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Desktops get friendly

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An exclusive hands-on review of a radical desktop system. GEM, from Digital Research, looks set to usher in a 'new age of user friendliness' and upset the Appletalk. The Graphics Environment Manager gives you the features of Lisa and Mac (icons, pull-down menus...) on the 16-bitters.



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ICL's OPD hits the desks

ICL is launching its One Per Desk (OPD) business micro tomorrow (Thursday, November 15) and if it matches up to the expected specifications could be a real showstopper for people attending COMPEC.

As the name suggests, ICL has designed the micro to be the essential piece of equipment on every office desk. It will handle all your computing/communications tasks in one box.

OPD is the result of a licensing agreement with Sinclair allowing the use of QL technology as the basis of an integrated workstation that combines the facilities of the telephone with those of a computer.

Because of the low cost of the QL board some industry watchers are forecasting that the OPD will cost £1,000 or less.

The OPD will include monitor, detached keyboard, telephone, networking interface and probably a single disk drive in a single package.

Although using QL technology, it will not be using QDOS as its operating system. When

Sinclair started to design the QL, ICL was one of the companies approached to design the operating system.

The QL came out sporting Sinclair's in-house developed O/S, but ICL decided to stick with its own system because of the heavy commitment it had already invested in the software to run under it.

One result of this is that expectations that OPD will come bundled with the Psion packages given away free with the QL are wide of the mark.

ICL has run the OPD project in conditions of great secrecy. One source told PCN that the team working on it were locked away on one of the floors of ICL's research and development building in Bracknell and few other employees of ICL were allowed access.

Despite this, some information has leaked out and it is thought that OPD will come with software that not only provides the usual functions of word processing and spreadsheets but also sophisticated communications functions.



Mac lookalike could prove a real GEM

Two British companies, Acorn and ACT, are to be the first in the world to use Digital Research's dazzling Graphics Environment Manager (GEM).

GEM takes the ground out from underneath Apple's Macintosh and Lisa by offering a wimp (windows/icons/mouse/program) man/machine interface to a wide variety of 16-bit micros (see our world exclusive review, page 38).

Acorn has, in fact, already shown GEM to the public when it pre-announced the ABC range of business micros at the

PCW show (issue 80). It will run on the top end of the range machine, the 300 series, which is based on the 80286 processor from Intel.

ACT's interest in GEM is significant. With its new F1E micro it will be able to offer a Macintosh lookalike for under £1,000.

And with the F1 it has a machine that has twice the memory and twice the storage of the Macintosh, colour as opposed to monochrome graphics, and multi-tasking with Concurrent DOS.

COMPEC kicks off with plenty of goodies

Roll up, roll up for the British computing industry's annual jamboree, COMPEC. It started on Tuesday and continues through until Friday. Admission costs £3.

COMPEC is primarily about business computers so you won't see much from the home computing front. But it is still worth a visit by any serious micro owner — if only to see what the big boys are up to.

One home micro manufacturer which will be there, and certainly is worth a visit, is Acorn. It is using COMPEC as a showcase to launch a bevy of new goodies for the BBC and Electron as well as showing for a second time its impressive range of ABC business machines due for a January launch.

For the Electron, Acorn is launching its Plus Three interface that allows you to add 3.5in microfloppies to your system.

For the Beeb it is launching ISO Pascal, Logo, the 32016 second processor and a hard disk system. Acorn will also be showing an upgraded version of Econet and its new interactive video system.

And talking of the BBC micro, Tandberg will be showing its new TCCR cassette recorder that allows Beeb users to add random access voice to programs. It can also be used as a computer controlled tape drive for other micros equipped with an RS232 interface.

COMPEC is always a good place to go to see what the future has in store which is why it might be worthwhile calling in at the Shugart stand. It will be demonstrating its Optimum optical disk storage system. It allows you to write as well as read from an optical disk with a massive one gigabyte capacity.

Among the new machines to be revealed at the show is the TDI Pinnacle which is claimed

to be the fastest machine around. So fast that the company is offering a jeroboam of champagne to the first person to find a computer at the show that runs faster.

A complete show report will be in next week's issue of PCN.

Microsoft's MS-Net debuts with ACT

Is Microsoft playing fast and loose? Microsoft wrote MSDOS, the IBM PC's operating system, and relations between the two companies are close, but at last week's launch of Microsoft Networks (MS-Net) there wasn't an IBM PC in sight. Worse, the machine MS-Net was running on was the Apricot 32, produced by IBM's European rival ACT.

IBM has already announced that it will be implementing MS-Net on the PC, but the ACT version will be the first to hit the stores. The idea behind MS-Net is that it will allow MSDOS systems to be networked together, and by establishing an industry standard, Microsoft intends to make it possible to use PCs from different manufacturers on the same network, and to allow Xenix multi-user systems to be linked to MSDOS micros.

The flexibility is derived from the fact that MS-Net is software only, and doesn't need specific hardware. Obviously you need the hardware link-up, and setting this up can be tricky, but once it's up and running the system is relatively transparent to the user.

MS-Net won't run under previous versions of MSDOS, as this was designed as a single-user system, but future deliveries of IBM PC's will include MSDOS 3.1, which will support it. Most current software will run under MS-Net, although its full benefits won't be felt until multi-user versions of the packages are produced.

Meanwhile, ACT's Roger

Foster was justifiably pleased about being the first micro manufacturer on the band wagon, and his company proved it by producing a 14-station networking system up and running at the launch. This was notable in that it came complete with real people (or at the very least out of work ACTors) claiming to be the Acme Widget company.

Within a curtained-off area of the hall Acme Widget's managing director could be seen telling his Apricot to show him the monthly figures (his voice sounded a bit strained, but it seemed to work), while the 'bit of a computer whizz-kid' could be seen typing a number into 1-2-3, graphing it, going back to type into another number, graphing it etc.

On a brief survey, it seemed to work, but if ACT would care to send us the 14 Apricots and assorted other paraphernalia PCN will be happy to investigate further.

Penman plotter should prove popular



Plotters could become a lot more popular over the next few months, if Penman has anything to do with it. The Penman plotter comes in at £217 plus VAT (£199 if you buy before the end of January), and besides being just about the cheapest plotter on the market its results are comparable to the output of much more expensive ones.

The Penman can do this because it employs one of those ideas that are so obvious everyone asks themselves why they didn't have it. Instead of using a large frame that moves the paper around underneath the pen it uses a small robot that moves the pens around on top of the paper.

It features two wheels and a choice of three pens, and runs around on the end of a ribbon cable. This attaches to an interface which plugs into your micro's RS232 output.

Effectively this means the Penman will operate on any size of paper, subject to the limitation of the length of the cable. The robot also has a small optical sensor in the base, so if you place the paper on a black background it senses where the edges are.

Elite — Don't call us, we'll call you

The Electron version of Acornsoft's Elite will start to make its appearance in the shops this week. And if you have already achieved Elite status on the BBC version — don't call us, we'll call you.

Daniel Gilbert and Howard Baker have already phoned to say they have achieved the coveted status. Unfortunately they were not the first.

Acornsoft, ever anxious not to put people off buying and playing the game, was not saying exactly how many people have claimed Elite status but a spokeswoman did concede that it had already received 'a few'.

It turns out that 'a few' amounts to 53 people who have written. Of these, nine have amassed over a million credits. All the claims are subject to verification, of course.

Meanwhile, Acornsoft will be shortly announcing the October winners of its Elite competition. The September winner was confirmed as Andrew Vickers of Epsom in Surrey with a rating of Dangerous and a cash tally of 106,764.9 credits.

Take a free peek at Prestel

Following last week's embarrassing breach of security on Prestel (issue 86) comes news of an open invitation to hack into the system.

Well, not exactly hack. What is on offer is a free look at a demonstration database that includes pages from Micronet and other bits of Prestel.

Anyone with a 1200/75 modem and viewdata software should call the operator and ask for Freephone 2043 then ask for your local Prestel number. Dial up this number and key in 4444444444 as the identity number and 4444 as the password and you will be in.

It is not quite as much fun as wandering round the whole of the Prestel database, but useful for anyone wanting to test out a modem or take a peek at what Prestel looks like.

● Compunet, the rival database for Commodore 64 owners, has scored something of a coup over Micronet.

It now has multi-user dungeon (MUD) up and running. This thoroughly addictive multi-player version of dungeons and dragons should bring in a lot of money for Compunet.

It is charging £5 per quarter membership fee and £3 an hour to play the game.



Magical modem waits in the wings

If the modem in the picture looks cheap, that's because it is — dirt cheap. And to make matters worse it's illegal and (as yet) unavailable.

So why mention it? Because it offers everything you wanted from a modem and much more for an all-in price of £49.97 (plus VAT).

Unicom, the company that was set up to make the modem, has like many companies new to the field been just a little too optimistic about when it will be ready.

First it was to be shown at the Electron & BBC Micro User Show. Unfortunately, it was not completely ready but PCN was promised a review model for the following week.

The week came and went.

'The guys have still to finish the software,' said Mark Simon from Unicom, 'but we will be holding a press conference on Friday week when the modem will be up and running.'

The press conference didn't materialise. 'There are still problems with the auto scanning software,' said Mr Simon 'but we will get one to you soon. Quite literally it is only a few days away. They are working on it day and night.'

When PCN gets one you'll have a full review. In the meantime, here is the claimed specification for the device.

It operates on CCITT and Bell frequencies at 300/300, 1200/75, 75/1200 and 1200/1200; holds up to 99 telephone numbers in memory with two-key selection; and has auto-dial and auto-answer with auto sense of the baud rate on an incoming call.

Needless to say, it is a long way off obtaining approval for connection to the telephone system. In fact, it hasn't even been submitted yet.

And the reason for the funny looking case? It has been glued together with epoxy resin to prevent competitors taking a good look at the inside.

'We are not using anything revolutionary. It is just the way we are using it,' said Mr Simmon.

W H Smith recalls Spectrum Plusses

W H Smith has run into trouble with the Spectrum Plus keyboard, and machines have been recalled from early purchasers.

As reported in PCN (issue 84) the keys of the 'new' Spectrum tend to fall off if you turn the machine upside down. Sinclair said then that this was because the press were sent pre-production models and that the fault would not exist in the models sold in shops.

However, it now seems that some faulty Spectrum Plusses have slipped through Sinclair's net and are now in the hands of end users.

