDIR

The example program, Figure 2, will move 500 bytes of data from address starting at 3C00 into addresses starting at 57A0. **PCN**

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Some time ago, we decided to add text printing facilities to the Dragon's Graphics Screens. Although it took 3 weeks of hard work we did it for all five PMODES. We made the characters redefinable, but we did not call them sprites, because they are not, they're just redefinable characters. Then we decided to add some sound effects and user definable sounds. After another week or so, we had done that as well.

Next, we thought we would give the Dragon some sprites. We required multi-coloured sprites of any reasonable size or shape and we wanted to be able to move them without obliterating whatever else might be on the screen. We quite fancied being able to control sprites from the keyboard or joystick with just a single command, and we thought it would be nice to be able to fire sprites with the joystick buttons. No sprite system worth its salt would ignore collisions, we thought, so we would have to have a collision detection as well. Also, we wanted the sprites to be fast, versatile and easy to use, with lots of functions so that the control programme would know where all the sprites were, and what they were doing. Another brainwave was to include an automatic maze running feature where all the sprites chase, (or run away from) a particular sprite, so that it would be easy to write THAT kind of programme. Then we thought we would like to have easy animation, preferably looked after automatically, by the sprite handling system. Finally, just to make the whole idea totally impractical, it would have to be driven entirely from Basic, without any tedious Peeking and Poking.

We did it, it took months, but we did it. The author of the two top selling Dragon games in a recent best sellers list, has described Sprite magic as the best piece of software he has ever seen.

Popular Computing Weekly said "Excellent" and "Superb". Dragon World said "Quite simply the best Dragon utility available on the market today". Personal Computer News said "Fantastic" and "if you've got a Dragon, what on earth are you doing without Sprite Magic".

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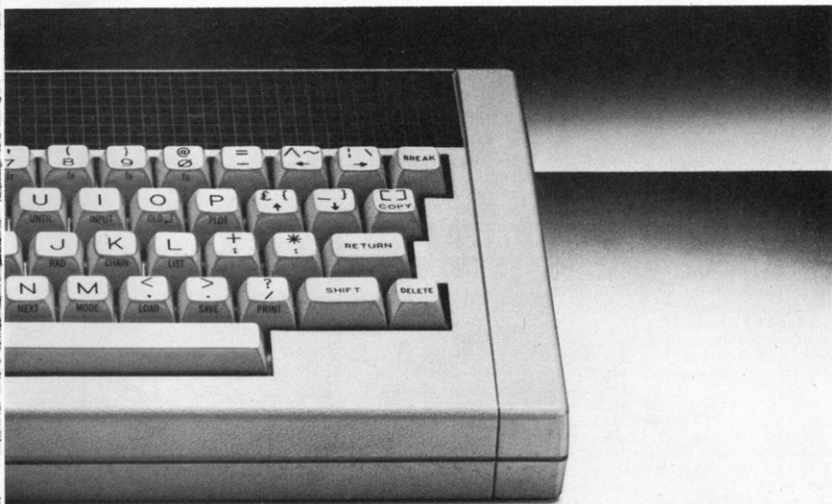
Of course it's not surprising that it's proving to be so popular.



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The Electron provides seven different display modes from high resolution graphics necessary in games, to a full eighty columns of text



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across the the screen. It comes not only with a comprehensive user-guide, but also with a book that takes you through the principles of Basic programming, as well as a demonstration cassette containing fifteen programs.

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CANON WIRE

This Canon printer rivals Epson's FX80, says Piers Letcher.

Serious printer competition for the Epson FX80 has arrived from Canon. The PW-1080A offers all of the features of the famous FX, and more. And it also cuts more than a £100 off the Epson price.

First impressions

Like most other Canon products the 1080A is neatly packaged and designed, and comes with a book-sized manual and enough paper to test the printer. Fitting the provided ribbon is easy, as is the insertion of roll, sheet, or tractor feed paper. A lever at the right gives friction or tractor feed.

Along the front are three buttons for the three standard printer control buttons (form feed, line feed and on-line), and the printer is topped by a curved perspex lid, which keeps the paper apart as it enters and exits.

Holding down the LF button while switching on puts the printer into continuous self-test mode, and this demonstrates the normal character set and italics.

Documentation

One of the printer's strongest advantages over others reviewed here in the last few months is its manual. At 200 pages it is more like a book, and is one of the best pieces of documentation I've seen.

Detailed explanation of what you can do with the printer, as well as how to do it, are given and these are illustrated with programs and examples.

Features

A wide range of features is provided, though perhaps the most interesting of these is the one that the FX80 does not offer — near-letter quality (NLQ). This is achieved by printing each letter in two passes — between these the paper is advanced 1/120th of an inch to enable the nine-wire dot head to generate a matrix 18 dots deep.

The quality, as seen in the example, is high. It also comes out at a genuine 27cps; unlike daisywheels the speed advertised is the speed you get, rather than a maximum.

Like the FX80 the Canon also allows you to use proportional spacing. When used with NLQ this produces output that is far from the dotted type usually associated with dot matrix printers.

Other features that add variety to your printed output are enlarged and condensed text (useful for headings and tables), italics, bold and underlined print (helpful in breaking up text), and superscript and subscript (of benefit in technical output).

All of the above features can be reached by sending control and escape codes to the printer, and the defaults can

be set with the dip switches. These are located deep in the heart of the printer, and the whole case has to be removed to get at them.

Although this is a fairly complex process, it is thoroughly documented and with the aid of diagrams, the switches can be reached and altered without too much effort. After the first time this is not difficult, and in practice the switches rarely need setting.

In use

The Canon is easy to use and was tested with a variety of machines. Since it has a Centronics interface you can attach it to almost anything, though you will need an extra interface if you are using a Spectrum, Commodore 64 or Atari.

The printer was mostly used with a Cortex, running Wordstar, and some time was spent working out which printer to use in the Install program, as the Canon does not yet feature on the list. After some experimentation it worked best as either a Star or an Epson.

Pretending the Canon was one of these meant that most of the standard Wordstar features (strikeout, bold, underline etc) could be used directly from Wordstar... except NLQ. However, setting the right dip switches and holding down FF on power up gave this feature too. Other dip switches can be used to give you NLQ all the time, but this rules out some of the other features from Wordstar.

Used with a BBC the special functions were even easier to access simply by sending the relevant control codes to the printer from Basic.

Verdict

The PW-1080A is the first printer I've used that is not only more versatile than the Epson FX80, but cheaper too. As long as it can match Epson's renowned reliability — and there seems no reason to believe it won't — then it should do very well indeed.

Printer prices have been high since the early days of micros but are now falling as the competition gets more fierce. The Canon is a step in the right direction, and a step worth taking if you want speed, quality and versatility.

Product Canon PW-1080A wire dot printer

Price £399 inc VAT and p&p **Distributor**

Micro Peripherals. Tel 0256 3232 **Interface**

Centronics standard **Speed** Normal or italic

type — 160 cps, near letter quality — 27 cps

Features Near letter quality, elite, standard

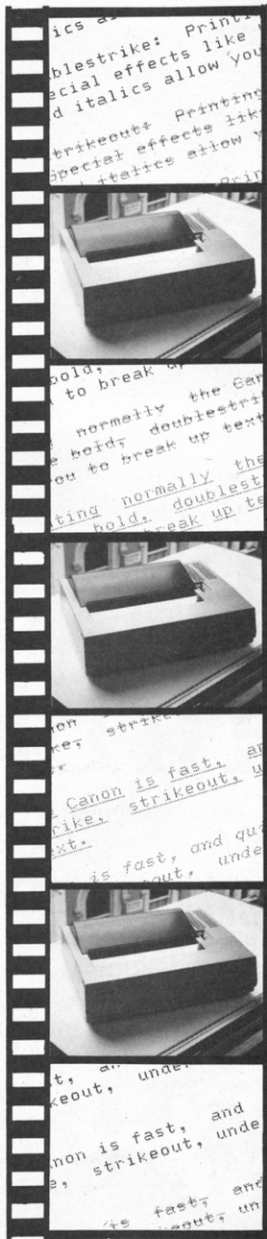
italic typefaces. Double strike, bold,

underlining, emphasised, enlarged, condensed,

subscript, superscript, proportional spacing,

international characters, graphics printing at 9

dot or 16 dot resolution per character.



Drive on Oric

Oric's prodigal disk drive is reviewed by David Janda.

At last, the Oric Microdisc that has been 'coming soon' for over 14 months, has arrived.

And, contrary to rumour, the Microdisc is a proper 3.25 inch disk drive, with an operating system that, once loaded, resides in memory and not as separate files on the disk.

However, Oric has been beaten at its own game by ITL Kathmill, whose Hybrid was reviewed in Issue 52. Although both units contain Hitachi 3.25 inch drives, the similarity ends there because they operate quite differently.

Hardware

The disk drive comes as two separate pieces of hardware: the drive itself and a (heavy) power supply. The drive sits in an oversized black rectangular case. The new power supply powers the Oric as well as the drive — plus an additional drive which is not yet available.

Inside the case is a controller board resting on top of the drive, supported by several pieces of foam. Behind this is a lot of space, which looks as though it might have been intended to contain the power supply but turned out to be too small.

The printed circuit board looks hand soldered, with links here and there, and no less than 21 integrated circuits.

The unit I received was a master drive, which has a red reset button at the back, and it controls any other (slave) drive that may be added — they are not yet available, but are 'expected in the near future'.

Finally, there is a small red plinth which may be attached to the underside of the

drive, to raise it at an angle.

Operating system

If you know CP/M you will find the Oric disk operating system (DOS) strangely familiar, as the command structure is similar in several ways.

All the DOS commands are prefixed with '!'. This symbol is used on a normal Oric or Atmos for user-defined machine code routines, which programmers often place on page four of RAM. This starts at #400 (address 1024 decimal), and is

Table of Oric Microdisc commands

BACKUP	<drive no.> TO <drive no.> Copies entire disk.
SCOPY	<old filename> TO <new filename> (option) Options are P for N, write protect. C single disk. O or M, overwrite or merge.
DEL	<filename> Deletes file, wildcards can be used.
IDIR	<filename> Can include disk no. and wildcards.
IDIRV	<drive no.> Sets drive no., only for use with more than one disk.
IFORMAT	<drive no.> Formats disk, note: does not lay down OS.
LOAD	<filename> (option) Options are D display start, end and execution address. N disables auto-run. A specify new load address. J join to program in memory.
IPROT	<filename> (option) P protect, N remove protection, I protect and remove from directory.
IREN	<filename> TO <filename> Renames file.
ISAVE	<filename> (AUTO) Saves a Basic or machine code program, with option of auto-run. For machine code start and end addresses need to be specified.
IOPEN	<filename> (option) Opens sequential file for R reading or W writing.
ICLOSE	Closes sequential file.
IPUT	<data> Write data to file.
IGET	<data> Get data from file.
ISTORE	<array name>, <filename> Stores array to disk.
IRECALL	<array name>, <filename> Loads array from disk.
There are also the following files on the system disk.	
IOLD	Recovers last Basic program that was NEWed.
ITYPE	<filename> Displays contents of text file to screen.
ISYS	<drive no.> Disk configuration program.

Oric's new disk drive sports the Atmos's striking colours and uses standard Hitachi disks.

reserved for such routines.

However, because the DOS uses this page for the OS and the ! is used for the DOS commands, you'll have to be pretty hot at machine code programming to continue using ! from within your Basic programs. If any of your programs use ! already you'll have to disassemble the DOS on page four to redirect the jumps.

File handling is restricted to loading and saving Basic or machine code programs as well as arrays. You can read and write to a sequential file, and that's about it. Unfortunately, there is no random access whatsoever, and worse, you cannot append to an existing file.

Data is !put to a file as a string, and you can also dump numbers — as long as they are integers and smaller than 256. Also, you cannot open more than one file for reading or writing at a time, so updating a file is going to be almost impossible.

Oric says its reason for this is that it wanted to keep things simple — but this may be taking things too far. To get into 'sophisticated applications' (as the advert puts it) the disk user is going to need something a lot more sophisticated.

In use

Once the drive is set up and the micro switched on a message to insert the system disk is displayed at the top left hand corner of the screen. The systems disk contains a number of help pages which are repeats of what is in the manual. Also supplied on the disk are three system programs: !OLD, !SYSTEM and !TYPE, which are written in Basic.

Unfortunately, the OS appears not to verify as you format a new disk. I discovered this after writing several test programs which refused to load. Coupled with the lack of any separate Verify command, this means you have to be especially careful.

However, the system does have numerous and fairly helpful error messages, and if you wish, it is possible to intercept errors and find out what they are under program control by PEEKing a location.

I found it possible to transfer some of my software to disk from tape but had no luck with programs that were in several parts with machine code.

Verdict

Disk systems have two purposes: one is to provide mass storage, and the other is to provide data file handling. Oric has missed out on the second point, and I can't think of any other micro DOS as limiting as this.