A spokeswoman from W H Smith said: 'if anyone buys a Spectrum Plus and finds that the keys are faulty, we will replace it with a new one'.

IN BRIEF

Inject some life into your Commodore 1541 and 1542 disk drive with Quickdisc. At £11.95 this utility program speeds up the loading of programs. And one of its main features is its Menu Maker. This is saved to disk along with the Quickdisc system so when you use the command LOAD "QD*MENU",8,1 it enables any program on a disk to be loaded quickly at the touch of the menu option.

ACT goes from strength to strength as its profits doubled in the first half of the year. Despite reduced sales of Sirius machines the British-based company's sales surged from £20.02m to £35.74m and profits before tax rose from £1.81m to £3.81m. The directors say that the increase in sales volume and improved profit margin reflects the market reception to ACT's Apricot product line. Indeed, the company, which is enjoying a winning streak, plans further expansion in the US.

Lightning has struck again. The company is offering a pack of six games for either the Spectrum Plus or Spectrum 48K for £9.95. With a saving of almost 75 per cent you get Planet of Death, Ship of Doom, Espionage Island, Collector's Pack, Embassy Assault and Inca Curse.



Super glue for 'unrevolutionary' super modem.

VIEW FROM JAPAN



Users caught by IBM blind date

Among the various bits of flotsam and jetsam that find their way into my possession is a somewhat tattered copy of the current issue of the *Tokyo PC News*, newsletter of the Tokyo IBM user group. In some ways, it reminds me of those songs and poems that have something good happen, only to be followed immediately by something disastrous.

Like you show up on a blind date to be greeted by a vision of loveliness that makes Helen of Troy look like one of Cinderella's ugly sisters only to discover she has breath so fetid it would stop a train only to

discover that she breathes but once an hour only to . . . I'm sure you get the picture.

Anyway, the good news is information on how to stuff an IBM PC with oodles of RAM at what look to me like great prices and from the UK might look even better. For example, a 128K expansion board for my computer with discount costs about 40,000 yen (£130).

If an IBM user here buys an expansion board without chips (there's no indication of what the board costs), 256K chips run at about 8,000 yen (£26). There's also information on who to buy the boards from in the US with a warning not to have them X-rayed.

It's the sourcing in the US that's the train stopper.

Not all the IBM PCs used in Japan, or even just by the club members for that matter, were sold in Japan. In fact, many of the members are of the growing fraternity of expatriate business executives who come and go on the whim of their multinational employers — banks, insurance companies, manufacturers, advertising agencies, etc.

Sensibly, when they acquire a personal computer of more than games capability they don't want a product from some fly-by-night company whose address may quickly change from Silicon Valley to Death Valley, so naturally, they turn to IBM. They expect, at the very least, that with its global operations, IBM will be able to service their hardware, maybe even answer a few questions about operating systems and software no matter where in the world they use it.

Surprise. Surprise. That kind of thinking may well serve in other corners of the world, but it gets them nowhere over here.

The IBM PC in its various configurations including the Portable PC (just the thing for the busy world traveller) is sold exclusively by ComputerLand Japan who in turn purchases its machines from a division of IBM in the US which handles sales to foreign countries.

And it is to ComputerLand Japan that Mr Rising-International-Executive is referred when he calls IBM about getting some service for his not-purchased-in-Japan IBM PC.

IBM Japan, he is told, wants nothing to do with it, despite its international warranty.

Since ComputerLand Japan has not seen one thin dime of profit on the particular faulty machine in question (all profits went to some other retailer and IBM), they don't have a lot of interest in servicing it. But they will, if the owner takes out a yearly service contract for ten per cent of ComputerLand's retail price for the machine in Japan. (Thanks to duty, transportation and a surcharge imposed by IBM in the US to compensate its local subsidiary, this amounts to a premium of some 60 per cent over the price for the same unit in the US). Thus, it can cost you some \$700 or more just to be told you've a blown fuse.

Naturally, IBM users that didn't originally purchase their machines from ComputerLand Japan (who quite innocently is catching a lot of flack but can't be expected to look after IBM's spilled marbles) are rather put out with IBM, or Big Blue Meanie, as they are wont to call the company here these days.

Serge Powell

Schools link up in sponsored scheme

Schools around the country will soon be able to exchange messages, enter competitions, upload and download programs through The Times Network for Schools service (TTNS).

The network, backed by The Times Network Systems, is also heavily sponsored by major companies such as Memorex. The service itself is based on the Telecom Gold public electronic mail service, forming a closed user group within it.

For £152, schools with BBCs or RML/380/480Z machines can buy a starter pack of a BABT approved modem, menu driven software, a TTNS Tutor program, a manual and cables to connect the modem to the micro's serial port.

In addition, each school on the system will pay £69 for a 12-week term. Of course, another cost is telephone charges.

At the moment, the network is in its pilot stage at the Garth Hill Comprehensive School, Bracknell, Berkshire — but is due to be in full swing by April 1985. So far, it has had much

favourable response from teachers, local councils and pupils.

Wendy Ludlam, 16, of Garth Hill said: 'I've only been using it a couple of days and it's so easy. I think it will be fantastic when it gets fully off the ground. We'll be able to exchange information with schools all over the country. And later on, have the chance to correspond with a pen-pal abroad on the network.'

Stanley Goodchild, headmaster of the school welcomes the network. He said 'TTNS is the answer to the problem of computers being put into schools but with little software support.'

'This service will open the way to the development of micros in schools. The framework is here, but it has not been fully developed.'

'There are so many application problems that will arise controlling it. And it will succeed or fail depending on the quality of the database.'

The Times network will be up against stiff competition. Prestel plans to launch its own network for schools, School Link, in January (delayed from September) and will offer similar facilities including mailboxes for electronic mail and downloadable telesoftware.

Wren gets hard disk drives and comms

The Wren, the £1,000 British portable, has received a boost with the announcement of a hard disk system and a comprehensive communications package.

The hard disk drives are manufactured by Pocket Computers and cost £1,350 and £2,000 respectively (plus VAT). They should be available through dealers now.

To those prices you must add £95 (plus VAT) for the essential program that allows you to back up the hard disk onto floppies.

The communications package, Wrenchat, has not yet been released but should be out

shortly. (PCN has already had a sneak preview).

The collection of programs allows you to dial up databases and services such as Telecom Gold and other electronic mail services as well as viewdata services such as Prestel. In addition it can be used for Wren's Wren communications.

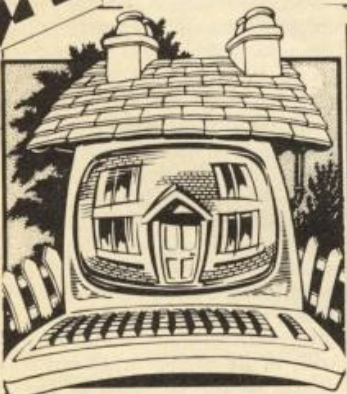
The program makes the most of the Wren's built-in 1200/75 modem but it can also be used with an external modem for communicating at 300/300 baud as well as other speeds.

The best part is the price expected to be under £100 (plus VAT). Wren also hopes to throw in a free membership to one of the electronic mail services.



Hard news for the Wren and good communications on the way.

HOMEFRONT



Toys for the boys to take to the pub

The apocalypse appears to be well underway with the advent of the fifth horseman, sorry generation, of computers (where were the other four?) This is the subject that good old Uncle Circlip has currently got the hots over. And will expound upon at great length when asked (see *Sunday Times* and Bernard Levin interviews for examples).

The whole deal seems to be that the Japanese are so tired of having to follow everybody's lead in the world of computers, MSX and all that, that they have decided to go for something so outrageous, but still

plausible, that it puts everyone off what they should be doing *ie* getting the machines and software they currently make into the marketplace.

The idea of machine intelligence is an old one dating back to the last century, or even the ancient Greeks. Unfortunately, putting any of these beautiful ideas into practice seems to have stumped everybody ever since and in some cases causes them to go gaga.

The problems appear to be a lack of sheer alien-zapping power and writing software without having an exact idea of what they're doing.

Fortunately, good old USCS (Uncle Sir Clive Sinclair being a kind of Meta Pascal operating system) has decided to take the British computer industry under his infallible guiding hand to get things moving before the Eastern boys get their act together, if they ever intend to.

The USCS school for meta brains wants all you British super programmers to get your mental disk drives whirring and turn out something as intelligent as, say Ronald Raygun or, if possible, USCS.

The crazy thing is that with such strange attitudes batting around, something may well

happen. All it would take is a new track of thought, a nice capable computer such as the QL, and plenty of dole time. Any one of these things can cause a revolution on their own. If they are all tried together a new generation of software thinking may be born (we hope).

What we can look forward to is computers that can understand human speech, speak it themselves, make intuitive decisions on any input data, and generally get drunk with the boys.

The constituent parts have been under development for some time but as is usual with any large research project, nobody has got all the bits together under one lid. The Americans are putting a lot of thought into intelligent missile systems and the Japanese, who started the pong ping, are reputedly pumping lots of money into poaching the world's leading programmers. The British so far aren't really doing much besides being goaded by USCS, although one can never tell what the MOD is doing for fear of being hushed up.

The other main drawback to clever machines (AI) is that they don't go down too well with the general public. This is

mainly due to such malevolent constructs as HAL 9000, the positronic brains of Susan Calvin, and such difficult beings as Deep Thought.

With the onslaught of home videos and their ensuing nasties, the chances are that things will only get worse. But, don't let this stop you setting up a system to make your Spectrum, Cray or whatever more friendly.

In fact, if you can come up with something really clever, don't hesitate to send it to PCN.

What you must aim for is to make your computer understand that when you ask for last year's sales figures, it will give you the time of the next flight to Korea (this is known as fuzzy logic). In addition to this you should put wheels and arms on your machine so when somebody threatens it with a chainsaw or axe, it can scuttle out of the way.

All this is not as far-fetched as you may think. The media would have us believe that this is the way computers should behave. Be very careful not to let your hyper intelligent, self-teaching computer have access to a teletext adaptor as it might well be able to interface itself to the adverts and then anything might happen. **Kenn Garroch**

Micros get more 'Mr Fixit' services

There are a lot of users with broken down and worn out micros to judge by the number of companies starting up computer maintenance and repair services.

Details of two new ones were announced last week. Computer Fix (0276-41266) claims to have invested £250,000 in establishing a network of 500 agents around the country which will offer 'fast and cheap repairs' for all leading home micros.

The company is so confident that it is offering fixed prices for repairs as well as a three-month guarantee.

Repairing a Spectrum will cost £19.55, a Commodore 64 £37.50 and a BBC £40.25. The prices

include labour, spares, postage, insurance and VAT. Just take your machine along to your local Computer Fix agent who posts it off to Computer Fix which promises a 48-hour turnaround, using specialised testing equipment and production line techniques.

Sounds like a good deal, especially if you feel lost when separated from your micro.

The other company stepping into the 'down time' breach is Compuguard (021-643 7113). It offers a low cost on-site maintenance agreement.

In exchange for an annual subscription you are able to call on Compuguard which sends someone round within 24 hours to fix your ailing machine.

Compuguard says it handles nearly all makes of new micros and peripherals, as well as used equipment.

Maplin's catalogue is on the shelves

No self-respecting computer hacker or electronics hobbyist should be without a well-thumbed copy of Maplin's encyclopaedic catalogue.

Good news then that the company has just released its 1985 edition.

Despite the addition of 'hundreds of new lines' the company has kept the price to £1.35 (£1.75 by post).

Having scoured the world to obtain its components, Maplin

says that — contrary to worries in the industry — it has found that the supply of semiconductors is now satisfactory.

One benefit of its globe-trotting is that it has been able to cut the price of many of the products on offer. Other improvements in the catalogue include price information alongside the featured products.

You can get your catalogue from one of Maplin's five shops or by mail order from PO Box 3, Rayleigh, Essex SS6 8LR (0702-552911).

THE KET TRILOGY

INCENTIVE THE COMPLETE ADVENTURE CLASSIC SINCLAIR SPECTRUM 48K

TRILOGY IN ONE — Incentive Software is offering you the opportunity to save £3.95. It is producing a Christmas gift-pack comprising the three parts of the Ket Trilogy. Each of the three graphics adventures sends you on a mission. To add an extra incentive, the company is offering a video tape recorder or £400 cash to the first person who completes each mission with a score of 100 per cent.

Keep in touch — use the telephone

British Telecom has a new line in dial-up services for micro users — a recorded message on events on the micro scene.

The trial service has been launched in the Bradford area in conjunction with Information Unlimited.

The service operates on Bradford 0274-7222622 and provides a three-minute message with information on what's new in hardware, software and peripherals.

The message is changed twice-weekly and will gradually be tailored to the needs of the users. So if you want things like programming tips, let British Telecom know.

As featured on Radio 1's
Saturday morning Chip Shop.

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	—	Underworld	Ultimate	SP	£9.95
2	3	Elite	Acornsoft	AC	£15.00
3	2	Decathlon	Ocean	SP, C64	£9.95
4	—	Tir Na Nog	Gargoyle	SP	£9.95
5	1	Jet Set Willy	Soft Projects	SP, C64	£5.95
6	4	Combat Lynx	Durell	SP, C64	£7.95
7	6	Sherlock	Melbourne	SP, C64	£14.95
8	5	Pyjamarama	Microgen	SP	£6.95
9	—	Eureka	Domark	SP, C64	£14.95
10	8	Beach-Head	US Gold	SP, C64, AT	£9.95
11	—	Danger Mouse	Creative Sparks	SP, C64	£7.90
12	19	Battlecars	Games Work	SP	£7.95
13	—	Travels With Trashman	N Generation	SP	£5.95
14	11	Dark Star	Design Design	SP	£7.50
15	15	Lords of Midnight	Beyond	SP	£9.95
16	7	Avalon	Hewson	SP	£7.95
17	9	Zaxxon	US Gold	C64, AT	£9.95
18	20	Havoc	Dynavision	SP, C64	£9.95
19	—	Chiller	M Tronic	C64	£1.99
20	—	Eddie Kidd Jump	Durell	SP	£6.95

SPECTRUM		
TW	TITLE	PRICE
1	Underworld	£9.95
2	Decathlon	£8.90
3	Tir Na Nog	£9.95
4	Combat Lynx	£7.95
5	Pyjamarama	£6.95
6	Sherlock	£14.95
7	Eureka	£14.95
8	Beach-Head	£9.95
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10	Travels With Trashman	£5.95

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TW	TITLE	PRICE
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3	Zaxxon	£9.95
4	Chiller	£1.99
5	Daly's Decathlon	£7.90
6	Int Soccer	£9.99
7	Fort Apocalypse	£9.95
8	Trollie Wallie	£7.90
9	Football Manager	£7.90
10	Eureka	£14.95

MICROS

BELOW £1,000		
TW	MACHINE	PRICE
1	Commodore 64	£199
2	Sinclair Spectrum	£125
3	BBC B	£399
4	Amstrad	£330
5	Electron	£199
6	Vic 20	£140
7	Atari 800 XL	£169
8	Oric	£99
9	Memotech	£199
10	Einstein	£499

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TW	MACHINE	PRICE
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3	Compaq	£1,795
4	Sirius	£2,525
5	Televideo TS1603	£2,640
6	Wang Pro	£3,076
7	NCR Dec Mate V	£1,984
8	Apple 3	£2,755
9	HP 85	£1,917
10	Dec Rainbow	£2,359

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the week up to November 8. The games chart is updated every week. The prices quoted are for the no-frills model and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month. PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.

If you want more from your MICRO



UPGRADEing your BBC micro (model "A" or "B") is the simplest, most cost effective way of dramatically improving its capabilities. An **UPGRADE** gives you access to the world's largest library of professional software and clears the way for future expansions by adding a Z80 A second processor and a flexible disk drive controller to your already powerful BBC micro. An **UPGRADE**'s ability to run TRUE CP/M rather than a CP/M compatible operating system is one of the features that make an **UPGRADE** the sensible choice. Couple this with its ability to handle disk drives independently from the BBC micro and your ability to choose what disk drives to use (3", 5" or even 8") and you can see why an **UPGRADE** is the only choice.

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NOTE: An **UPGRADE** does not require the fitting of a DFS within the BBC micro.

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Keyboard — As BBC

Graphics — As BBC

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RANDOM ACCESS



PCN reviews aren't just a momentary work

Kokotoni Wilf is a multi-level, multi-screen arcade adventure game, which has been well received by other magazines.

Therefore, that it was reviewed less than favourably by PCN (issue 84) drew my attention. My concern is not that your review was out of step with earlier reviews (a thumbs down I can accept where a game has obviously been well tested), but that the review had obviously been written on the strength of a quick glance at the first four or five screens of this sixty-plus screen game.

Reviewers are under pressure of time like everyone else, but incomplete assessments aren't in anyone's interest, are they?

Steve Wilcox, director,
Elite Systems.

No, they're not. Which is why we give all products a full review — Ed.

I'm dangerous and I'm hooked

I just thought I'd drop you a line on Acornsoft's new game *Elite*.

I classed myself as a boring old user who did not splash out £400 to buy a computer to play games. But after reading your review, I thought 'why not?'

May I now say that I am hooked. All those programs I've been writing and trying to debug are now on the bottom shelf collecting dust. I've also had to put an alarm clock at the side of the computer to tell me when to pack in.

I have reached a rating in the game which I am finding very hard to get past. I wondered if you have heard of anyone who has so that I know that it is possible. I'm currently dangerous.

I have only a tape-based system at this time, so could you tell me the difference between the tape version and the disk version (ie is it worth me going out and buying a disk drive)?

S Pilley,
Rotherham, S Yorks.

Yes, we do know someone who has gone beyond dangerous and is now deadly. The main difference between tape and disk

versions is the range of equipment you can buy and the types of spaceship you'll encounter. Disk versions have a greater variety of both. Welcome to the game-playing fraternity—Ed.

MSX has had the welcome it deserves

It has come as a great pleasure to see the relative failure of the much heralded MSX computers. They are supposed to represent a new and exciting era in computer technology. However, after reading the reviews it has become apparent that they are just a hyped idea. They offer nothing new.

While the much-vaunted MSX Basic is an improvement on some of the standard Micro-soft Basics, it does not have the capabilities that we were led to expect.

It appears that all the Japanese want to do is destroy the domestic suppliers like good old Uncle Clive, the Oric family, Acorn and Lynx. I think that we should resist this. It could mean that very soon we'll rely on foreign manufacturers to dictate what we are to use. At the moment the market is wide and varied, satisfying everyone's fantasies. However, MSX could mean that we pay

through the nose for software and hardware as the consortium could easily raise prices.

The domestic market knows what it wants and I think it shows how sensible we are in Britain by not adopting the MSX 'standard'.

A Gallacher,
Greenock, Scotland.

The market doesn't satisfy my fantasies — how about megabytes of storage and a 6ft holographic display for about £500? — nor did the Lynx need a helping hand on the road to destruction. Whether or not the British public is 'sensible' remains to be seen — Ed.

Computers — they're cool for cats

Many people underestimate the potential of their computers. They buy a more expensive machine simply because it plays the best version of *Manic Miner* or *Jet Set Willy*.

It is quite possible, for instance, with very little electronics experience to build a light pen. When we did so at school we saved £18 on the official version. Machines are being built with ever increasing capacity but what is the use of such capacity if it is never used? How many computers are now

gathering dust after people have got bored with their games library?

Few people realise the uses a computer has. For instance, a friend of mine had his computer controlling a motor which opened a bread bin with the cat's food in, a simple but ingenious example. My father uses my computer to evaluate figures on a spreadsheet, my mum uses the word processor and my sister plays all my games.

Paul Lambert,
Solihull, W Midlands.

Why should cat food in the bread bin be more enlightening than Manic Miner? — Ed.

All are welcome at our TI club

Your readers may like to know of a Texas Instruments Users Club in the north east. We meet on the first Thursday in every month at room D103 in the Newcastle-upon-Tyne Poly from 7pm to 9pm. There is also a marathon meeting at the Newcastle Central Library November 17 from 10am to 4.30pm.

We help all ranks of programmers, and cater for game players too. We have a large range of TI hardware and software for demonstration, including TI's expansion box, disk controller, disk drive, minimum and extended Basic cartridges, speech synth etc.

New members are always welcome. Any newcomers, please ask for Phil or Errol. If you write to me for details please enclose an SAE.