Although the user interface is fine the operating system offers very little to those who wish to do any file handling.

The Microdisc is the 'approved' drive for the Oric and Atmos. I would advise anyone who is considering Oric disk systems to take a close look at the Hybrid from ITL. This system is far more sophisticated than the Oric disk drive and, pound for pound, offers a lot more.

Product Oric Microdisc Price £270 inc VAT
Manufacturer Oric Products International,
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GG

Apple has another winner waiting in the wings to share some of the Macintosh's limelight. The attractions of the IIc, the first Apple micro to approach genuine portability, include immediate software availability, built-in disk drive and memory capacity.

Features

The IIc is based around the CMOS version of the 6502. Going CMOS primarily means lower power consumption. In fact, a manufacturer is already producing battery packs for the IIc. Couple this with the 80 x 24 LCD screen due to be available in the Autumn, and the IIc will be truly portable, rather than merely transportable. The CMOS aspect also means you can lose power for up to seven seconds without losing memory contents.

The IIc comes as a take home, plug-in and run product. It weighs only seven and a half pounds; has an integral 5.25in disk drive (with many grills in the casing to dissipate heat); 128K RAM; hardware switchable 40/80-column display modes and a modulator, so you can plug it into your TV. The twelve volt power input and internal transformer mean you should be able to run it from a cigar lighter adaptor.

Keyboard

The keyboard is good; it has 63 keys, of which four are cursor arrows and two are programmable function keys; one open and one filled Apple symbol. These serve as 'control' keys to effect commands within packages like AppleWorks, the integrated wordprocessor/spreadsheet/filing system. The cursor keys are badly placed at the bottom right of the keyboard — a cluster would have been preferable. The Return key is elongated, but not enough: it's too easy to hit the end of the over-wide right shift key when you want Return. The keys are marked in an attractive font and the keyboard is the same size as the IIe's. Transfer from the IIe to the IIc will be easy for touch typists.

You can switch character sets *ie* swap from pound signs to hashes with a hardware switch to the right of the 80/40-column display switch. A curious feature of the latter is that it's viable only when the machine is switched off.

Storage

Apple has bought in the disk system rather than use its own. This is quiet and doesn't whirr and click like other Apples. Disk

Bryan Skinner's first impressions of Apple's new transportable.

Apple Super C



IIc complement: the monitor, second disk drive and mouse are optional extras.

capacity is only 143K, which may deter some — a single disk system can be very frustrating — but it does mean you can use IIe disks and make use of the existing large Apple software base.

Software

You can use Apple's new Unix-like ProDOS operating system and the Mac's Mousepaint. Most IIe software, besides that requiring extra boards, will run on the IIc, and Apple is providing buyers with a comprehensive software compatibility list. This indicates whether you'll need to run a package in 80-40-column mode, whether you need to use the Pascal Disk Formatter (provided with the IIc utilities disk), whether the package can be made to print text but not graphics, if a program will cope with inverse upper case characters and so on. The IIc has been designed to be as compatible as possible with the IIe, and many software houses have had the specifications for some time.

Expansion

Usually, Apple users expect to be able to add a wide variety of bits and pieces to their machine, but the IIc is an exception. You can't open it up without invalidating the warranty, but with the various ports at the back, you shouldn't need to. There's a 9-pin DIN socket for a joystick, Apple's hand controllers and the Apple mouse, which you need for MacPaint. Serial input/output is handled via two 5-pin DIN sockets. One of these will take the modem (coming soon) and a printer or plotter. There's no parallel output, so Centronics printers are out, at least until a third party

brings out a suitable interface. For display output there are the 15-pin D socket and one RCA-type jack socket for a monitor. A second disk is catered for via a 19-pin D connector and the half-height disk drive in IIc styling is already available.

Video

The IIc monitor is an optional extra but the IIc itself has a maximum 'double' resolution of 560 x 192 pixels in 16 colours. Also available are the 40/80-column mode, a low-resolution graphics display of 40 x 48, and a normal, high-resolution graphics 192 x 80, 16 colour mode.

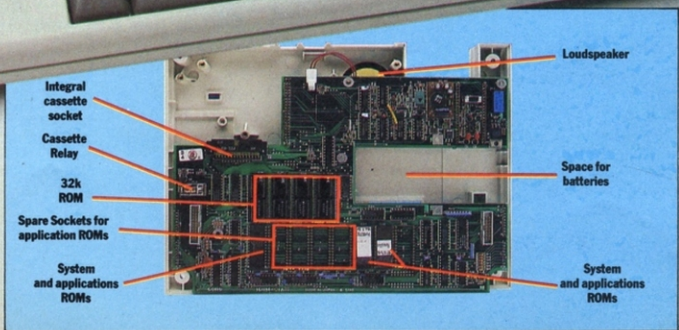
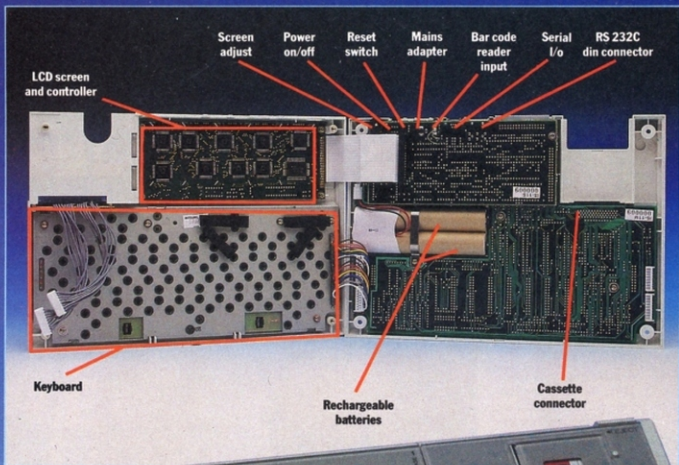
Verdict

The Apple IIc is a professional product; it looks good, has a small imprint and behaves well. Its compatibility with the IIe gives it a great advantage over the competition. Its portability aspect, together with the variety of add-ons bound to arrive in the coming months, should make other manufacturers tremble. **PCN**

SPECIFICATIONS

Price	£1064
Supplier	Apple Computer UK 0442 60244
Processor	65C02 at 1.02 MHz, 16 bit data bus
Display	560 x 192, 16 colours
Disk drive	143K
Memory	128K RAM, 16K ROM
External drive	£264.50
Monitor	£161 (stand £31)
Mouse	£80.50 (with Mousepaint)
Carrying case	£31
Appleworks	£201.25

Rear view: I/O ports and carry handle/stand.



Sord's edge!

Bryan Skinner compares the Sord IS-11 with the competition.

The current spate of lap-held portable micros begs the question of who will use them. There will always be the small market among enthusiasts who want a programmable machine wherever they go, and an equally small number who will buy them as executive toys. Their true value will probably be found among those who travel about and need to work on the move — business executives, sales reps, site engineers, architects and so on.

In any case a portable should ideally offer some kind of database, a text editor and a finance program.

The Sord IS-11 is the latest entry in the lap-held stakes and takes on the now established micros like the Tandy 100, NEC 8201A and the Olivetti M10. Unlike these it does not come from the Japanese manufacturer Kyocera and it's also much more expensive. At about £1,000, it's almost twice the price.

However, the Sord has rather more built-in software including a dedicated calculator, text editor and communications package. But the star is the database/spreadsheet with full editing and graphics capability. This is Sord's PIPS system which allows you to print pie or bar charts on screen or to a printer and also features full formulae handling.

First impressions

The Sord comes with a detachable micro-cassette recorder and a ROM-based cassette operating system. There's also a built-in spreadsheet/database program and a calculator. You get a simple text-editor, but a programming language is an optional extra.

Initial impressions were favourable, but disappointment set in surprisingly quickly. For all my writing I use a NEC whose main problem is a lack of memory. A 2,000 word document only just fits in an empty NEC (12K), so I was looking forward to 32K and a built-in storage device to work with. Writing this review on the Sord proved impractical. The Sord's basic text-editor, I-EDIT, is of little use for serious long-haul writing.

The machine will have a detachable ROM cartridge with a 'proper' word processor on it, but that was absent on the machine supplied.

The Sord is heavier than the NEC, but not much. It has rechargeable batteries which are automatically on charge when it's run off the mains adaptor. This is a nice touch — one of the NEC's problems is that you must keep recharging batteries — nickel cadmiums last only four or five hours (Duracells last for 18 hours). However, you can't remove the Sord's batteries, so if they run flat in transit you can't swap them for a spare set, as you can with the NEC. With the machine plugged into the charg-

er, the batteries take only a couple of hours or so to recharge, as against up to 16 for 'normal' rechargeables.

The keyboard is not as nice as that of the NEC or Tandy, being rather springy and a bit rattly. A group of keys can be toggled to act as a numeric keypad with the NUM key — if you've a lot of data entry they can speed things up. Since there's the spreadsheet this might prove useful and Sord is to release a detachable numeric keypad to fit on the right hand side.

The keys are laid out neatly and the markings are clear, but I found the tops a bit loose.

Documentation

The manual supplied was preliminary, but is quite adequate. Most of the pages cover how to use the I-PIPS database system. The manual is part tutorial with illustrations of screens to go with the text, so if you follow the instructions you can get fairly familiar with the system very quickly. There was no index or detailed specifications, such as the pin-outs on the RS232 port and it's to be hoped that such important information will be included in the final version.

Screen

The screen is the now almost standard 40 characters by 8 lines, but the physical dimensions are considerably less than the Tandy, NEC or Olivetti. These are about 195 x 55mm, while the Sord's is 145 x 40mm. I found it rather a strain.

You can even define up to eight windows on the LCD for display of your calculations etc. However, this is of limited value as you can scroll information only in the last window defined, and the screen's so small.

What really lets the Sord down is the speed of the screen update. It's incredibly slow, as if each character were drawn rather than dumped from a ROM-based set onto the screen. You can almost see each of the 63 lines run across the screen when it scrolls. For word processing it's intolerably slow.

Below the screen are the six function keys around which so much of the software revolves. Above these you usually get a single line window in which the current functions are displayed. Sometimes the design of this window left much to be desired; information would scroll out of the window before you could assimilate it.

Software

All the software has the prefix I-. There's I-PIPS, I-EDIT, I-CALC and I-COMM. From the main menu there's also SYSTEM and HELP. A Help function (function key 6) is available under most menus and tells you very briefly what the various options do. SYSTEM lets you set such things as the



The microcassette drive — detachable storage.

date and time, initialise a tape, toggle the printer on and so on.

Of the software supplied, I-PIPS is both the most interesting and the most powerful. Standing for Pan Information Processing, I-PIPS is a very cut-down version of Sord's data management/file handling system used on its larger systems. On the IS-11 it's function key oriented and you're faced with up to six choices at each point, so it's menu-driven in a sense. As with all the Sord's menu systems you can usually always escape to previous levels via the ESCape key.

If you want to set up a table for database use, the first thing is to select Create, to set up a data file. This is little more than configuring a data table: rows, how many columns, defining data types as numeric or character, number of characters per field and so on. The number of rows is determined by existing memory usage. Of course, for a largish model, you could PUT all the files in memory onto tape, then erase them from RAM to make room, but that requires a lot of messing about. Even when you're working with an empty memory, a table of four columns taking a total of 24 characters per row can only hold 547 rows in the standard 32K model, so we're not really talking about any serious applications.

Once the Sord has set up space for the model you can perform various operations on it such as data entry, sorting, selecting (using mathematical operators), sub-total and other calculations.

For data entry you can choose to have automatic updating by row or column *ie* specify the next item to be updated. This is handy and saves a lot of time when you've a lot to enter at one go.

One feature that most business-oriented users will find of great value is the graphing function. You can have the data in a column or row of a table displayed on the LCD in pie or bar chart form, six rows or columns from the table at a time, and have the chart sent to a printer.

The implementation of PIPS is possibly not as good as it might be. Just as a simple test I set up a simple file with name, age, sex and phone number and made five entries before asking for a sort by name in ascending order. Incredibly, it took 90 seconds, so I asked for a re-sort by age. Same time. It seems as if PIPS sorted all the array, even null entries, because the row entries disappeared from rows one to five and were now to be found between 95 and 100. Presumably a sort on a full 100 entries wouldn't take much longer, but even so it's

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Mike and Peter Gerrard are regular contributors to *Which Micro?* and *Personal Computer News*. Peter Gerrard is the author of many titles in the Duckworth Home Computing list, including the Exploring Adventures series, and contributes to *Popular Computing Weekly*, *Commodore Horizons* and *Micro Adventurer*.



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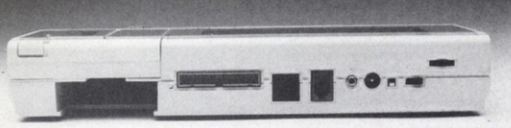
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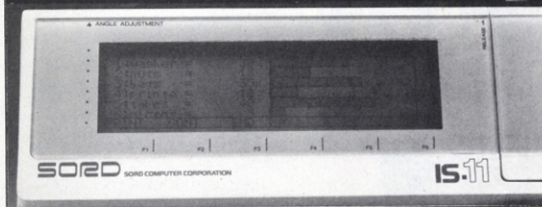
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Top: At the back the cartridge port and I/O sockets for various peripherals.
Bottom: Bar graphs can be produced, six rows from a spreadsheet at a time.



an unrealistic length of time. Even with only 24 per cent of memory used, a similar table with ten entries took 60 seconds.

On the other hand, I-PIPS allows you to insert or add rows or columns into a table, delete rows or columns of a table, delete whole files, have the result of a selective search sent to a separate file, etc.

I-PIPS lets you define macros of a sort. You can set up command files under I-EDIT to be automatically executed when called up with the command AUTO. You can use the whole range of functions available here including SOR, INT, RND etc and even have the file fill in a table set up with I-PIPS for database operations.

Many other very useful and impressive facilities are available, making I-PIPS the main focus of the micro.

A curious aspect of the spreadsheet is that formulae are entered in RPN (Reverse Polish Notation). If you wanted to set up a table to calculate the areas of circles, the formula might be $PI*(C1^2) = C2$, meaning 'entries in column two of all rows will be the squares of column one (the radius) time PI'.

I-EDIT is a rather primitive text editor. All you can do is enter text, move the cursor around a character or line at a time, delete and so on.

I-CALC, accessed by pressing function key 3 from the 'main menu', puts up a calculator window on the right of the screen with a menu window at the foot. A single line for data entry also appears at the top. You can do some pretty fancy stuff with I-CALC, as well as being able to call it up from I-EDIT or I-PIPS.

I-COMM lets you set the number of bits/word, parity status, number of stop bits, baud rate and everything else you might need to transmit information down a modem or to another micro. You also get a terminal emulation program which allows you to set up communications with Sord information network systems.

An aspect I didn't like is that if you turn the machine off you restart on reboot at the main menu. Another gripe is that the keyboard buffer isn't cleared after most functions have been executed. This means if you press a key for too long, the characters or commands are acted on when the Sord returns to them.

Input/output

Most of the I/O is handled round the back, while the numeric keypad port and that of the printer are strangely underneath. There are sockets for a bar code reader, the mains power adaptor, a serial port, an RS232C and an expansion port which will probably be used for a disk interface. The RS232C port needs an eight pin DIN socket, so I didn't get a chance to try out the comms package at all. Indeed, the printer socket takes a tiny 16 pin plug which was unobtainable.

The microcassette player slips out from a socket at the rear right of the machine and just beneath this is the ROM cartridge socket. A C30 microcassette can take up to 128K of data, and this is very useful. Should you run short of RAM space, or just as a precaution against terminal battery drainage, it's a fairly simple matter to PUT a file onto tape, then delete it from memory. This is preferable to using an external cassette as it's quicker and you can get a directory of files on tape, but some of the operations are slow. On the positive side you can get a selective directory, with wildcards, just as you can with files in RAM.

An odd feature of the cassette operating system is that it doesn't keep a directory in a working RAM file to be updated when the cassette is written to, or files are deleted from it. Each time you ask for a directory of the tape, the system has to re-read the tape

directory which is held in the first few seconds of the tape. If you ask for a directory of an uninitialised tape, the system will look for a directory the whole length of the tape.

Reliability

The review machine had some serious faults. Somehow I managed to put the Sord in a loop it wouldn't quit. The bottom window kept displaying 'DELETE WHAT?', with the function key commands FILE, ROW, COLUMN below, then erasing that display and repeating it, together with a ticking noise. The only way out was to switch off the machine and reboot it.

I also messed up the Sord's RAM file pointers at one stage. I'd just graphed a table, then pressed the function key for END before the system froze. I tried reset, escape and a few other tricks. Eventually I turned off the backup power switch, which should give a cold boot when it's turned on again (with no files in RAM) only to be greeted by one garbage file name in the directory and the information that 148 per cent of memory was being used. The only cure was to INIT the memory from the SYSTEM menu.

In my opinion, the faults I encountered on the Sord point to major problems in the software, so I'd be very cautious about any operations on data I'd not stored on tape. Users really should never be faced with major disasters like this and I can only hope that they were due to the machine being a pre-production version.

Verdict

It's a nice enough machine, but it's overpriced. I didn't like the keyboard and the screen is too small. The overall feeling I had was that too much effort had been put into porting I-PIPS across, while not enough attention had been paid to the hardware.

Problems aside, there's little doubt that with the optional 32K RAM extension, the word processing package I-WP, the optional Basic, the forthcoming microfloppy disk system and whatever else Sord comes up with, the Sord IS-11 could find a welcome among a large group of users. For the busy, nomadic business micro-user, the Sord could offer a very neat, albeit rather expensive package.

PCN

SPECIFICATIONS

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I/O	Bar code (5mm jack), Centronics printer, keypad, RS232C (8 pin DIN), PPI socket (for CRT, to be announced), 9V power in, SIO, ROM socket, microcassette socket
Keyboard	70 keys, 6 function keys
LCD	145 x 40mm, 40 x 8 character, 240 x 63 pixels, 8 user definable windows
Weight	1.9kg
Dimensions	298 x 215 x 50mm
Distributor	Sord Computer Systems (UK) 01-930 4214.

Bitstick for the BBC

Magazine readers and TV watchers will notice the impact that computer graphics are having on graphic design. The problem in the past has been that the cost of implementing a professional graphics system on a home computer was well out of reach of the average home user. Now Acorn has solved this problem to some extent with the introduction of its 6502 second processor and the Bitstick system for the BBC model B, originally produced by Robocom for the Apple.

First impressions

After opening the boxes and getting out the gear, the most noticeable thing was the incredibly short length of connecting cable between the second processor case and the BBC. This case is the same depth as the BBC and is about half the width, making it look very neat when sitting next to the machine. In fact it is encased in the same box that Acorn uses for its Teletext and IEEE-GPIB units.

The basis of the Bitstick system is a precision joystick that looks flimsier than it actually is. The stick is tri-axial, that's to say it can detect diagonal movements as well as up and down ones. Its centre control is a rotary mechanism used mainly to alter the magnification of objects on the screen. The three control buttons are used to select menu options, going away with the keyboard and giving a nice ergonomic design.

Setting up

Installing the system involves the fitting of various ROMs into the BBC. Two of these are for the second processor. The first, a new filing system (DNFS) ROM, covers the disk and network filing systems in one chip, replacing existing ones. The second is HIBasic, a version of Basic II designed to sit higher up in the second processor memory than the original, giving more space for programs.

Connecting the second processor to the main BBC is a little more difficult than it may, at first, appear, especially if there are printers and disk drives attached.

The Bitstick system is much easier to install, requiring the graphics ROM to be slotted in and the stick connected to the analogue port at the back of the BBC.

The documentation supplied with the

PCN PRO-TEST PERIPHERALS

Graphics plus a second processor impress Gary Marsh



The Bitstick and manuals.

system is well up to Acorn's usual standard. The thin A5 spiral-bound manual supplied to cover the second processor unit is split into two major sections, one about the 6502 second processor: why, when, where and how it works, and the other describing in detail the new enhanced Basic II.

The Bitstick user guide, another A5 spiral-bound manual, contains about 170 pages. The major drawing features and functions are explained in one chapter followed by a detailed 'hand holding' tutorial that puts the theory into practice. If the 'getting going' instructions are not followed (as is usual), it's possible to get into a lot of trouble. The book describes the system as 'easy to use', though this is not the case. However, the system gets easier with time and experience.

In use

Starting up the Bitstick system is fairly easy and once loaded, the screen displays a detailed menu showing the current system status. The drawing cursors are initially in the centre of the screen but can easily be relocated using the left button of the controller. Along with the default settings of solid white line drawing, there are many variations from the colour palette. All 16 colours are available on initialisation, as well as features like variations in dotted lines, circles, arcs and, probably the best of all, the nib function.

This provides a means of drawing and

shading diagrams in different colours and textures. Not only are there five levels of shading, but also various colours and textures giving effectively 20 shades. The angle of the shading can be altered simply by using the right hand joystick buttons and turning the centre rotary control making the differences in shading virtually infinite.

Some of the more professional features available from the Bitstick are zoom and pan, enabling highly detailed information to be shown about a specified area of the workpage through use of the rotary control. After selection of the magnified section using zoom, it is re-displayed at the full workpage size. Using the pan option, it is possible to magnify a section and look around the original drawing magnifying each part in turn.

Apart from such fancy artwork, it is also possible to do detailed technical drawings. These could be used as working drawings since it is possible to store sections in a library on disk, so minor alterations can be made with little effort. And there's no problem with labels and titles since these, along with numbers, can be stored with the drawing.

The last feature would be even more useful when used with RS232. The problem here is that there appear to be no facilities for connection to other output systems besides the Acorn Sparkjet printer. A plotter or even an Epson would have been nice.

Verdict

Overall, the system is very good but, when all's said and done, out of the range of the average home user and possibly even the average school. Its main market, since it cannot support plotters at the moment, is limited to drawing rather expensive and fancy pictures. Even so, it would be a nice gadget to have.

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GAMES

Games which offer prizes are in vogue at present. This week there is *The Prize*, the prize being 'up to £5000'. If you can survive level four of this space maze game you'll get a special code and, oddly, have to take a photograph of the screen as evidence of making the grade.

Sinclair Research released four new games which, while fairly competent, are also uninspired and nothing to get excited about. *Zipper Flipper* is a pin-ball game. *Bubble Buster* involves shooting bouncing balls, whereupon they split into two and have to be shot twice more to be destroyed, which is not easy since they get smaller each time.

Most political title of the week goes to Phoenix's *Attack on Windscale* (shouldn't that be Sellafield?) in which you, as Captain Phoenix, have to defend the Windscale reactor from attack by our intergalactic

enemies. As with all Phoenix games it's a two-parter. You have to get to the end of level four of the action game to find out the running code for the adventure (what's so special about level four?). In this case, the adventure is also in two parts.

Antics is a follow-up to *The Birds and the Bees*. *Pop Quiz* has 56 questions verified by DJ Stuart Henry and a donation will be made to his Multiple Sclerosis Research Fund for every cassette sold. *Inferno* will be released on June 1 and is a graphic adventure loosely based on Dante's book of the same name.

Buffer Adventure might sound as if you type in all your answers, then leave them to be pulled out of the buffer and acted on, but no. It's a Quill-written program where the characters are the people who work at the Buffer shop, the suppliers of the program. A bit self-indulgent perhaps, but it shows that the Quill is limited only by the imagination of its users.

UTILITIES

The Computer Cookbook for the Spectrum is a two-tape program which allows you to

enter a recipe name and the number of people it is to serve. It will then calculate and list the quantities of the ingredients you'll need. The other tape gives you the opportunity to enter ingredients and then have possible recipes suggested, together with recommended wines.

Ace Trace is a relocatable Dragon machine code utility which includes a monitor, disassembler, line editor and trace facilities for machine code programs.

Sinclair's Which? Tax Calculator is for the tax period 1983-84 and will calculate the tax you should have paid in that year. The questions appear more or less in the order they do on the tax return form to make life a little easier. The manual contains quite a lot of detailed information about each point and how to go about claiming tax back in the event the Inland Revenue has overcharged you. There's nothing about a suitable course of action if you've been undercharged.

Make Music on the Spectrum requires a sound box, such as the Zon, Fuller or Timedata. Alternatively, if you've got an AY-3-8912 sound chip hooked up and know the relevant out commands, you could use that.

Make Music gives you access to five octaves and three voices or channels. The musical information is stored in RAM and can be rewound, fast-forwarded and so on for editing. Once finished, a tune or other set of noises can be saved to tape.

Sci-file is Visions' first venture into the non-games market. It's called a program generator, runs on any Spectrum and at a quick glance looks rather like *The Last One*. This is a CP/M program which allows you to design a database management program, but *Sci-file* doesn't quite go that far. It will, however, allow you to be quite flexible in your design of the format of a database and also includes a useful report formatting program, extensive documentation and a breakdown of the Basic program generated. 16K owners will now be able to experience the delights of databases, even if the package is limited because all data is held in memory.

EDUCATIONAL

Penguin has now released BBC and Electron versions of its Shakespeare study software range; *Macbeth* on the Spectrum was reviewed last issue.

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DRAGON DITTIES

Bored by Dragon's limited sound range? Synther 7 takes you out of the world of beeps and into the world of boings, showing you just what your machine can do. It won't turn you into Vangelis overnight, but the program isn't just a toy to play funny noises you couldn't get without doing a lot of coding.

In use

Once loaded, the program displays a piano keyboard and a series of what appear to be bar graphs. Some of the number keys plus the top row of letters on your Dragon control the synth's black and white notes. Studying the rather detailed manual — which takes some doing especially if you're a novice in the music world — will help you pick up 'what did what', function by function.