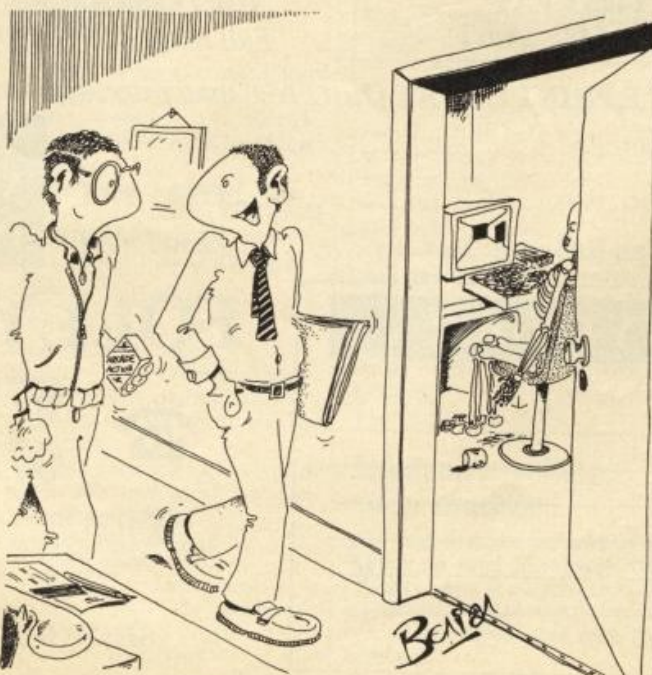
Phil Coates, 5 Saville Place,
Newcastle-upon-Tyne.

PS — We can also purchase a large amount of software from the US.

Firebird is part of British Telecom plc

Allan Kelly objects (issue 85) to British Telecom establishing itself in the software market through its software house Firebird. He says it would be acceptable if British Telecom were already privatised.

In fact British Telecom has already been privatised and became BT plc on August 6.
Vic Taylor,
Altrincham, Ches.



I wonder if Dave ever escaped that 3D maze?

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ROUTINE ENQUIRIES



Vic or C16 — which should I buy?

Q I was about to buy a Commodore Vic 20 when along came the C16. I am now very confused about the differences between the machines, apart from the price tag. If I choose the C16 will I be able to use the established range of software and add-ons?

*P Hilton,
Wirral, Merseyside*

A Although the C16 and Vic 20 look the same, the similarities end there. They use a different processor — although both run 6502 machine code — and have different memory maps, so no Vic software will run on the C16.

The version of Basic on the Vic is very crude and has no commands for things like graphics and sound, while the C16 has a much improved Basic that includes these and more.

On the peripherals side, things are a little brighter. Printers, plotters and disk drives will all work. However, joysticks and anything that uses the joystick port — like light pens — won't fit because Commodore changed the socket. Vic cartridges won't fit either, although it's possible someone will produce an interface that will allow you to use some products.

The choice largely comes down to whether you want a lot of software right now (buy the Vic) or long term support (buy the C16). There's little doubt that the C16 will be around for some time, although if you bought a Vic and as much software as you think you need you'd have a system that will last you quite a while anyway, given that a Vic with memory expansion and super expander cartridge will almost match the newcomer for facilities.

Bad disks knock heads out of line

Q Is it possible that the hardware of a Commodore 64 is damaged by a certain poke? If so, is it true that some professional programs are protected against back-up copying with this poke?

*J de Stigter,
Gouda, Netherlands*

A The hardware of the Commodore itself cannot be dam-

aged by any software, POKES or otherwise. What you may be thinking of is a method of disk protection used by some companies which involves deliberately writing bad tracks or sectors to a disk.

Under normal circumstances the computer would crash when it encounters a bad sector, but the loading program checks for its presence. If the sector is there, the load carries on as normal. If it isn't there — which it wouldn't be on a copy — the program crashes.

The damage factor comes about because of the way the read/write head on the 1541 disk drive seeks data. If it finds a bad sector it will try several times to read it, flipping back and forth from the directory track to the error track. This rapid banging to and fro will soon knock the head out of line leading to read/write problems eventually.

Saving arrays on the Amstrad

Q How do you save arrays on the Amstrad, then load them back in again? I am writing a program which requires the contents of three string arrays and a numeric array to be saved.

Also, is it possible to load a different set of data using the same array variables?

*C Powell,
Salford*

A There is no command that allows you to load and save arrays — you have to resort to the tried and trusted technique of sequential files.

The cassette system has a stream number of 9, so all data will pass through that stream. To open a file for data use the command: OPENOUT "yourfile" followed by PRINT#9, your value which actually sends the data to the tape. The OPENOUT simply prepares the Amstrad and the tape unit.

To get your information back again use the logical opposites of those commands:

OPENIN "yourfile"
INPUT#9, your value.

When the data passing is complete, tell the computer you're finished with either CLOSEOUT or CLOSEIN.

To use these with your array problem you need a loop to read

the data and send it to the tape, or reverse the process for loading. For example, to manipulate an array of names, try something like this:

```
10 DIM NM$(20)
20 FOR I = 1 TO 20
30 INPUT NM$(I)
40 NEXT
50 OPENOUT "NAMES"
60 FOR I = 1 TO 20
70 PRINT#9, NM$(I)
80 NEXT
90 CLOSEOUT
```

To get your array of 20 names back, use something like this:

```
100 OPENIN "NAMES"
110 FOR I = 1 TO 20
120 INPUT#9, NM$(I)
130 NEXT
140 CLOSEIN
```

Obviously you can use the same variable names for different sets of data, but if the array names are the same the new data will overwrite the old.

Prism modem leads to Spectrum crash

Q I have just received my Prism VTX5000 modem but the Spectrum crashes when Interface 1 is connected. Is there any way of solving this problem?

*Terence Smith,
Prestel Mailbox 919992213*

A Original VTX5000s had some problems with Interface 1s but yours should be okay. We can think of two areas of difficulty. The first is that Interface 1 should be connected but not operative.

You could also try powering everything up before connecting the phone to the modem. Plugging the phone in should reset the modem, solving any hang-ups.

You might find some problems powering up the system from cold. Just power up the Spectrum on its own for a while, then plug in and power up again. Before trying the second tip, we'd recommend you phone Prism on 01-253 2277.

Amstrad machine code muddle

Q I need a simple explanation of how to print characters and change colours in machine code on my Amstrad. Another sticking point has been trying to input from the keyboard.

*Stephen Minifie,
Tiverton, Devon*

A What you need is a copy of the CPC 464's firmware manual. This is published by Amsoft (0277-230222) at £19.95. It lists all the ROM calls you'll need for writing characters to the screen, and locating the cursor, as well as dealing with more esoteric aspects.

To display characters you'll need the routine at &BB5D, called TXT WR CHAR. Place the ASCII code of the character you want printed in the A register, then call the routine. Note that TXT WR CHAR corrupts the three register pairs, but that's one nice aspect of the manual. It lists the entry and exit conditions for each routine. And of course you'll want to move the cursor before you print the character. This is done using TXT SET CURSOR at &BB75. Registers H and L should contain the logical values of the desired column and row respectively.

To change colours you'll need TXT SET PEN at &BB90 and TXT SET PAPER at &BB96, or GRA SET PEN at &BBDE and GRA SET PAPER at &BBE4. In all cases, the A register should contain the ink value.

To collect characters from the keyboard there are two ROM routines you could use, KM WAIT CHAR waits for a key to be pressed and the routine lives at &BB06. It returns with carry true, and the character's code is held in the A register. Alternatively, use KM READ CHAR at &BB09, which returns with carry true and the character in A if there are any characters in the keyboard buffer. It doesn't wait for a key press, carry will be false and the A register corrupt if no characters are available.

Games search for Commodore 64

Q Will any of the following games be available for the Commodore 64? Richard Sheperd's *Urban Upstart*, Hewson's *Avalon MikroGen's Pyjamarama Beyond Lords of Midnight*, and *Frank n Stein* from PSS.

*Michael McGann,
Chiswick, London W4*

A *Urban Upstart* has been available for the 64 for months, *Pyjamarama* is also out, Beyond may have a version of *Lords of Midnight* coming, but PSS and Hewson have no plans for 64 conversions, as far as we know.



Have you any stunning routines that you can pass on to other readers? Share your hints and tips through our weekly Microwaves column. If your tip is printed, you get £10 and there's a £50 cheque waiting for the best Microwave of the Month. Send them to Microwaves, Personal Computer News, Evelyn House, 62 Oxford Street, London W1A 2HG.

Reformat your BBC listings easily

Here's a pretty printer for the BBC or Electron. It intercepts all calls to the operating system routine that output characters to the screen. This is done by replacing the OSWRCH vector (&20E & 20F) with one to the pretty printer routine. The new

routine then filters out all calls until it encounters the colon ':' character. At this point it starts a new line and prints a number of spaces. Compare listings 1 and 2 to see the effect.

After typing in the program and running it, make a CALL to ENTRY. Any program listed now is printed prettily.

*J Tullin,
Gateshead, Tyne & Wear.*

```
100SAS=!&20E AND &FFFF
200SNWL=&FFE7
30FOR X=0 TO 3 STEP 3
40P%=&B03
50C
60OPT X
70.ENTRY
80LDA £XPAND MOD 256:STA&20E
90LDA £XPAND DIV 256:STA&20F
100RTS
110.XPAND::CMP£58:BNE FIN:JSR OSNWL:L
X£0::LP::LDA£32:JSR OSAS:INX:CPX£5:BNE L
P:LDA£58::FIN:JSR OSAS:RTS:J:NEXT
```

Program 1

```
100SAS=!&20E AND &FFFF      :JSR OSNWL
200SNWL=&FFE7                :LDX£0
30FOR X=0 TO 3 STEP 3        :.LP
40P%=&B03                    :
50C                          :LDA£32
60OPT X                      :JSR OSAS
70.ENTRY                     :INX
80LDA £XPAND MOD 256         :CPX£5
      :STA&20E                :BNE LP
90LDA £XPAND DIV 256         :LDA£58
      :STA&20F                :
100RTS                       :.FIN
110.XPAND                    :JSR OSAS
      :                      :RTS
      :CMP£58                 :J
      :BNE FIN               :NEXT
```

Program 2

Simpler solution to graphics control

Your reply in Routine Enquiries (issue 84) concerning the control of graphics on the MCP40 printer would certainly solve the problem but I feel my solution is simpler.