The odd variety of instruments on offer include a gamba (supposedly a cello-like sound), a hogfife, a jinni, a krummhorn, and a lute.

The instruments all exist, but most are so ancient that few people will have heard of them.

There are several ways of changing the sound. Attack, sustain and decay (time taken to reach the sound, the length of time playing a sound and the time taken for the sound to die away) offer you a range of notes and sounds. Levels of one or more notes can be preset. Notes can be bent either up or down and twangs can be added to the start or finish of each note. Pressing the space bar as you tinkle the ivories — or in this case the keyboard — will deepen the vibrato.

There is no provision for saving the sounds in code for use in other programs. And although you can record direct from the computer, using a blank cassette, the music has to be played live. You can't type in a series of bars, then leave it to play or repeat itself. The remote lead on your tape player must also be disconnected, so unless you have a separate pause facility, you'll have to work hard to build up any masterpieces.

Verdict

Rather a disappointment for the price. A few pounds less and I would have put up with the things that irritated me.

RATING (5)

Features	■ ■ ■ ■ ■
Documentation	■ ■ ■ ■ ■
Performance	■ ■ ■ ■ ■
Reliability	■ ■ ■ ■ ■
Ease of use	■ ■ ■ ■ ■
Overall value	■ ■ ■ ■ ■

Songs or sound effects, Jim Ballard hears both on the Dragon.



While Dragon's Synther 7 gives you a chance to play music of a sort, Shaper takes you into the more appealing world of sound effects. Detailed documentation is provided in the twin cassette pack — but don't be put off by the length of some of the sections. One cassette contains the program while the other has thoughtfully been provided to store your finished work.

In use

The choices offered on the nine-option menu range from a summary of the instruction book to hearing any or all of the 100 sounds.

If words like attack, decay, chain and expand still mean nothing apart from the obvious to you, don't worry. A help routine can be called up.

By selecting the change option, you can alter any of the sounds already stored in the program. As you turn off and on each function, or change the numeric values stored, you soon begin to understand what each function actually does.

With the sounds safely saved as a cassette file, you can either sit back and entertain and amuse friends with them or, better still, use the sounds created to enhance your own programs.

By selecting T on the menu, you are transferred to a new program. The 30-page manual details where the code is stored in hex. Don't worry if you haven't progressed to machine code yet. You are told how to play and use the sound effects within a Basic program.

Having polished your program with its dazzling sound effects to perfection, another routine will save it to tape twice.

Other routines allow you to create your own copyright notice and change the printed text on screen from the standard black on green to light green on dark green, red on orange and orange on dark red.

Verdict

Even without the extras this useful and well-written program offers, I found it more tempting than Dragon Data's Synther 7. Good value for money, and clear logical instructions. Own this, and you'll seldom bear to have a simple beep in a program again.

PCN

RATING (5)

Features	■ ■ ■ ■ ■
Documentation	■ ■ ■ ■ ■
Performance	■ ■ ■ ■ ■
Reliability	■ ■ ■ ■ ■
Ease of use	■ ■ ■ ■ ■
Overall value	■ ■ ■ ■ ■

Name Shaper System Dragon 32
Publisher Shards Software, 189 Eton Road,
Ilford, Essex IG1 2UQ Format Cassette
Language Machine code and Basic Other
versions none Outlets Retail/Mail order

Name Synther 7 System Dragon 32 Price £10.95
Publisher Dragon Data Ltd, Kenfig Industrial
Estate, Port Talbot Format Cassette Language
Machine code Outlets Retail/Mail order



SAM speaks out

The 64 has never been so eloquent, claims Barbara Conway.

Heh3low riy2ders2, ay3m Bah5bahrah2. Or, to put it another way, hello readers, I'm Barbara. Once you've spent some time with SAM, you get into the habit of expressing yourself first in the language of a kindergarten teacher and second in what the documentation describes as the 'easy-to-learn, very readable International Phonetic Alphabet.'

SAM stands for Software Automatic Mouth and is produced by the American company Don't Ask Software.

The package supplies the wherewithal, not so much for a variety of voices as for intriguing variations on one voice pattern. The Commodore 64 version crossed the Atlantic to emerge in the UK just ahead of Commodore's own hardware add-on, Magic Voice.

SAM could provide formidable competition not least because, unlike the official Commodore program, it is not limited to a set vocabulary of 250 words. SAM claims, in one of its own demonstration speeches, to be the most versatile speech program on the market and while you shouldn't believe everything your computer tells you, it makes a credible case for itself. SAM delivering Hamlet's soliloquy has to be heard to be believed.

In use

The version I was using was on disk (there is a cassette version available) and loads up a special SAM wedge which patches into the normal Basic in the machine. Once loaded you have the choice of two main modes,

either of which can be incorporated into your own programs. The 'reciter' mode allows you to type in normal English text, using the command SAY which SAM translates to speech. Switching to SAM mode leaves the machine expecting phonetic input.

The disk has four demonstrations, of which the speeches, including the Gettysburg Address (well, it is an American package), are the real party pieces. A 'Sayit' demo program illustrates the way SAM speaks in both modes and shows the reciter is adept at recognising potential problems such as the difference between tough and cough. It even made a quite passable stab at antidisestablishmentarianism.

Programming speech via the reciter is straightforward. Just key in an instruction like SAY HELLO and it will. For those who can't be bothered to learn the phonemes, this will provide understandable speech.

'Knobs' is a command which allows for voice characteristics and requires two values, defined as 'throat' and 'mouth'. Each has a range from 0 to 255 and the documentation gives a handy reference guide to six sample voices which can be produced using knobs together with speed settings, effectively ranging from a gabble at 20 to funereal at 225, and a pitch which covers the same range from treble to basso profundo.

There is no mistaking that this is all one voice, and very much the voice of a computer, but the variations are considerable. Among the stereotypes offered in the

36-page handbook are 'little old lady' (a good try, but if I met a little old lady who sounded like that I would make sure she got medical attention) and a rather more convincing 'extra-terrestrial'. The poignant phrase 'I want to phone home' in reciter mode and with speed at 100, pitch at 64 and knobs at 150,200 nearly had me reaching for a Kleenex.

But although you can do a lot with reciter text, which will take strings of up to 255 characters, you have to accept the inbuilt inflection rules. These are adequate (the program recognises most punctuation marks as pauses) but more sophisticated results can be achieved with the SAM phonetic mode which allows the user to inflect the speech.

The handbook gives 54 phonemes, each with an appropriate word beside it to demonstrate the sound. Thus 'UH' is illustrated with 'book' while, rather less easy to remember, 'NX' is as in 'song'. However, since there are relatively few of them, the phonemes can be picked up quite quickly, and there are 14 pages of quick-reference phonetic translations in the book.

Inflections, as in the example at the start of this review, are inserted as required after syllables, with a register of 1 to 8 available. Considerable experimentation is needed before near-conversation can be reached.

Because of the way the program accesses memory, each time speech is used the screen blanks, an obvious drawback if using a voice in a games program. This can be rectified with another SAM command called 'Light', with the result that the screen display will remain but the voice will become noticeably gravely. Likewise, sprites on screen, if not blanked, will lead to deterioration in the voice, but it should remain comprehensible.

When booted into the computer the program takes up 10.75K: the bulk of which is neatly tucked behind Basic. It can be compacted if necessary. Reciter, which takes up 6K, can be placed high in memory, using only 2K of RAM, but the likelihood of a memory clash with other utilities here is high.

Verdict

SAM is definitely not an acceptable substitute for human speech, but then neither is any voice program on a home computer to date. It comes nearer than most in terms of flexibility, it is cheaper than the Commodore cartridge and, if you are not of a musically sensitive disposition, can even be induced to sing for you. Good value, well documented and fun. PCN

RATING (/5)

Features
Documentation
Performance
Reliability
Usability
Overall value



Name SAM Price £41.50 System Commodore 64
Publisher Don't Ask Software Format Disk/
cassette Other versions Atari, Apple Outlets
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SPECTRUM

Fighting Fever

Name Galactic Warriors **System** Any
Spectrum Price £5.95 **Publisher**
Abacus, 716 Langley Rd,
Treborth, Swansea SA5 9EL 0792
799183 **Format** Cassette **Language**
Machine code **Other versions** None
Outlets Mail order/retail.

Some games ideas are obvious . . . once someone else has thought of them. Programmer Michael Lee has combined *Space Invaders* with *Centipede* in a game that's great fun.

Objectives

Motherships move across the top of the screen dropping aliens as they go, and these then proceed to zig-zag in familiar fashion, your job being to see them off before they get you.

In play

You can only move across the base of the screen, and when this is set up there are various rocks scattered about for the aliens to bounce off when they start zig-zagging down. The first mothership appears and a line of aliens is dropped along the top of the screen unless you can shoot the ship first. You get a bonus for that depending on how far across the screen the ship has travelled; that's on top of the bonus of having no more aliens descend from it.

The aliens themselves behave like caterpillar heads. They're not linked, and if you shoot one it immediately turns into a rock which takes two

shots to destroy. The aliens can fire at you, and one annoying aspect is that you cannot destroy their fire with your own—hitting it with your own laser merely halts it temporarily. As the aliens tend to fire rapidly it pays to turn them into rocks as soon as you can.

You have three lives to help you cope with all this. You earn yourself a bonus each time you score 20,000 points, and a small bonus if you destroy a complete attack wave. Your other defence is to erect an Energiser Barrier around yourself, and you need this should an alien make it to ground level and be zipping towards you. Pressing Symbol Shift creates the barrier, which destroys any alien running into it. While it also deflects enemy fire it does the same to your own laser, so remember not to fire when the barrier is around you.

The game is fast-moving, and I couldn't detect much difference between the fastest and slowest speeds, while the sound is as satisfying as you can expect from the Spectrum.

Verdict

While *Galactic Warriors* could soon become repetitive for your average player, it's aimed squarely at those who think repetitive alien-zapping is the only way to live.

Mike Gerrard

RATING (/5)

Lasting appeal

Playability

Use of machine

Overall value



Keep on running

Name Magic Meanies **System** Any
Spectrum Price £5.95 **Publisher**
CDS, 10 Westfield Close, Tickhill,
Doncaster DN11 9LA 0302744120
Format Cassette **Language** Basic
Other versions None **Outlets** Mail
order/retail.

Magic Meanies is one of those games that comes along once in a while and shows that a simple idea, if tackled with flair and a touch of humour, can be a winner.

Objectives

You are the inevitable little man, and when the game begins you're on a screen in which a path has been partly cut out. You can move anywhere, but will automatically create a new path as you go, down which you are pursued by a number of meemies while you try to reach a number of goodies scattered about the screen. Your aim is simply to survive, collect the goodies and progress upwards through ever-harder screens.

In play

A lovely additional touch is the music, which is a jaunty plink-along version of the extract from *Orpheus* in the Underworld better known for accompanying the Can-Can. If this gets too much for you then you can switch it off at the start. The opening menu also gives you the chance to elect for keyboard or Kempston joystick control and to choose from the nine skill levels available. Of these, even the easiest is hard while the hardest is so fast it had me falling about laughing at its manic music and Formula One

meanies.

As protection against these deadly creatures you are equipped with five crystal balls per screen which you can fire at them. The only other way of dealing with the deadlies is to drop something on their heads. In addition to the diamonds you're collecting there are also several bags of gold. If you clear a path underneath these they drop to the bottom of the screen, taking any meemies with them. The pleasure of a squashed meemie is short-lived as another one soon materialises to take its place.

The other use for the bags is to have them fall and block a path. If you're on one side and the meemies are on the other then you can gather up a few diamonds in peace, but the lay-out of the maze has been carefully designed so that this is only easy to do on the left-hand side of the screen, the right-hand side being a loop where you can only escape the meemies by using your two legs and your five balls.

My one complaint is that the man doesn't respond quite perfectly to the joystick, and there's sometimes a delay: you're pushing frantically upwards while he's still beating his head against a brick wall on the right. Other than that the game is excellent.

Verdict

Another winner from CDS, which recently did well with its version of *Pool*.

Mike Gerrard

RATING (/5)

Lasting appeal

Playability

Use of machine

Overall value



COMMODORE 64

Death in the skies

Name Flying Feathers System
Commodore 64 Price £6.99
Publisher Bubble Bus Software, 87
High Street, Tonbridge, Kent TN29
1RX 0732 355962 Format Cassette
Language Machine code Other
versions None Outlet Mail order
retail

You can prove your prowess with the shotgun against some pretty sneaky eagles with a taste for fresh fish, without prosecution from the RSPB.

Objectives

The aim of the game may be simple, but it's a strain on the eyes.

You are the game warden of a fishery and from your vantage point in a boat on the lake you must stop the marauding eagles from stealing the stocks of fish around you.

Naturally, the more eagles you kill, the more you have to defend the fish against them as they attack in greater numbers and with increasing ferocity.