The printer does indeed expect the control codes to be embedded within a string, eg LPRINT "D100,—50". If, however, it is required to use variables rather than predefined coordinates, it is permissi-

ble to use the variable names directly, without converting them to their string equivalents, as long as the code "D" (or any of the other acceptable command codes) and the separating comma are represented as strings, eg

LPRINT "D"X",Y
Note that semi-colons are not necessary in Oric Basic. Appropriate values can be assigned to the variables by means of inputs or by reading data from within a program.

*D Farmer,
Rugby, Warks.*

Interfacing machine codes to Basic

The Oric 1 and Atmos have excellent facilities for interfacing machine code routines to Basic programs. I have found a number of ROM routines which make it easy to pass integer parameters to CALL and ! routines. The addresses in parentheses are for Version 1.1 ROMs.

D80D (D8C8) get a byte value

(0-255) in the X register.
E79D (E7B3) get a word value (0-65535) in #33 (low) and #34 (hi)

CFD9 (D065) parse comma

There are also two combination routines:

D85B (D916) word/comma/byte

D861 (D91C) comma/byte

The following is an example. It exclusive-ors the value at an address passed with a value passed.

!#BB80. #FF
*C Hamilton,
Belfast.*

	Version 1.0	Version 1.1
JSRD85B	20 5B D8	20 16 D9
TXA	8A	8A
LDY \$00	A0 00	A0 00
EOR (33), Y	51 33	51 33
STA (33), Y	91 33	91 33
RTS	60	60

Spectacular patterns on your Beeb

This short routine provides some spectacular patterns on your BBC.

If you insert your favourite graphics routine between lines 40 and 80 you can watch it

slowly build up while it smoothly scrolls onto the screen. It can be an interesting way to start a game with the playing area scrolling onto the screen.

Line 30 stops output to the screen

Lines 90-140 scroll the screen
*Jason Holliday,
Castle Bromwich.*

```
10 MODE2
20 VDU23:B202:0:0:0:
30 VDU23:1,0:0:0:0:
40 REM INSERT GRAPHICS HERE
50 FOR=1 TO 10
60 GCOL0,RND(7):PLOT85,RND(1280),RND(1024):NEXT:VDU5
70 GCOL0,14:MOVE0,500:PRINTTAB(5,10)" P.C.N RULES D.K":VDU4
80 REM
90 FOR=0 TO 80
100 VDU23:1,T:0:0:0:
110 FOR=1 TO 30:REM ADJUST TO REQUIRED DELAY
120 REM ADD SOUND IF REQUIRED
130 NEXT
140 NEXT
```

Spectrum screen damage controlled

Here's a way of limiting the damage when designing the SCREEN\$ on a Spectrum to only seven character spaces. It works by embedding PRINT at control characters in the code name when saving it.

eg SAVE CHR\$(22)+CHR\$(4)+CHR\$(0)+ "udgs" CODE USR "a", 168 CHR\$(22) is equivalent to AT and is followed by the line and row co-ordinates ie AT 4,0. So the cursor is moved back to the start of the line before starting to print the name (Seven characters maximum).

Other PRINT control codes can be embedded for unusual effects:

CHR\$(18)+CHR\$(1)+

"program"

gives a flashing name.

Ridiculously long names can be produced by stringing together the codes for Basic keywords. You can even produce messages such as:

CHR\$(247)+CHR\$(198)+CHR\$(205)+CHR\$(191)+CHR\$(216)+CHR\$(236)+CHR\$(231)+CHR\$(254)+CHR\$(204)+CHR\$(169)

By the way, these can make a real mess of the display on header reader programs.

*Peter Edwards,
Headington Quarry, Oxon.*

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OUTPUT: SPECTRUM

PROCESSOR GOES PRO

Stuart Nicholls, author of 'Assembly Language for Arcade Games and other Fast Spectrum Programs' and 'The Spectrum Graphics Machine', both published by McGraw-Hill, offers you a word processor routine.



Here we see Specword in action.

Specword is a full-function word processor for the Spectrum and is comparable to many commercial word processors. The listings produced here are mainly Basic, and may be used only in conjunction with the Specwide 64 column print routine published in PCN issue 83.

Once the two are put together the finished article is a semi-professional word processor matching Tasword in

many respects, and I think going one better with its block-handling commands.

For instance, it supports block move, copy, delete, print, save and merge with a block definable from any character position. It also supports word wrap, margin, reform, insert mode and a 400 lines x 64 cols text file. I have omitted justification as I feel that 64 characters per line can look unsightly

when justified. It would be just as quick for the operator to do this by hand as it would for a Basic routine.

Several of the time-consuming tasks have been converted to machine code. Also, the version for the standard Spectrum without microdrives has a BREAK disable routine built-in.

To enter the program we will start with the new machine code, and these are the routines:

- 1 keyboard read
- 2 delete all text
- 3 find end of text
- 4 delete line
- 5 add line
- 6 simple Kempston compatible interface (one that correctly interprets the £ sign but not keywords).

The KEYBOARD READ routine should already be part of your 64 column machine code which starts at address 64471 and replaces the Basic.

PAUSE 0: LET I\$ = INKEY\$
is a little too slow in Basic to keep up with a fast typist. The machine code version also selects CAPS LOCK.

To test this routine switch to 64 column mode and RUN the following:

```
10 PRINT USR 64471 : GOTO 10
```

That should produce a simple typewriter program.

The remaining routines two to six should be entered using the hexdump

Table 1: Main routines

Start at Routine line:	
10	INITIALISE VARIABLES
40	MAIN KEYSKAN/INTERPRETER
100	PRINTER OPTION
200	BLOCK COPY
400	BLOCK MOVE
500	RE ENTRY FROM BREAK
600	BLOCK MOVE
1000	REFORM PARAGRAPH
1400	HELP PAGE
1600	BACKSPACE
1800	FORWARD SPACE
2000	UP LINE
2200	DOWN LINE
2400	DELETE
2600	NEWLINE
2700	E-MODE
2900	WORD WRAP ON/OFF
2905	INSERT ON/OFF
2910	SET BLOCK START
2930	MARGIN RESET
2940	REMOVE BLOCKS
2950	BLOCK END SET
2970	MARGIN SET
3000	STATUS REPORT
3500	CLEAR SCREEN
3600	PRINT CURRENT WINDOW
3700	PRINT BLOCKS
4000	MAIN PRINT ROUTINE
4500	WORD WRAP
5000	LOAD
5500	MERGE
6000	SAVE
6040	VERIFY
6500	SEARCH AND FIND
7000	PRINT TO PRINTER
7500	ACCEPT OPTIONS
8000	CURSOR LINE for M/C CODE
8300	INSERT MODE PRINT
8500	ADD LINE
8510	DELETE LINE
9500	GOTO START of FILE
9600	GOTO END of FILE
9700	UP ONE PAGE
9800	DOWN ONE PAGE
9900	DELETE TEXT
9998	LOAD PROGRAM
9999	SAVE PROGRAM

in Listing one from address 63265. Once entered, you can SAVE it with the Specwide code using SAVE "SPECWORD" CODE 63265, 2271.

Then enter the Basic program as List two and save that complete with Specword CODE using GOTO 9999.

Note that variables I and O are used in place of 1 and 0 from Line 12. This has been done to save memory.

The program in Listing one is for a 48K Spectrum without Interface 1 and Microdrives and contains the BREAK disable routine. However, because of the shadow ROM this routine is not entirely successful when Microdrives are attached. To delete the routine remove lines 1, 37, 38 and 1485, and amend line 500 to read:

```
500 POKE AA + 5, 244 : POKE AA + 6, 251 : GOSUB 3500 : GOTO 40
```

and amend line 3500 to read:

```
3500 PRINT CHR$ 3;
```

To check that all is well follow the instructions, and if a command does not function then recheck the listing using Tables 1 and 2 to locate the fault.

Instructions

Specword is a word processor program that allows a text file of up to 400 lines of 64 characters per line to be created, and displays 24 lines x 64 characters of that text as a window on the TV screen. The text paper is bright white with a normal white border.

Nearly all the Spectrum characters

Table 2: Main variables

A\$(400,64)	TEXT FILE
C\$	CHARACTER for CURSOR
F\$	WORD SEARCH REQUIRED
I\$	INKEY CHARACTER
N\$	DOUBLE SHIFT CHARACTERS
O\$	EQUIVALENT UNSHIFTED CHARACTERS
R\$	MODE MESSAGE
S\$	64 SPACE STRING
X\$	MODE SELECTED "LOAD", "SAVE" etc
AA	STREAM 'S' OUTPUT ADDRESS
BAS	START ADDRESS OF REM STATEMENT
C	COLUMN for CURSOR
CC	COLUMN for MARGIN
D	CODE I\$
ERR	ADDRESS IN STACK HOLDING ERROR RETURN
FC	BLOCK END, COLUMN
FL	BLOCK END, LINE
I	VALUE 1
L	SCREEN LINE, CURSOR
LEN	'SAVE' BYTES LENGTH
O	VALUE 0
PE	WINDOW END, LINE
PL	CURRENT TEXT LINE
PS	WINDOW START, LINE
Q	LINE START for 'PRINT'
SC	BLOCK START, COLUMN
SL	BLOCK START, LINE
ST	START ADDRESS for 'SAVE'
S	START ADDRESS for 'MERGE'
VAR	ADDRESS of START of TEXT FILE
WW	WORD WRAP FLAG

are available from the keyboard using caps or symbol shifts as necessary, the exceptions being the double shifted ones. These require the pressing of both shift keys to enter the E-mode, in which the border is made yellow. Then release both keys and press the required character key, after which the border will reset white and you may continue typing. All the keys will auto repeat with the exception of these double-shifted ones. The ENTER key will give a new line.

Text mode controls

In text mode (white border), the following keys function:

EDIT (CAPS SHIFT/1) : Displays a HELP PAGE.

CAPS LOCK (CAPS SHIFT/2) : Toggles CAPS LOCK ON/OFF.

CURSOR CONTROLS (CAPS SHIFT/5,6,7,8) : Move the cursor around the screen.

DELETE (CAPS SHIFT/0) : Deletes the character behind the cursor and backspaces to that position, moving the remainder of the characters on the line one place to the left.