In play

There are eight different skill levels to the game. There is no forced progression from one skill to another — the eagles keep coming till they've stolen the five fish they need to end the game. You simply choose which skill level you want to play before you start.

Joystick control is via port two as usual. If you're using the keyboard it's J for up, L for down, D is right and A is left. I

prefer different keys, but there's no way of reconfiguring this. The space bar fires your shotgun and F7 will turn off the sound if you can't stand it any longer.

In skill levels one to four, using either the keyboard or the joystick, you position the marker so it's either over the eagle you want to shoot or in line with it and fire. For every eagle hit you score 100 points, 200 if it's carrying a fish. Bonus fish are occasionally awarded.

On skill levels five to eight the object is to continue holding the fire button until the shot is over the target and then release it to shoot the eagle down.

All high scores are recorded and the action can be frozen. Highly useful when going for a high score if you are suddenly overtaken by cramp.

Verdict

The colours in the landscape are difficult on the eyes and the birds can often hide out in the tree on the left if you have problems distinguishing black from brown.

Despite a lack of any lasting appeal it's an entertaining little game but I remain unimpressed by the variation in skill levels five to eight. I think the time, effort and memory could have been put to greater use with better variations on the original skill levels.

Keith Mason

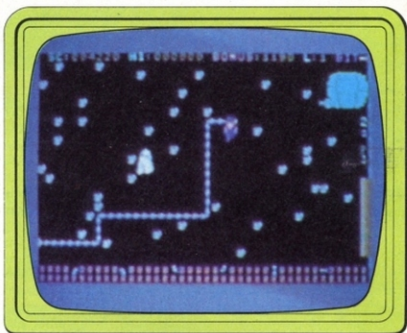
RATING (/5)

Lasting appeal

Playability

Use of machine

Overall value



Round the U-bend

Name Plumb Crazy System
Commodore 64 Price £7.95
Publisher Terminal Software, 28
Church Lane, Prestwick,
Manchester M25 5AJ. 061 797
3635 Format Cassette Language
Machine code Other versions None
Outlet Mail order/retail

George the Plumber may rank among the best drip fixers in the business, but this time he's got a pretty tough job on his hands.

Objectives

The water temperature in the boiler is rising rapidly and liable to blow a stop cock any time. George must plumb a relief pipe from the valve at the bottom left hand corner of the screen to the boiler in the top right corner.

Easy? Not quite. First, you must identify and fetch all the right bits of piping to weave your way around all the boulders littering your path.

Then there's the ghost of George's former employer who harbours him a grudge and is out to get him a bad name by stopping him from completing the relief pipe in time.

In play

Control of George's speedy little feet is via the keyboard or joystick. If you use the keyboard, pieces of pipe are picked up and laid in place by positioning George over the piece of pipe and pressing the space bar. The fire button replaces the space bar when using a joystick.

All the pieces of piping — vertical and horizontal straights as well as all the bendy-bits —

are laid out in order at the bottom of the screen. An indicator at the top of the screen tells you which George is carrying.

Should George get carried away and lay too much piping the F1 function key gives him a spanner to undo what he's done and F3 makes him put a spanner down again.

All the while, the pressure gauge at the right of the screen is rising and the bonus decreasing. There's even a warning tone to let you know when it's going to blow.

At each of the 99 levels of increasing difficulty, George is given a stick of dynamite to blow up those awkwardly placed boulders.

George has three lives per game and is given a bonus life for every 40,000 points which are scored at the rate of ten per boulder plus the bonus which depends on the speed of the relief pipe completion.

Verdict

Initially, this seemed lacklustre. But it's not. George has the kind of appeal that grows on you.

The first few levels are fairly easy to cope with but they soon get harder and as the boulders are randomly placed no two games are the same. It's also a game of instant strategy; there's not much time to choose which way to build the pipeline. And once George starts there's no going back.

Keith Mason

RATING (/5)

Lasting appeal

Playability

Use of machine

Overall value



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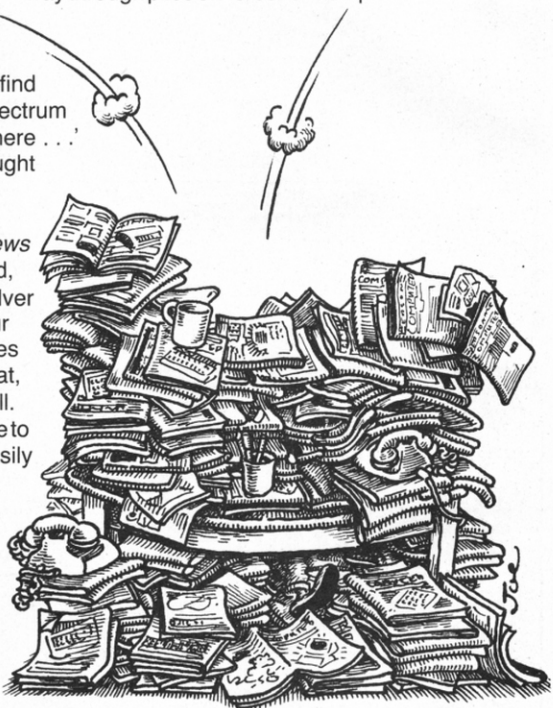
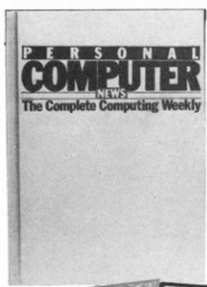
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ASSEMBLER/DISASSEMBLER

Program notes (continued)

		address) is pressed.	2145-2190	Poke in the operand.
		Check for END.	3000-3080	Work out branches for relative addressing mode.
		Check for edit (EDT).		
		Get the addressing mode.	3050-3065	Compute two's complement for backward branches.
1004	Turn the keyboard on.			
1020-1040	Get three letters.			
1045	Check if space bar (mistake) is pressed.	2020-2050	4000	Disassembler starts here.
1046	Check if cursor down (increase address) is pressed.	2070-2090	4010	Get the starting address (B).
1047	Check if cursor up (increase address) is pressed.	2140	4011	Clear the screen and disable the keyboard for speed.
		Read code (H).		
		Poke the instruction into memory.		
670 PRINT "	'6'....ABSOLUTE, X	[----	1100 IF A\$="1" THEN D=1; B\$="--"	
,X]"			1110 IF A\$="2" THEN D=2; B\$="--"	
680 PRINT "	'7'....ABSOLUTE, Y	[----	1120 IF A\$="3" THEN D=3; B\$="--, X"	
,Y]"			1130 IF A\$="4" THEN D=4; B\$="--, Y"	
690 PRINT "	'8'.... (ABSOLUTE, X) [(---		1140 IF A\$="5" THEN D=5; B\$="--"	
-,X)"]			1150 IF A\$="6" THEN D=6; B\$="----, X"	
700 PRINT "	'9'.... (ABSOLUTE), Y [(---		1160 IF A\$="7" THEN D=7; B\$="----, Y"	
-,Y)"]			1170 IF A\$="8" THEN D=8; B\$=" (----, X) "	
710 PRINT "	'0'.... (ABSOLUTE) [(---		1180 IF A\$="9" THEN D=9; B\$=" (----, Y) "	
-,)"]			1190 IF A\$="0" THEN D=10; B\$=" (----) "	
720 PRINT "	'-'.... ACCUMULATOR [A]"		1200 IF A\$="-" THEN D=11; B\$="A"	
730 PRINT "	'='.... IMPLIED [J]"		1210 IF A\$="=" THEN D=12; B\$="="	
740 PRINT "	'\'.... RELATIVE [----		1220 IF A\$="\\" THEN D=13; B\$="----"	
J			1225 IF A\$="" THEN C\$="" : POP : PRINT : GOTO 20	
750 PRINT "PRESS ANY KEY TO CONTINUE"			1230 PRINT B\$;	
760 GET D\$: CLS			1240 IF D=11 OR D=12 THEN RETURN	
770 PRINT : PRINT "ALL ADDRESSES AND OPERAN			1250 IF D=1 THEN D=2 : POKE 617, 10+E	
D\$ MUST BE IN HEXADECIMAL"			1260 IF D=2 AND D=4 THEN D=2 : POKE 617, 9+E	
780 PRINT : PRINT "If you wish you may EDIT			1270 IF D=5 AND D=7 THEN D=4 : POKE 617, 9+E	
the listing."			1280 IF D=8 AND D=10 THEN D=4 : POKE 617, 10+E	
790 PRINT "To do this type in 'EDT' inste			1285 IF D=13 THEN D=4 : POKE 617, 9+E	
ad of a"			1290 FOR N=1 TO D	
800 PRINT "machine code mnemonic. To end			1300 K\$=KEY\$	
the"			1310 IF K\$="" THEN 1300	
810 PRINT "listing type in 'END' similari			1315 IF K\$="" THEN C\$="" : V\$="" : N=0 : POP : PRI	
ly.": PRINT			NT : GOTO 20	
820 PRINT "If you make a mistake simply p			1320 PRINT K\$;	
ress"			1330 V\$=V\$+K\$	
830 PRINT "SPACE BAR'. To decrement or in			1340 NEXT	
crement"			1345 PRINT	
840 PRINT "the address press 'CURSOR UP'			1350 RETURN	
or"			2000 REMASSEMBLE INSTRUCTION	
850 PRINT "CURSOR DOWN' respectively.			2005 CALL E6CA	
PRESS ANY KEY TO			2010 RESTORE	
BEGIN"			2020 REPEAT	
860 GET D\$			2030 READ D\$	
870 RETURN			2035 IF D\$="" THEN D\$="" : POP : PRINT : C\$="" :	
1000 REM GET INSTRUCTION			GOTO 20	
1004 CALL E6B04			2040 UNTIL D\$=""	
1005 E=LEN(HEX\$(A))			2050 IF D\$="" THEN D\$="" : GOTO 20	
1007 D\$=""			2060 IF D=12 OR D=13 THEN READ H : GOTO 2140	
1010 PRINT HEX\$(A); " >";			2070 FOR CODE=1 TO D	
1020 FOR N=1 TO 3			2080 READ H	
1030 K\$=KEY\$			2090 NEXT	
1040 IF K\$="" THEN 1030			2130 IF H=EFF THEN POP : GOTO 20	
1045 IF K\$="" THEN C\$="" : N=3 : PRINT : POP : GOTO			2140 POKE A, H	
20			2144 D\$=D\$+V\$	
1046 IF K\$=CHR\$(10) THEN A=A+1 : N=3 : POP : PRIN			2145 OP=VAL(D\$)	
T : C\$="" : GOTO 20			2150 IF D=13 THEN GOSUB 3000	
1047 IF K\$=CHR\$(11) THEN A=A-1 : N=3 : POP : PRIN			2160 IF D=12 OR D=11 THEN A=A+1 : PRINT : RETURN	
T : C\$="" : GOTO 20			2170 IF C=4 THEN POKE A+1, OP : A=A+2 : RETURN	
1050 PRINT K\$;			2180 IF D=5 AND D=9 THEN DOKE A+1, OP : A=A+3 : R	
1060 C\$=C\$+K\$			ETURN	
1070 NEXT			2190 POKE A+1, OP : A=A+2	
1075 IF C\$="" THEN PRINT : CLS : CLEAR : GOTO 5			2200 RETURN	
1077 IF C\$="" THEN PRINT : INPUT "NEW ADDRE			3000 REM TWO'S COMPLEMENT	
SS"; A : C\$="" : POP : GOTO 20			3010 OP=OP-(A+2)	
1080 PRINT " ;			3020 IF D>0 THEN RETURN	
1090 GET A\$			3050 IF ABS(OP)>127 THEN POP : POP : GOTO 20	
			3055 OP=ABS(OP)	

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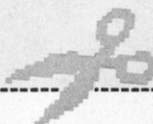
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ASSEMBLER/DISASSEMBLER

Program notes (continued)

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4035-4050 Read instruction.
4060-4075 Read the op-code.
4081 Compute forward branches.
4082 Compute backward branches.
4083 Single byte operands (NS).
4084 Double byte operands (NS).
4100-4300 Print addressing mode (S).
4310-4330 Hex dump.
4375 Re-enable the keyboard.