GRAPHICS (CAPS SHIFT/9) : Status report of cursor position and modes in use given on line 24. This stays displayed until keys released.

E-mode controls

To enter the extended mode (E-mode), press both shift keys then release.

Q <= GO TO the start of the text file.

E >= GO TO the end of the text file.

R < Move up one page.

T > Move down one page.

K + Add a blank line at the current cursor position moving down the text, including that line, to make room. Note that text on line 400 will be lost.

J - Delete cursor line and close up text.

L = Reform paragraph from the cursor line to the end of the paragraph. The end of paragraph is taken as the first line found at the beginning with a space.

W WORD WRAP toggle ON/OFF. Set ON when first RUN.

I INSERT MODE toggle OFF/ON. Set OFF when first RUN.

Normally the cursor is shown as an underline symbol and letters typed will overprint any existing characters, but if we select INSERT ON, then the cursor will become a character-size block and typing will displace existing characters to its right and insert letters into the line. Characters pushed off the end of the line will be lost. In this mode, NEWLINE will create a new line and WORD WRAP ON will transfer overrun words to the new line.

H SEARCH AND FIND
This mode will ask for the

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required word: it will not find parts of words and care should be taken on use of upper or lower case letters. So if asked to SEARCH and FIND 'Fred' it will not find 'FRED' or 'fred'. The search will start at the cursor line, and if the word is

Listing 1

```
CODE 63265,173
F721 CD 44 F7 E9 10 06 40 EB = D6
F729 36 20 23 10 FB C9 CD 44 = 5E
F731 F7 09 EB 09 2B 1B ED B8 = DF
F739 06 40 EB 36 20 2B 10 FB = BD
F741 C9 05 00 2A 4B 5C 11 08 = B8
F749 00 19 E5 11 40 00 ED 4B = 87
F751 42 F7 0B 78 B1 28 03 19 = B1
F759 18 F8 EB 19 C1 E5 E5 21 = C0
F761 00 64 09 A7 C1 ED 42 44 = 48
F769 4D E1 C9 01 BF E3 21 B0 = 6B
F771 5C CB 46 20 0C F5 3E 01 = 4D
F779 ED 79 3E 0F ED 79 F1 CB = D5
F781 C6 FE 60 20 02 3E 01 C5 = CA
F789 05 1E 0E ED 50 CB 3A 38 = AB
F791 FA F3 05 05 ED 79 C1 ED = 0B
F799 59 1C ED 59 FE 0D 20 04 = EA
F7A1 3E 0A 18 DD FB C9 2A 4B = 76
F7A9 5C 11 08 64 19 01 00 64 = 57
F7B1 2B 7E FE 20 C0 0B 78 B1 = BB
F7B9 20 F6 C9 2A 4B 5C 11 08 = C9
F7C1 00 19 54 5D 13 01 FF 63 = 40
F7C9 36 20 ED B0 C9 = BC
```

B

found it will be placed in the centre of the screen if possible. SET LEFT MARGIN.

This will set the left-hand edge of your typing at the cursor position and will indicate that it has done so by reducing the bright white paper width accordingly. All controls except cursor and delete will now work on the reduced paper width. Words in the margin will be ignored when reforming a paragraph.

N

RESET LEFT MARGIN.

This reverts back to 64 columns per line.

X

DELETE ALL TEXT FILE

E-mode block commands

Specword has an extremely useful set of block commands including BLOCK PRINT/SAVE..

5

This will put a BLOCK START marker at the current cursor position and indicates that the block includes the character at that position. The marker may prove indistinct when placed over a character so it is advisable if possible to place it

in a space between characters. Once set, this marker cannot be erased or overprinted but can be moved by reselecting another block-start position. Adding or deleting lines before the line containing the block marker will move the marker with the text.

8.

This will place a BLOCK END marker at the current cursor position in the same way as BLOCK START. BLOCK END can be on the same line as BLOCK START but if placed before BLOCK START the block will be ignored.

7

Because block markers slow down typing they may be removed when not required using this key.

Z

BLOCK COPY will copy a SET block to the current cursor line, creating spaces as necessary to insert the block between existing text. The block markers will remain in position after the copy is made.

M

BLOCK MOVE will copy a SET block as above and will then delete the original block, clos-

Listing 2

```
1 REM 00000
10 DIM A$(400,64): LET AA=PEEK
23631+256*PEEK 23632: POKE AA+5
,244: POKE AA+6,251: BORDER 7: P
OKE 23693,120: PRINT CHR$ 3;
12 LET S$=A$(1): LET I=1: LET
0=0: LET SL=0: LET SC=0: LET FL=
0: LET FC=0: LET CC=0
15 PRINT : PRINT TAB 24;"S P E
C W O R D": PRINT : PRINT TAB 2
0; 1984 Stuart Nicholls"
16 PRINT FLASH I;AT 11,19;" S
T O P T H E T A P E": BEEP .5
,10: BEEP 1,5: PAUSE 150: PRINT
CHR$ 3;
20 LET N$="I~\{}": LET O$="
yupasdfgyUPASDFG"
25 LET VAR=PEEK 23627+256*PEEK
23628+8
30 LET WW=I: LET PL=I: LET PS=
I: LET PE=24: LET G=4000: LET C$
=""
35 GO SUB 100: BRIGHT 8: PAPER
8
37 LET BAS=PEEK 23635+256*PEEK
23636+5: POKE BAS,205: POKE BAS
+1,125: POKE BAS+2,27: POKE BAS+
3,24: POKE BAS+4,251: POKE BAS+4
,0: LET BASH=INT (BAS/256): LET
BAS1=BAS-BASH*256
38 LET ERR=PEEK 23613+256*PEEK
23614: POKE ERR,BAS1: POKE ERR+
1,BASH
40 LET C=(67-PEEK 65146): LET
L=24-PEEK 65147: PRINT OVER I;C
$;CHR$ 8;: LET D=USR 64471: PRIN
T OVER I;C$;CHR$ 8;: LET I$=CHR
$ D
50 IF D>31 AND D<127 THEN BEE
P .0015,10: GO SUB 0: GO TO 40
60 IF D<6 OR D>15 THEN GO TO
40
70 GO SUB D*200: GO TO 40
100 PRINT AT 7,23;"PRINTER CHOI
CE";AT 10,15;"1. ZX Printer";AT
12,15;"2. Centronics Printer"
```

```
110 PRINT AT 15,20;"Select opti
on <1><2>"
120 LET I$=CHR$ USR 64471: IF I
$<>"1" AND I$<>"2" THEN GO TO 1
20
130 IF I$="1" THEN POKE AA+15,
244: POKE AA+16,251: GO TO 150
140 POKE AA+15,108: POKE AA+16,
247
150 PRINT CHR$ 3;: RETURN
200 IF SL=0 OR FL=0 OR SL>FL TH
EN RETURN
205 IF PL>SL-I AND PL<FL+I THEN
RETURN
210 IF FC<SC AND FL=SL THEN RE
TURN
220 IF SL=FL THEN GO SUB 8501:
LET X=X+(SL>PL): LET A$(PL,SC+I
TO FC+I)=A$(SL,SC+I TO FC+I): P
RINT AT L,0;A$(PL);AT L,C;: RETU
RN
225 LET X=FL
230 IF PL>400 THEN GO TO 3600
235 GO SUB 8501: IF SL>PL THEN
LET X=X+I
240 IF X=SL AND SC<>0 THEN LET
A$(PL,SC+I TO )=A$(X,SC+I TO ):
GO TO 290
270 IF X=FL AND FC<>63 THEN LE
T A$(PL, TO FC+I)=A$(X, TO FC+I)
: GO TO 290
280 LET A$(PL)=A$(X)
290 PRINT AT L,0;A$(PL);: LET X
=X-I: IF X<SL THEN PRINT AT L,C
;: RETURN
295 GO TO 230
400 IF SL=0 OR FL=0 OR SL>FL TH
EN RETURN
410 IF FC<SC AND SL=FL THEN RE
TURN
420 IF SL=FL THEN LET A$(SL)=A
$(SL, TO SC)+A$(SL,FC+2 TO )+$:
GO TO 470
430 IF SC<>0 THEN LET A$(SL,SC
+I TO )=$: LET SL=SL+I
440 IF FC<>63 THEN LET A$(FL,
```

```
TO FC+I)=$: LET FL=FL-I
445 IF SL>FL AND SC>FC THEN GO
TO 470
450 IF SL>FL THEN LET A$(FL,SC
+I TO )=A$(SL,FC+2 TO )+$: LET
PLA=PL: LET PL=SL: GO SUB 8000:
LET A=USR 63265: LET PL=PLA: GO
TO 470
460 LET PLA=PL: LET PL=SL: GO S
UB 8000: FOR A=SL TO FL: LET X=U
SR 63265: NEXT A: LET PL=PLA
470 LET SL=0: LET SC=0: LET FL=
0: LET FC=0: GO TO 3600
500 POKE AA+5,244: POKE AA+6,25
1: GO TO 3500
600 GO SUB 200: GO SUB 400: RET
URN
1000 IF A$(PL)=$ THEN RETURN
1010 LET I$=CHR$ 13
1020 IF PL=400 THEN PRINT A$(PL
,CC+I TO );: RETURN
1030 IF A$(PL+I,CC+I)="" THEN
GO SUB 2602: PRINT AT L-I,0;A$(P
L-I);A$(PL);: PRINT AT L,C;: RET
URN
1040 FOR A=64 TO CC+I STEP -1: I
F A$(PL,A)="" THEN NEXT A
1045 LET F=64-A
1050 FOR B=CC+I TO 64: IF A$(PL+
I,B)<>" THEN NEXT B
1060 LET G=B-CC: IF G>F THEN GO
SUB 2602: GO TO 1020
1070 LET A$(PL,CC+I TO )=A$(PL,C
+I TO A+I)+A$(PL+I,CC+I TO B-I)
: LET A$(PL+I,CC+I TO )=A$(PL+I,
B+I TO )+$: PRINT AT L,0;A$(PL)
;
1080 IF A$(PL+I)=$ THEN GO SUB
2602: GO SUB 8510: LET I$=CHR$
11: GO SUB 1620: LET L=L-(L<>0)
1090 GO TO 1010
1400 PRINT CHR$ 3;: PRINT PAPER
1; INK 7;AT 0,23;" H E I P P
A G E "
1402 PRINT PAPER 0; INK 7;" FRO
M THIS PAGE"
```




◀ 15

Ø

ing the text accordingly. The block markers will be removed on completion.

BLOCK DELETE will remove text in the block and close the text. The block markers will be removed.

Controls from help page

Select EDIT to obtain the help page.

S This is the save mode. Although the text file is created using the dimensioned array A\$(400,64), text is saved as a block of bytes to save time and tape space. To save all your text just follow the instructions but note that file names are not checked for syntax. Once saved you have the option to verify your text. If this should fail then enter GOTO 500 and try again. You may also save a set block of text using this option. Set your block marker as described previously and follow the instructions.

L This will load a saved text file into memory, deleting any existing text and saving it.

M

With this merge mode, a saved file can be merged with existing text. The position for the start of the merge is defined by the BLOCK START marker (or as saved if the marker is not set). The merged text will overwrite any existing text in this position. Ensure that line 400 is not exceeded. This mode can be used as a type of Mailmerge with names and addresses held on a data tape to be merged one after another to the same position in your text.

P

When run the program will ask if you are using a Centronics or ZX printer. If Centronics is selected, then a software routine is used to drive the Kempston interface which allows all ASCII characters to be printed including the £ sign. The printer may be configured to any typeface by breaking the program, Lprinting the codes then entering GOTO 500 to re-enter the program. The ZX printer will print at 64 characters per line. You

may elect to print all your text or a set block.

After LOAD/SAVE/MERGE/PRINT you will be returned to the text mode at the same place as you left it. If at any time the program breaks then enter GOTO 500 as a direct command to re-enter it.

Other printer interfaces can be used as long as the driver software does not interfere with the 64 column code. The UDG area is OK to incorporate the software press B_{right} when asked for the printer choice then merge the printer software Basic and move this Basic to line 140. So when run, the program will load your interface code when selecting option 2. You may save your modified Specword with CLEAR : GOTO 9999 but note that text created with your modified version will not necessarily load correctly into an unmodified Specword program. The program can also be configured to load and save text on Microdrive amending the commands to LOAD="M";1;"-" etc.

But if the program is modified in any way ensure that the first line REM statement is not disturbed; the first variable must be A\$(400,64) and VAR, BAS & ERR variables must not be tampered with.

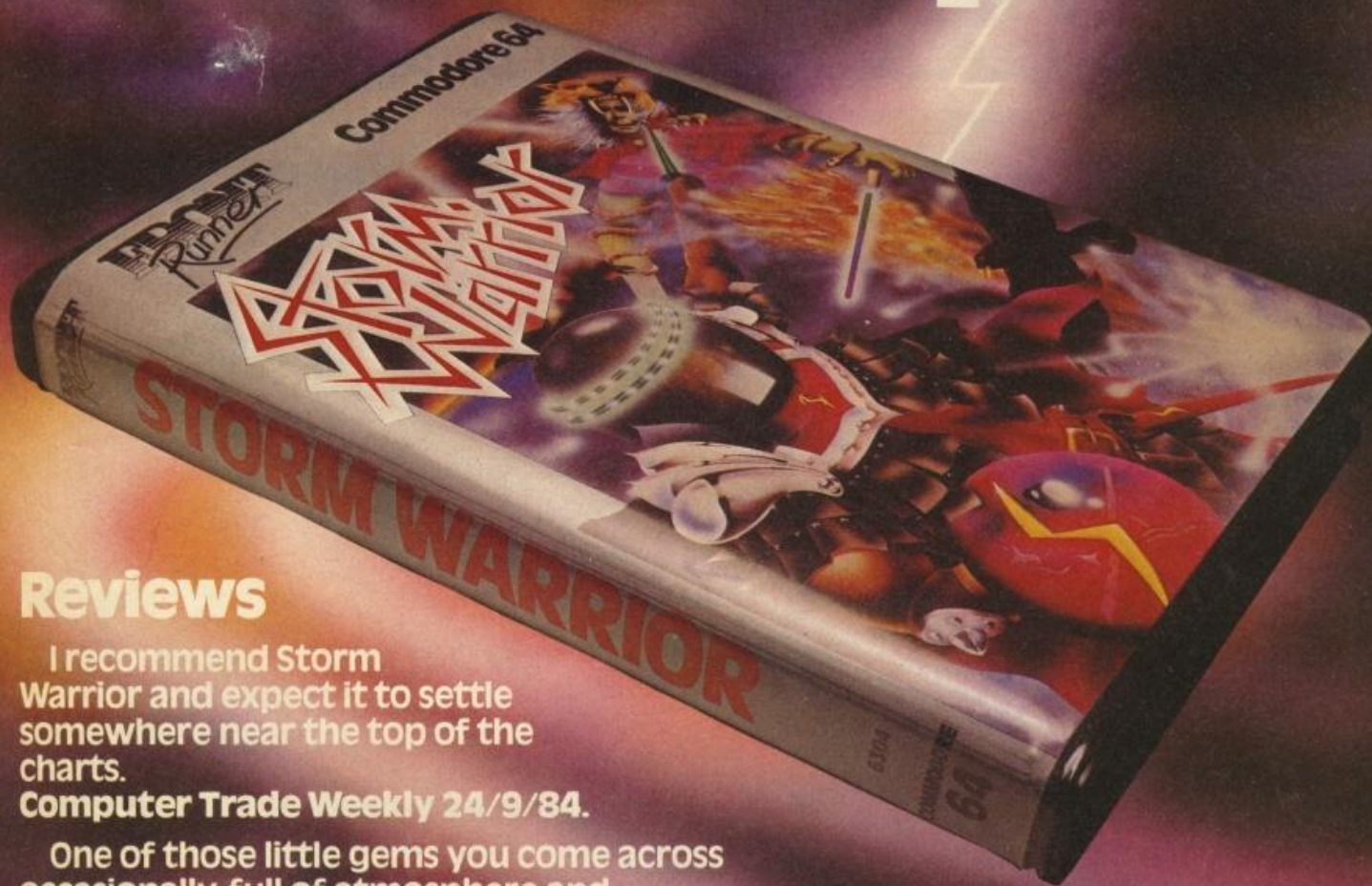
Listing 2 (continued next week)

```
1405 PRINT "<S> SAVE MODE (All o
r Block)""<M> MERGE MODE (as SA
VED or from Block START)""
1410 PRINT "<L> LOAD MODE""<P>
PRINT MODE (All or Block)""
1420 PRINT PAPER Ø; INK 7;" FRO
M E MODE "I PAPER 7; INK Ø;"ie.
BOTH SHIFTS ( do not keep a SHIF
T key pressed )"
1435 PRINT PAPER Ø; INK 7;"CURS
OR COMMANDS";TAB 22;"BLOCK COMMA
NDS";TAB 44;"FORMAT COMMANDS
"
1440 PRINT "<Q> <= GO TO start";
TAB 22;"<S> SET start";TAB 44;
"<K> + ADD line"
1445 PRINT "<E> >= GO TO end";TAB
22;"<Ø> SET end";TAB 44;"<J>
- DELETE line"
1450 PRINT "<R> < UP one page";
TAB 22;"<Ø> DELETE block";TAB 44
;"<L> = REFORM para."
1455 PRINT "<T> > DOWN one page
";TAB 22;"<Z> COPY block";TAB 44
;"<X> DELETE TEXT"
1460 PRINT TAB 22;"<M> MOVE bloc
k";TAB 44;"<H> WORD SEARCH"
1465 PRINT TAB 22;"<7> REMOVE bl
ocks"
1470 PRINT PAPER Ø; INK 7;" TEX
T MODE COMMANDS "
1471 PRINT "<I> INSERT ON/OFF""
<W> WORD WRAP ON/OFF""<B> MARGI
N SET""<N> MARGIN RESET"
1472 PRINT "<GRAPHICS> Status re
port""<DELETE> erase character
behind cursor""<ARROWS> cursor
up/down/left/right""<ENTER> new
line"
1480 PRINT PAPER I; INK 7;AT 23
,19;"<N> TO RETURN TO TEXT MODE"
1485 LET ERR=PEEK 23613+256*PEEK
23614: POKE ERR,3: POKE ERR+I,1
9
1540 RESTORE 1560: LET D=USR 644
71: LET D=D-(32*(D>90))
```

```
1560 DATA 80,7000,83,6000,76,500
0,78,3500,77,5500,90,1540
1570 FOR A=1 TO 6: READ X,Y: IF
X<>D THEN NEXT A
1580 GO TO Y
1600 IF C THEN PRINT I$;: RETUR
N
1610 LET C=63
1620 IF PL=I THEN GO TO 3610
1630 LET PL=PL-I: PRINT I$;: IF
NOT L THEN LET PS=PS-I: LET PE=
PE-I: GO TO 1850
1640 RETURN
1800 IF C<>63 THEN PRINT I$;: R
ETURN
1810 LET C=0
1820 IF PL=400 THEN GO TO 3600
1830 LET PL=PL+I: PRINT I$;: IF
L=23 THEN LET PS=PS+I: LET PE=P
E+I: GO TO 1850
1840 RETURN
1850 PRINT ;AT L,Ø; BRIGHT Ø;A$(
PL,I TO CC); BRIGHT I;A$(PL,CC+I
TO );
1852 IF PL=SL THEN PRINT AT L,S
C; OVER I;"F";
1855 IF PL=FL THEN PRINT AT L,F
C; OVER I;"I";
1860 PRINT AT L,C;: RETURN
2000 GO TO 1820
2200 GO TO 1620
2400 IF NOT C THEN GO TO 2440
2410 LET A$(PL,C TO )=A$(PL,C+I
TO )+" "
2420 LET C=C-I: PRINT AT L,Ø;A$(
PL);: GO TO 1852
2440 IF PL=I THEN GO TO 3600
2450 LET PL=PL-I: LET C=64: IF N
OT L THEN LET PS=PS-I: LET PE=P
E-I
2460 LET L=L-(L<Ø): PRINT I$;:
LET A$(PL,64)=" ": GO TO 2420
2600 IF C$=CHR$ 143 AND I$=CHR$
13 THEN GO SUB 2602: GO TO 8500
2602 IF PL=400 THEN GO TO 3410
2603 IF L=23 AND C=64 THEN GO S
```

```
UB 2610: GO TO 1850
2605 IF I$=CHR$ 13 THEN PRINT
2610 LET C=CC: LET PL=PL+I: IF L
<>23 THEN LET L=L+I: PRINT AT L
,C;: RETURN
2615 IF I$=CHR$ 13 THEN PRINT
2620 PRINT AT L,C;: LET PE=PE+I:
LET PS=PS+I: GO TO 1850
2800 BORDER 6: LET I$=CHR$ USR 6
4471: FOR A=I TO 8: IF I$=Ø$(A)
OR I$=Ø$(A+8) THEN LET I$=N$(A)
: GO SUB 2850: GO TO 4000
2810 NEXT A
2815 RESTORE 2820: LET D=CODE I$
: LET D=D-(32*(D>90))
2820 DATA 72,6500,55,2940,77,600
,78,2930,87,2900,66,2970,53,2910
,56,2950,90,200,48,400,73,2905,7
5,8500,74,8510,81,9500,82,9700,8
4,9800,88,9900,69,9600,76,1000
2830 FOR A=I TO 19: READ X,Y: IF
X<>D THEN NEXT A: GO TO 2850
2840 GO SUB Y
2850 BORDER 7: RETURN
2900 LET WW=Ø+(I$(WW=Ø)): RETURN
2905 LET Q=4000+(4300*(Q=4000)):
LET C$=CHR$ (95+(48*(CODE C$=95
))): RETURN
2910 IF SL=PS AND SL<=PE THEN
PRINT OVER I;AT SL-PS,SC;"F";
2920 LET SL=PL: LET SC=C: PRINT
OVER I;AT L,C;"I";AT L,C;: RETU
RN
2930 IF NOT CC THEN RETURN
2935 LET CC=Ø: PRINT AT Ø,Ø;: FO
R A=1 TO 24: PRINT BRIGHT I; OV
ER I;S$: NEXT A: PRINT AT L,C;:
RETURN
2940 GO SUB 3700: LET SC=Ø: LET
SL=Ø: LET FC=Ø: LET FI=Ø: RETURN
2950 IF FL=PS AND FL<=PE THEN
PRINT OVER I;AT FL-PS,FC;"I";
2960 LET FL=PL: LET FC=C: PRINT
OVER I;AT L,C;"I";AT L,C;: RETU
RN
```