3060 OP=255-OP
3065 OP=OP+1
3080 RETURN
4000 REMDISASSEMBLER
4010 INPUT "STARTING ADDRESS";B
4011 CLS:CALL EE6CA
4012 FORN=1TO25
4020 PRINT HEX$(B); " >";
4025 RESTORE:N$="":R=-1:S=0
4035 REPEAT
4040 READ I$
4050 UNTIL I$>="A"
4055 R=R+1:S=0
4056 IF J$="END" THEN I$="???":S=12:J$="":GOTO 4080
4058 IF PEEK(B)=EFF THEN I$="???":S=12:J$="":GOTO 4080
4060 REPEAT
4065 READ J$
4070 S=S+1
4072 IF J$>="A" THEN FULL: I$=J$:GOTO 4055
4075 UNTIL VAL(J$)=PEEK(B)
4076 IFR>22ANDR<48 THEN S=12
4077 IFR>47 THEN S=13
4080 PRINT I$ " ";
4081 IFS=13ANDPEEK(B+1)>128 THEN N$=HEX$(B+(B+2)-(255-(PEEK(B+1)-1)))
4082 IF S=13 AND PEEK(B+1)<128 THEN N$=HEX$(B+(B+2)+PEEK(B+1))
4083 IFS<5 THEN N$=HEX$(PEEK(B+1))
4084 IFS=4ANDS<11 THEN N$=HEX$(DEEK(B+1))
4087 IFLEN(N$)=4 THEN N$=RIGHT$(N$,3):N$="0"+N$
4090 IFLEN(N$)=3 THEN N$=RIGHT$(N$,2)
4095 IFLEN(N$)=5 THEN N$=RIGHT$(N$,4)
4096 IFS=4ANDS<11 AND LEN(N$)=2 THEN N$="00"+N$
4100 IF S=1 THEN B$="%" +N$
4110 IF S=2 THEN B$=N$
4120 IF S=3 THEN B$=N$+" ,X"
4130 IF S=4 THEN B$=N$+" ,Y"
4140 IF S=5 THEN B$=N$
4150 IF S=6 THEN B$=N$+" ,X"
4160 IF S=7 THEN B$=N$+" ,Y"
4170 IF S=8 THEN B$="(" +N$+" ,X)"
4180 IF S=9 THEN B$="(" +N$+" ,Y)"
4190 IF S=10 THEN B$="(" +N$+" )"
4200 IF S=11 THEN B$="A"
4210 IF S=12 THEN B$=" "
4220 IF S=13 THEN B$=N$
4300 PRINT B$ " ";
4310 G$=HEX$(PEEK(B))
4315 IFS<11ANDS<12 THEN G$=G$+" "+HEX$(PEEK(B+1))
4320 IFS=4ANDS<11 THEN G$=G$+" "+HEX$(PEEK(B+2))
4330 PRINT G$
4340 PRINT;
4350 IFS=5ORS=13 THEN B=B+2
4360 IFS>4ANDS<11 THEN B=B+3
4365 IFS=11ORS=12 THEN B=B+1
4370 S=0:NEXTN
4375 CALL EE604
4380 INPUT "END DISASSEMBLY";A$
4390 IF LEFT$(A$,1)="" THEN RETURN
4400 GOTO 4012
5000 DATA ADC,E69,E65,E75,EFF,E6D,E70,E79,E61,E71
5010 DATA AND,E29,E25,E35,EFF,E2D,E3D,E39,E21,E31
5020 DATA ASL,EFF,E06,E16,EFF,E0E,E1E,EFF,EFF,EFF,E0A
5030 DATABIT,EFF,E24,EFF,EFF,E2C
5040 DATACHP,EC9,EC5,ED5,EFF,ECD,EDD,ED9,E61,ED1
5050 DATACPX,EE0,EE4,EFF,EFF,E6C
5060 DATACPY,EC0,EC4,EFF,EFF,E6C
5070 DATA DEC,EFF,EC6,ED6,EFF,ECE,EDE
5080 DATA EOR,E49,E45,E55,EFF,E4D,E5D,E59,E41,E51
5090 DATA INC,EFF,E66,E66,EFF,E6E,E6E
5100 DATA JMP,EFF,EFF,EFF,EFF,E4C,EFF,EFF,EFF,EFF,E6C
5110 DATA JSR,EFF,EFF,EFF,EFF,E20
5120 DATA LDA,E49,E45,E55,EFF,EAD,EBD,EB9,E41,EB1
5130 DATA LDX,E42,E46,EFF,E66,EAE,EFF,EBE
5140 DATA LDY,E40,E44,E44,EFF,EAC,EBE
5150 DATA LSR,EFF,E46,E36,EFF,E4E,E5E,EFF,EFF,EFF,E4A
5160 DATA LDR,E09,E05,E15,EFF,E0D,E1D,E19,E01,E11
5170 DATA LRL,EFF,E26,E36,EFF,E2E,E3E,EFF,EFF,EFF,EFF,E2A
5180 DATA ROR,EFF,E66,E76,EFF,E6E,E7E,EFF,EFF,EFF,EFF,E2A
5190 DATA ASB,E09,E05,E05,EFF,EED,efd,EF9,E11,E21
5200 DATA STA,EFF,E85,E95,EFF,E8D,E9D,E99,E81,E91
5210 DATA STX,EFF,E86,EFF,E96,E8E
5220 DATA STY,EFF,E84,E94,EFF,E8C
5230 DATABRK,E00
5240 DATARTS,E40
5250 DATARTI,E40
5260 DATA CLI,E18
5270 DATABASE,E38
5280 DATA CLD,E08
5290 DATABASE,E08
5300 DATA CLV,E08
5310 DATA CLI,E58
5320 DATASE1,E78
5330 DATATAX,EAA
5340 DATATXA,E8A
5350 DATATXS,E9A
5360 DATATSX,E8A
5370 DATATAY,EAB
5380 DATATYA,E9B
5390 DATAINX,E08
5400 DATADEX,ECA
5410 DATAINY,E08
5420 DATADEY,E8B
5430 DATAPHA,E48
5440 DATAPLA,E68
5450 DATAPHP,E08
5460 DATAPLP,E28
5470 DATANOP,E0A
5480 DATABNE,E00
5490 DATABEQ,E00
5500 DATABPL,E10
5510 DATABCC,E90
5520 BATABMI,E30
5530 DATABVC,E50
5540 DATABVS,E70
5550 DATABCS,E00
5560 DATAEND

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Issue 8, April 28-May 6.
Programs: Atari Home Files Manager, Kobra's VIC Star for the Vic 20, Hestacrest's Accounts for the Spectrum, Epson RX200 printer, Atari's Decision Mate V, Future Computer's FX20 (Spectrum), Spectrum Microcompact programming on the TT994A.
Gameplay: Harvester (Vic 20), Strategic Command (Dragon 32), A first book of Micro Rhymes (BBC), Telling the Time/Money (Spectrum).
Databases: Software.

Issue 9, May 6-13.
Programs: Structured Basic on the Apple, Pixel Power on the Vic 20; DPF10 printer, Dama and Interop interfaces for Commodore 64, Micro-Professor.
Features: BBC function keys, Atari word-processing part 1.
Gameplay: Dragons of Infrigue (Oric), The Castle (Oric), Starship Command (BBC B), Dragon Trek, Nowotnik Wizard (Spectrum).
ProgramCards: Lana and Joywick Controller (Dragon 32), CBM database cards 5-6, Monster (Spectrum), Wildcard Search (Mbase).
Databases: Hardware.
Microcasseta: Software, part 4.

Issue 10, May 13-20.
Programs: Infomast on Commodore 64, Dragon Maze, MC22 and CMU800 music synthesizers (Apple), Prism directly coupled modems, Epson ZX10.
Features: ZX81 graphics part 1; Atari word-processing part 2; Gameplay: Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choplifter (Vic 20), Skyhawk (Vic 20).
ProgramCards: Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (Mbase), Formula (BBC B).
Databases: peripherals.
Microcasseta: Graphics, part 5.

Issue 11, May 20-26.
Programs: BBC Vulfie, PFS-File for IBM, Apple Pascal, printer comparison, Fickard and Joywick Controller for ZX81 and Spectrum; C/E Computer Board.
Features: ZX81 graphics part 2, Basic on the Sharp MZ80K.
Gameplay: Motor Mania (Commodore 64), Oric Flight, BBC Music Synthesiser, Music Maker (Spectrum), Embassy Assault (Spectrum), Tobor (Spectrum).
ProgramCards: Homework Board (ZX81), Connect Four (Dragon 32), CBM Database, cards 10-11 etc.
Microcasseta: Keyboards.

Issue 12, May 27-June 2.
Programs: Spectrum word processor, PFS-Report on IBM, Fickard Handling for Colour Game; C/TI C/P50 type 1 printer, TG Trackball; Sorf ME.
Features: Epson Basic, Oric sound part 1, Tandy Colour graphics, Gameplay: Mad Martha (Spectrum), Frenzy (Spectrum), Headbanger (Spectrum), Oric Election Barchart (Commodore 64), Memory Utility (BBC B), Munch (Spectrum).
Databases: Hardware.
Chubnet: disks (Cambridge Micro-computer Club special), Atari word-processing: D8s Drives, part 1.

Issue 13, June 3-9.
Programs: Teletviter for Dragon 32, Abernethy Fort for Spectrum, GPS graphics processing system for Apple II+, joystick, rulers, Ajlie.
Features: Dragon meets Tandy, the music part 2, transferring Basic for Colour Game and Genie I.
Gameplay: Everest Ascent (Spectrum), Colour Genie round-up, Micro Maze (Jupiter Ace), Oix (Atari).
ProgramCards: Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).
Databases: peripherals.

Issue 14, June 10-June 15.
Programs: Apple Accelerator II board, Petrol (Atari), Oric-Basic, Joystick Control Unit 16, Kempston Centronics Interface, BBC Speech Synthesiser.
Features: Newbrain Basic part 1, Sirius designing.
Gameplay: Ali-Biddans (Spectrum), Monopole (Commodore 64), Automopole (Spectrum), Dragon dynamics.
ProgramCards: Time Bomb (Atari, cont), Sheep Drive (BBC B).
Databases: Software.
Microcasseta: Spectrum, Part 1

Issue 15, June 16-June 22.
Programs: Com 35, Address Manager (Spectrum), Sysyx (Commodore 64), MST Database (Epson HX 20), Voice Input Module (Apple II).
Features: Newbrain Basic part 2, Genie scene.
Gameplay: Cleared for Landing, Playing the Ace (Apple II), Vultures, Star Jammer (Dragon 32).
ProgramCards: Mover (BBC B), Sprite Clock (Commodore 64), Pirate Island (Atari), 3 of 9, Micro-mind (Colour Game), Brickbat (Dragon 32).
Databases: Hardware.
Microcasseta: Spectrum, part 2.

Issue 16, June 23-June 29.
Programs: Atari's Acorn, word processing for the Commodore 64, Sunplife (CP/M), MPF-II printer, Z80 Pack for BBC.
Features: ZX81 Maths, Ual mail order, Atari graphics.
Gameplay: Computer Scramble (Spectrum), Education (BBC), Computer Spiders (Spectrum), Catcha Snatcha (Vic 20).
ProgramCards: Video Tiler (TT994A), Spiders (Spectrum), Pirate Island (Atari, cont).
Microcasseta: Spectrum, part 3.

Issue 17, June 30-July 6.
Programs: Trac and ZX Text Organizer (CP/M), Jaxi-6100 Laserweave, Ultra Term (Apple II).
Features: Leasing part 1, Atari screen action.
Gameplay: Oric chess, Grand Master (Commodore 64), Escape from Oric (BBC), Jet Pac (Spectrum), The Ring of Darkness (Dragon 32), Spectrum spactacle.
ProgramCards: Video Tiler (TT994A cont), Pirate Island (Atari cont) word processor (BBC).
Microcasseta: Sound, part 1.

Issue 18, July 7-July 13.
Programs: Tandy 100, RS232 interface (ZX81), ROM pack (Commodore), Interface printer buffer, IBM Personal Basic, Spectrum assembler, Newbrain W/P.
Features: Leasing part 2, Lynx music.
Gameplay: Spectrum Backgammon, BBC Snooker, Commodore 64 round-up, Serpentine (Vic 20), Pat's (Spectrum), Spectrum Safari.
ProgramCards: Word Processor (BBC), Fruit Machine (Spectrum).
Microcasseta: Sound Part 2.

Issue 19, July 14-July 20.
Programs: Jobbit chips, Stock control (Epson HX20), Mailplus (Torch), Smith-Corona day-viewer, ZX81 word processing.
Features: Insurance, buying second-hand.

Gameplay: Escape MCP (C64), board, Petrol (Atari), Apple round-up, Temple of Apathi (C64), Airline (Spectrum), Heathrow (Spectrum).
ProgramCards: Colour Code (Atari), Wreck (Dragon).
Microcasseta: Sound, part 3.

Issue 20, July 21-27 July 27.
Programs: Kade bareboard, Vic digital tape drive, Seikohsa colour printer, Toolkit (Spectrum), Bonus (Pet patrol), Newbrain monitor.
Features: Computer art, Dragon scrolling.
Gameplay: Rabbit Trail (TT994A), Artec Challenge (Atari, Vic 20, TT994A), BBC round-up, Joist (Spectrum), Melar Mail (Spectrum), Print Shop (Spectrum), Time-Lords (BBC).
ProgramCards: Tumbler (Oric), Wreck (Dragon), Atari Errors, Speed Race (Vic 20).
Microcasseta: Spectrum, part 4.

Issue 21, July 28-August 3.
Programs: Rabbit Trail (TT994A), Newbrain assembler, BBC turtle, Oric printer, Triumph printer.
Gameplay: Franklin's Tomb (Dragon), Hammer House of Horror (Spectrum), Jumpman (64), Jumping Jack (Spectrum), Fourth Encounter (Vic), Cyclons (64).
ProgramCards: Collection (Vic), Bomber (64), Defender (BBC).
Microcasseta: Sound, part 5.

Issue 22, August 4-August 10.
Programs: Spectrum FORTH, BBC graphics, music synthesizers, IBM printer, Brother daisywheel, Maltron keyboard, Mupid.
Features: Genie assembler, Dragon machine code.
Gameplay: River Rescue, Orc Attack (Atari), Zork (64), Knot in 3D, 3D Combat Zone (Spectrum), Moria (Oric), Velnor's Lair (Spectrum).
Microcasseta: CP/M part 1.

Issue 23, August 11-August 17.
Programs: Sord Basic-G, Tasword, BBC microcassettes, Microdrive, Tandy Model 2.
Features: Dragon machine code, Atari controllers.
Gameplay: Bridge Master, Sysx, Maxis Miner (Spectrum), Atari round-up, Candy Flow/Hangman (Oric), Everest (Dragon).
Microcasseta: CP/M, part 2.

Gameplay: Oric round-up, Cookie, Egg Farm, Xadom (Spectrum), Seal Lord (BBC), Lusitania (Dragon), The Island (64).
Microcasseta: Commodore 64, part 1.

Issue 25, August 25-August 31.
Programs: BBC Electra, Simons Basic, Oric monitors, Microdrive.
Features: Newbrain map, Acorn Atom, Dragon machine code.
Gameplay: Suspended (64), Terror Daktils, Tranz AM (Spectrum), Dragon round-up, Jagger (Oric), Frogger (IBM).
Microcasseta: Commodore 64.

Issue 26, September 1-September 7.
Programs: Microtan 65, BCPL, BBC tracer, 80 column Pci, Oric interfaces.
Gameplay: Magic Mountain, Seungleons Cove (Spectrum), Spectrum round-up, Matrix (64), Ninja Warrior (Dragon), Dallas, Oric, Call to Arms (IBM).
Microcasseta: Commodore 64.

Issue 27, September 8-September 14.
Programs: Sharp MZ700, BBC LSI, Apple editor, IBM mic, ZX81 surgery.
Gameplay: Zip-Zap, Zzoom, Spectrum round-up, Hover Beaver, Beni-Space Rescue (64), Microcasseta: Dragon, part 1.

Issue 28, September 15-September 21.
Programs: Zenith Z100, Snail Logo, Atari Supergraphics, Newbrain CP/M, IBM's daisywheel, Maltron keyboard, Mupid.
Features: Genie assembler, Dragon machine code.
Gameplay: River Rescue, Orc Attack (Atari), Zork (64), Knot in 3D, 3D Combat Zone (Spectrum), Moria (Oric), Velnor's Lair (Spectrum).
Microcasseta: CP/M part 1.

Issue 29, September 22-September 28.
Programs: Portico Miracle, Dragon editor, BBC toolkit, Dragon drives, Apple light pen.
Features: HX20 disassembles, TI transformations.
Gameplay: Griddler, Gloopset, California Gold Rush (64), Oric round-up, Bomb Alley (BBC), S/P, General Election (Spectrum).
Microcasseta: Dragon, part 3.

Issue 30, September 29-October 5.
Programs: NEC's Advanced Personal Computer, Financial Planner (IBM), Kongman's a/b's, Countabot Hot Dog Spotter (Spectrum), Prism VT-X500, Extended Basic (Dragon).
Features: Spectrum machine code, Oric's Balls of Death/No-Death (Fargol), 747 Flight Simulator (BBC), Dragonfly (Dragon 32), Forensic/Note Invaders (BBC).
Programs: Search (ZX81), Compuser (Oric).
Databases: Hardware.
Chubnet: Everything you wanted to know about programming, part 1.

Issue 31, October 6-October 12.
Programs: Atari 600XL, Condor Series 20 (IBM), Accasia Non-Dairy Filing system (BBC), ROM extension board (BBC).
Features: Oric sound routines.
Gameplay: Greedy Guld (Spec-

Programs: Kated computer Adaptor (Intellivision), Sprite-Gen (BBC), Typing Strategy (Apple), Muzer 2 (Spectrum), Critch Epron Program (Apple).
Features: Teletext option, Inside the scene.
Gameplay: Space Shuttle Frogger (Dragon 32), Atari round-up, Spectator 2/Football Pools Program (Spectrum).
Databases: Software.
Chubnet: Clubs.
Programs: Bees Away (BBC), Compuser (Oric).
Microcasseta: Everything you wanted to know about programming, part 3.

Issue 33, October 20-October 26.
Programs: Z/W/P, Cover, Sinclair ZX Interface 2, Wat.

Programs: Amcom DFS (BBC), Sinclair ZX Interface 2, Wat.

Programs: Amcom DFS (BBC), Wordsworth (BBC), Atariwriter.
Features: Oric Operating System.
Gameplay: Dragon round-up, Haster (64), Cricket/Luna Crab (Spectrum), 3 Deep/Space (Utility), Bees Away (BBC), French Darts (Apple).
Microcasseta: Everything you wanted to know about programming, part 4.

Issue 34, October 27-November 2.
Programs: NEC's PC-8201A, Simply File (64), The Forest (Spectrum), Amcom DFS (BBC), Currah Microspeech (Spectrum).
Features: Oric Machine Code.
Gameplay: Fort, Apocalypse/Pooyan (Atari), Death Cruise/1 Ching (Dragon), Trench Canyon (Spectrum), Football Manager/Pool (Spectrum).
Features: French Text (Apple), Baseball (ZX81), Count (Vic 20), Men/Arth (Vic 20), Road Hog (BBC).
Databases: Hardware.
Microcasseta: Everything you wanted to know about programming, part 5.

Issue 35, November 3-November 9.
Programs: Kaypro 10, Stock Control (Spectrum), Educational games (BBC), Brother EP22 electronic typewriter, US Centronics Interface (Spectrum), Jupiter Ace.
Features: Tandy Graphics, BBC operating System, US Centronics.
Gameplay: Vahalla (Spectrum), 64 round-up, Slinky (Atari), Hesperus (Spectrum).
Programs: Mini Math (Spectrum),

Multi-Square (Oric).
Databases: Peripherals.
Micropedia: Everything you wanted to know about programming, part 6.

Issue 36, November 10-November 16.
Pro-Tests: Tiger from H.H. ZX81-Forth, Exom (Oric), Cycle Planner, Growth Tracker/Diet Master (Spectrum), U-Com 2 (Apple).
Features: Newbrain sound, BBC FX commands.
Gameplay: Creepers (Vic 20), Extremator (64), Spectrum round-up, Death Miles of Sinus (Dragon 32).
Programs: Fatlands Raid (BBC), Mini Math (Spectrum), Pyramid (Spectrum).

Databases: Software.
Micropedia: Everything you wanted to know about programming, part 7.

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Issue 37, November 17-November 23.
Pro-Tests: Apricot, Paint (Atari), BBC Micro Toolbox, Spectravideo Compunote (Atari VCS 2600), Big Ears.
Features: Flight simulators, Spectrum screening.
Gameplay: Empire/Treasure Tomb, Crystal Chalice, Temple of Zoren (Dragon 32), Cobas Maze/Bewitched (Vic 20), Cosmic Convo/Fiasco (64), Bagaboo/Goon (Spectrum).
Programs: City Defense (Oric), Fatlands Raid (BBC), Pyramid (Spectrum), Monitor (64).
Databases: Cluhnet.
Micropedia: Everything you wanted to know about programming, part 8.

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Issue 38, November 24-November 30.
Pro-Tests: Coleco's Adam, Small Business Accounts (Spectrum), Masterfile (BBC), Monitor round-up.
Features: Apple programming, NewBrain editor part 1, Dragon action part 1.
Gameplay: Dragon round-up, Zepherus/Mar (Atari), Skramble/Falcon Patrol (64), 737 Flight simulator (BBC).
Programs: Shipment (Spectrum), Monitor (64).
Databases: Hardware.
Micropedia: Guide to Monitors.

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Issue 39, December 1-December 7.
Pro-Tests: Dragon 64, Tandy CDP-220, White Knight II (BBC), Cross Reference Utility (IBM).
Features: NewBrain editor part 2, Dragon Action part 2.
Gameplay: Oric round-up, Haunted Hedges/Corridors of Genos (Spectrum), Microbe/One Hundred & Eighty (BBC), Atari round-up.
Programs: Lower CL 5 (Spectrum), Shipment (Spectrum), Monitor (64), Beta Search (BBC).
Micropedia: Buyer's Guide to Micros.

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Issue 40, December 8-December 14.
Pro-Tests: Timex 2058, Thermal Printer TP-10, Cambridge Computing system (Spectrum), Beeb-synth/The Synth-Music Processor (BBC), Vizavize/Vizapell (64), Education games (Spectrum).
Features: NewBrain editor part 3, Dragon Action part 3.
Gameplay: Fantasy Wizard (Vic 20), The Quest of Merrivaid (64), Wavy Nany/Savage Pond (Atari).
Programs: Link Four (Spectrum), Tilt (Dragon 32).
Micropedia: Buyer's Guide to Peripherals.

Issue 41, December 15-December 21.
Pro-Tests: Apple II, Byte Drive 500, IBM AT, Power Cleaner, Commodore 1701, Color Monitor, BC Basic (64), Database/MST-Calc (Dragon).
Features: Computerised Psychotherapy (BBC), Spectrum Display.
Gameplay: Micropoly/Pettigrew's Diary (Dragon), 64 round-up, Dimensions of Destructors/Sheer Panic (Spectrum).
Programs: Colony Invader (Spectrum), Grid (Vic 20).
Micropedia: Buyer's Guide to Software.

Issue 42, December 22-January 4.
Pro-Tests: Spectrum add-ons (U/Microcenter/Atari), Oric-1 Filestar, Games Designer (Spectrum).
Features: Micros of 1983, Computer Security, BBC word processing, Dragon Action part 4.
Gameplay: International Football (64), Grouch/Queeked Flag (Spectrum), Way Out/Jet Boot Jack Superlanders/Outback (Vic 20), Danger Rangers/Up PeriScope (Dragon 32).
Databases: Cluhnet.
Micropedia: Games Special.

Issue 43, January 7.
Pro-Tests: IBM Junior, Grafpad (BBC), Walters WM80 Printer Display (Spectrum).
Features: Computerscape, Spectrum Display, Tabs on Oric.
Gameplay: Trace Race/Pinball (Dragon 32), Colossus Genie round-up, 1001 Hunt, Killer/M. Wimpy (Spectrum), Crazy Caverns/Goodness Gracious (64).
Programs: Jungle Chase (Oric), Screen Dump (BBC).
Databases: Hardware.
Micropedia: Election part 1.

Issue 44, January 14.
Pro-Tests: Hitachi (MBC), Intex Color Teletext (BBC), Intex Colourjet printer, DTL-Basic (64), Database Microprint 4255/Multifont (Spectrum).
Features: Adventure games, Colourscape: Devil Assault/Wasp & Dragon Racer (Dragon 32), Survival Simulator/Furbo 20 daisy-wheel/Spectrum educational software: BBC graphics extension ROM.
Features: Bargain buys: Making money with your micro and Pub Crawl (Dragon), Trax and Wild West Hero (Spectrum), Atari/Commodore 64 round-up.
Programs: Battletier Fighter (Commodore 64).
Databases: Software.
Micropedia: Election part 3.

Issue 45, January 21.
Pro-Tests: Portables — Commodore SX64, Olivetti M10; Acorn Spectrum printer Furbo 20 daisy-wheel; Spectrum educational software: BBC graphics extension ROM.
Features: Bargain buys: Making money with your micro and Pub Crawl (Dragon), Trax and Wild West Hero (Spectrum), Atari/Commodore 64 round-up.
Programs: Battletier Fighter (Commodore 64).
Databases: Software.
Micropedia: Election part 3.

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Issue 46, January 28.
Pro-Tests: Apple Macintosh: BBC sideways ROM board; IEEE interfaces for Commodore 64; Silver Reed EX44 typewriter/printer; Bridge on Spectrum and Dragon; BBC filing program.
Features: Buying by mail order; programming the Memotech.
Gameplay: Barmy Burgers and Gangers (Spectrum), Birdie Barage and Plankwalk (BBC), Blue Moon and Dancing Feats (Commodore 64).
Programs: Caves of Treasure (ZX81).
Micropedia: Modems and communication.

Issue 47, February 4.
Pro-Tests: Sinclair QL: Atari Touch Tablet; Silver Reed EXP500 daisywheel; IBM COM; BBC Spell Check.
Features: Programming the Memotech part 2; Low cost printers.
Gameplay: Motherhood and Quinzie Warrior (Commodore 64), Two Gun Turtle and Multigames (Oric), Apple adventures, Spectrum round-up.
Programs: Pot Hole (Dragon).
Micropedia: A to Z of Atari part 1.

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Issue 48, February 11.
Pro-Tests: Spectravideo 328; Atari 800XL; Dragon Jin disk drives; low cost monitors; Artex C (Apple); BBC educational software.
Features: Sideways printing on Epson HX20.
Gameplay: Bedlam and Morris Meets the Bikers (Spectrum); Commodore 64 round-up; Zoragon's Kingdom and Flight Zero-One-Five (Vic 20).
Programs: Gridtrap (Lynx).
Databases: Peripherals.
Micropedia: A to Z of Atari part 2.

Issue 49, February 18.
Pro-Tests: Oric; Amos; tracker ball controllers; Spectrum speech synthesizers; Rainbow Writer (Dragon); Colour Genie assembler; Spectrum educational programs.
Features: Computer jargon; 42-column display on Spectrum.
Gameplay: Quadrant and Jupac (Vic 20); Crazy Ballroom and Setouchi (Commodore 64).
Programs: Sprite generator (Commodore 64).
Databases: Software.
Micropedia: A to Z of Atari part 3.

Issue 50, February 25.
Pro-Tests: Sanyo MBC650; Commodore speech synthesizer; BBC real-time code interface; BBC machine code tracer; Atari home utilities code track; Atari home utilities code track.
Features: Expanding your Spectrum; introduction to Lisp.
Gameplay: Urban Upstart and Godzilla and the Martians (Spectrum), Shuttlezap and Hooked (Dragon).
Programs: Minescape (Oric).
Micropedia: Printers part 1.

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Issue 51, March 3.
Pro-Tests: Sharp's PC5000, Graphics Package (Oric), Fancy Font (CP/M, Torch), Superbase Application Database (64), Printer round-up, IEEE 488 Interface (BBC).
Features: Microdrive data files.
Gameplay: Spectrum selection, Robopods (T199/4A), Batty Builder/Brules (Atari).
Programs: Millipede (BBC/Electron).
Databases: Hardware.
Micropedia: Printers, part 2.

Issue 52, March 10.
Pro-Tests: Wren MSX, Multisynth 64, Mr T's Number Games etc (BBC; Spectrum, 64), Hybrid cable (Oric, Amos).
Features: Adventure games.
Gameplay: Dragon round-up, Mirror-Free Fall (BBC), Spectrum round-up.
Programs: UFO (Vic 20), Snake Code (BBC), Gary the Guitarr (64).
Databases: Peripherals.
Micropedia: Printer, part 3.

Issue 53, March 17.
Pro-Tests: Yamaha Y1S03, Tandy TRS 800/Em (RX32), MDI/DS (BBC), Toolkit (BBC), The Quill (Spectrum).
Features: Screen technology, Atari graphics.
Gameplay: Megahaw/Megawar

Issue 54, March 24.
Pro-Tests: IBM's Portable PC, Spectrums keyboards, Beethoven, Games Designer (Vic-20).
Features: Atari graphics, Chip Dancing.
Gameplay: Airstrike 2/Pole Position (Atari), Deathbeats/Fighter Pilot (Spectrum), BBC round-up.
Programs: Orthero (64), Charpatt (CGI, M).
Cluhnet: User groups and clubs.
Micropedia: Atmos, part 2.

Issue 55, March 31.
Pro-Test: HP 150, Light pens (BBC, 64), Micro-Prolog (Spectrum), Electron Graphics System.
Features: Spectrum routines, Cool-smurthers.
Gameplay: Patience/Metagalactic Lamas Battle at the Edge of Time (Vic-20), Loko/Rat Split (Oric), Tennis (Atari).
Programs: Fast Draw (Dragon 32), Flash shooter (Atari).
Databases: Hardware.
Micropedia: Communications, part 1.

Issue 56, April 7.
Pro-Tests: Vorlax Type 'n' Talk, MicroCommand (BBC; Spectrum, 64), Commodore 1001 disk drive, Apple's Macintosh, Animator (Dragon 32), Knoware (IBM).
Features: Spectrum maths, Adventure in history.
Gameplay: Hunchback Planet Challenge (64), Defense Force/Psychic II (Oric), Volcanic Aztec (Spectrum).
Programs: Ape King (Vic-20), Lynx VAL.
Databases: Peripherals.
Micropedia: Communications, part 2.

Issue 57, April 14.
Pro-Tests: Microkey, Morex Disk Drive Interface (Spectrum), Atari 1020 colour printer/plotter, FT Monitor (IBM PC, Sirius).
Features: Assembly course, Portables.
Gameplay: Learning games (Spectrum), Air Traffic Control/Super Spy (Dragon), Neptune's Daughters/China Miner (64).
Programs: Tranium (BBC), Electronic Chess Miner (64).
Micropedia: Communications, part 3.

(64), Castle of Doom/Fishy Business (Dragon 32).
Programs: Battle Stations (Spectrum).
Databases: Software.
Micropedia: Reaching for the Atmos, part 1.

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Issue 58, March 31.
Pro-Tests: IBM's Portable PC, Spectrums keyboards, Beethoven, Games Designer (Vic-20).
Features: Atari graphics, Chip Dancing.
Gameplay: Airstrike 2/Pole Position (Atari), Deathbeats/Fighter Pilot (Spectrum), BBC round-up.
Programs: Orthero (64), Charpatt (CGI, M).
Cluhnet: User groups and clubs.
Micropedia: Atmos, part 2.

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Programs: Fast Draw (Dragon 32), Flash shooter (Atari).
Databases: Hardware.
Micropedia: Communications, part 1.

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Databases: Peripherals.
Micropedia: Communications, part 2.

Issue 61, April 14.
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Gameplay: Learning games (Spectrum), Air Traffic Control/Super Spy (Dragon), Neptune's Daughters/China Miner (64).
Programs: Tranium (BBC), Electronic Chess Miner (64).
Micropedia: Communications, part 3.

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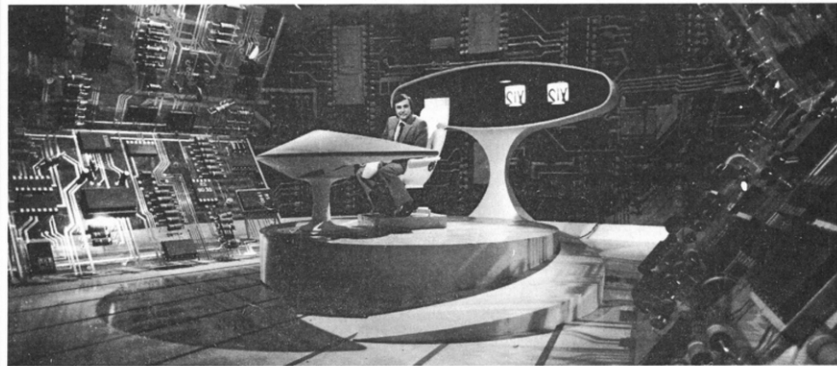
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Atari software: Pole Position, £18.50; Lone Rider, £8.50; Fort Apocalypse, £15; Scram, £8. All cassettes except 48K Position (cartridge). Tel: (0795) 750620 (ask for Rob).

Spectrum software for sale. All originals as new. Flight Simulation, Chess, Transylvanian Tower, Football Manager, Timegate, £3.95 each. Many recent titles. Tel: Wedmore 712564.

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Atari Program Recorder 1010, 45, Pole Position, £16. Suncom and Spectra-video joysticks, £7. Lot £65. Lloyd, 13 Viking House, Denmark Road, London SE5 9EG.

Wanted for IBM 700, Superscript II. Also Superbase and CalResult. Please contact Lionel Tun, Elm Lodge, Cricket Green, Mitcham, Surrey CR4 4LB.

Sharp £280K. Excellent condition, many games, languages include several Basics, Pascal, Fortran, two assemblies, and m/c Toolkit, £300 ono. Tel: (0482-647449).

48K Spectrum Currah micro speech interface 2, Kemston interface, Quickshot joystick, lots of software (Jet Set Willy ZZoon etc), 6 books, £200. Tel: Darford 338886.

Sharp MZ-700 64K, under guarantee, complete with demo tape, built-in cassette, five games, £185. Contact: J. Martin, 11 Rosina Street, Higher Openshaw, Manchester.

IBM 64 software: Hobbit, £8; Soloflight, £9; Startrek, £4; Space Pilot, £4; Haurier Attack, £4; China Miner, £4; Grand Master, £7. All originals. Tel: (0454) 414736.

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Multicart cartridge copier with software and instructions for sale. Works on the Atari 400/800 computers only. Fully boxed, £50. Tel: (0487) 821998 for details.

Gemini Galaxy Z — 64K RAM, 400k disk CPM 2.2, various software, hardware. Cost today £1,466.25. Complete system in as new condition, only £850 ono. Tel: Bath 20150 (eves).

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BBC software Gemini Beepbop (tape), £12.50. Computer Controls Beebacle (ROM), £16.50. Pentlands "Management Accounts for The Small Retailer", £12.50 (tape). Tel: 031-445 2218.

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SH20 machine code monitor cartridge, £18. Almost new. Tel: 0732-883679. J. Shubrook, "Chestnut End", One, Tebbys Way, Lightham, Kent. (Evenings only).

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Vi20 plus 16K, 4 books, 35 tapes, joystick, boxed as new, £150. Tel: 01-644 4275 (4-6pm).

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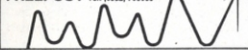
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Keep your paper on a tight leash



It's a battlefield in today's office. As law and order disintegrates, packs of hungry printer paper have been roaming the

corridors of once proud firms, baying in the lift shafts and tearing out the throats of the unwary.

But the forces of light are fighting back. Here we see detective Harriet Callaghan (Owerty Harry) apprehending 45kg of killer fanfold. Once the Woodhouse Institute for the Rehabilitation of Paper has put the box-load through three months of housetraining, it will be ready to take its place as a useful member of society.

If you wish to try taming your own paper, Inmac (Runcorn 67551) will be pleased to sell you its Paper Caddy which after training, doubles as a useful trolley to take the strain out of moving heavy paper, and costs only £29. A small price to pay for streets safe for old ladies to walk without fear...

Any recidivist stocks of sheet-feed should be sent to the Newport Pagnell School of Origami by first class post.

NEXT WEEK

Baby Blue — Will the Peanut stick in IBM's throat? Find out in our Pro-Test of the PC jr.

Tank Battle — Get PCN's listing for the Spectrum in your sights.

MTX Code — Crack assembler on your Memotech.

Dragon at work — We take a look at a business-like word processor for the Dragon.

Games — Issue 64 reviews games for the 64 (Commodore) and a round-up of BBC diversions.

B Movie — We focus on display techniques for the BBC Micro.

I see no chips

In old Taiwan, where according to legend the Apple clones are as numerous as fruit on a tree, disaster looms.

The blossoming electronics industry faces an unseasonal frost in the form of the worldwide chip shortage. An Intel 8088 costs twice as much as the spot market that it does in long-term contracts.

The Taiwanese response is typical of the spirit that has made some of its companies such a thorn in the side of western micro makers. The number of thefts is growing. One victim, Multitech, says it lost \$1 million's worth of integrated circuits in one fell swoop last month. The thieves even stole a pair of company trucks to get away.

Anybody offered an IBM PC-lookalike with a 20-ton Magirus Deutz truck where the processor ought to be should contact the Taiwanese police urgently.

PAL-2000

by Mollusc.



PCN DATES

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

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Protecting Computer Software '84	June 4-5	Park Lane Hotel, London W1	Business Research International 01-637 4383
Office Automation Show	June 5-7	Earls Court, London SW5	Reed Exhibitions 01-643 8040
Offshore Computer Conference and Exhibition	June 5-7	London Barbican	Cahners Exhibitions 01-891 5051
5th International Commodore Show	June 7-9	Skean Dhu Hotel, Aberdeen	Offshore Conferences & Exhibitions 01-734 4343
IBM User Show	June 12-14	Novotel Hotel, London W6	Granard Communications 01-930 6711
Computer Fair	June 14-17	Wembley Complex	Online Conferences 01 868 4466
Educational Computing and Software Fair	June 18-19	Earls Court	Reed Exhibitions 01-643 8040
Compec North	June 19-21	John Taylor Teachers' Centre, Leeds	G. Creighton 0532 782182
National Conference and Exhibition on Computers in Personnel	June 26-28	Belle Vue, Manchester	Reed Exhibitions 01-643 8040
		Royal Lancaster Hotel, London	Peter Mirrington Exhibitions (0277) 232030

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
International Computer Show for Office, Home, Hobby	June 14-17	Cologne, Germany	German Chamber of Industry and Commerce 01-930 7251
National Computer Conference and Exhibition	July 9-12	Las Vegas, USA	American Federation of Information Processing Societies Inc. 0101 703 620 8900

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