Storm Warrior leads the pack



Reviews

I recommend Storm Warrior and expect it to settle somewhere near the top of the charts.

Computer Trade Weekly 24/9/84.

One of those little gems you come across occasionally, full of atmosphere and originality. – Bryan Skinner.

Personal Computer News 22/9/84.

Lots of original thought, playable as well as challenging. We have here – amazingly – a new concept. I don't think anyone will bore with this one quickly. – Bob Wade, Samantha Hemens and Chris Anderson.

Personal Computer Games November 1984.

This warrior should brew up a storm amongst games players everywhere. Definitely worth buying.

Computer & Video Games November 1984.

This game's superb sound, graphics and fighting sequences set it well above the others.

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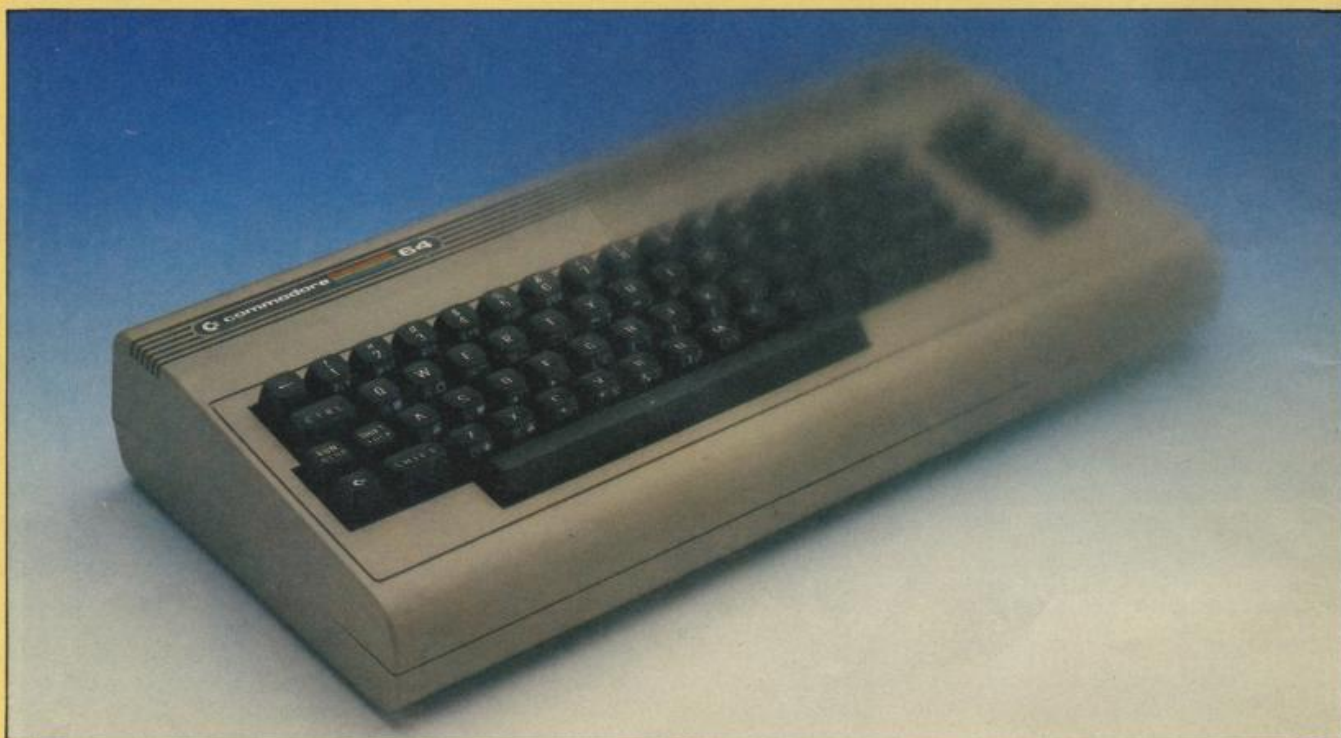
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RUDIMENTS OF RASTER INTERRUPTS

Richard Keeble shows you how to exploit rasters to give you split screen graphics.



Commodore 64 graphics programming can exploit rasters — the rows of dots that make up a TV screen — to produce interrupts. In this way, the screen can be split in two, with a different graphics mode in each half. An example would be a high-resolution graph with explanatory notes underneath.

Because the picture on screen is redrawn around 60 times per second, interrupts must be handled by machine code routines.

There are four registers which concern us here:

- 1 Raster compare register at 53266 (\$D012)
- 2 Raster compare register bit 8 at 53265 (\$D011)
- 3 Interrupt enable register at 53274 (\$D01A)
- 4 Interrupt status register at 53273 (\$D019)

The raster compare register has two functions. If it is read, the exact location of the raster is obtained. If written to, an interrupt is forced when the raster reaches that position.

For an interrupt to occur, the Interrupt enable register must be set to a 1. Finally, when an interrupt occurs, the

interrupt status register is affected. If caused by the raster, bit 0 is set to a 1.

Two listings are provided here, one in Basic and one in Assembly language. If using an assembler, lines 10-40 and 200-250 can be omitted from the Basic program.

When run, the program places multi-coloured blocks on the top half of the screen, with text underneath. This may not sound too exciting, but provides the rudiments of more advanced techniques as found in *The Hobbit* or *The Hulk*.

The Basic program is self-explanatory, but I shall deal with the machine code in sections.

```
SEI
LDAIM    29
STA      788
LDAIM    192
STA      789
```

This first part relocates the address for interrupt handling routines. The address is stored in 788 (LSB) and 789 (MSB). When the 64 is first switched on, these registers contain the address 59953.

Raster blaster

If an interrupt occurs while this address is being changed, the computer would

probably 'lock-up'. For this reason, the routine starts with SEI — set interrupt disable.

```
LDA      53265
ANDIM    127
STA      53265
LDA      53274
ORAIM    1
STA      53274
```

Here, 'bit 8' of the raster compare is set to a 0, so all values fall within the range 0 to 255 (the screen is from 51 to 251, ie 25 rows). The interrupt enable register is set to ON.

```
CLI
RTS
```

Having changed the vectors and prepared for the new interrupt routine, interrupts can be enabled again (CLI). The program is exited with the RTS.

Now onto the new routine:

```
LDAIM    1
BIT      53273
BNE      3
JMP      59953
```

Interrupts can also be caused by sprite collisions and light pens, so this part of the program checks that the flag was set by the raster compare IRQ, using the BIT instruction. If the raster didn't cause the interrupt, the usual interrupt

LDAIM	252
STA	53266
LDA	53270
AND IM	239
STA	53270

This does the opposite to the previous

Control is returned to the program via the RTI instruction.

```

10 FOR N = 1 TO 96 : REM POKE MACHINE CODE
20 READ SPLIT : REM INTO MEMORY
30 POKE 49151+N,SPLIT : REM STARTING AT 49152
40 NEXT N
50 PRINT"[CLR]"
60 PRINT"A DEMONSTRATION OF SPLIT SCREEN GRAPHICS"
70 PRINT"[DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN]"
80 PRINT"A DEMONSTRATION OF SPLIT SCREEN GRAPHICS"
90 POKE 53282,1 : REM BACKGROUND COLOUR 2,WHITE
100 POKE 53283,2 : REM BACKGROUND COLOUR 3, RED
120 SYS49152 : REM SPLIT THE SCREEN
130 END
200 DATA 120,169,29,141,20,3,169,192,141,21,3,173,17,208,41,127
210 DATA 141,17,208,173,26,208,9,1,141,26,208,88,96,169,1,44
220 DATA 25,208,208,3,76,49,234,173,18,208,201,252,176,21,169,252
230 DATA 141,18,208,173,22,208,41,239,141,22,208,169,6,141,33,208
240 DATA 76,85,192,169,130,141,18,208,173,22,208,9,16,141,22,208
250 DATA 169,14,141,33,208,169,1,141,25,208,104,168,104,170,104,64

```

ADDRESS	MACHINE	ASSEMBLY CODE	49200	C030	8D 12 D0	STA	53266
DECML HEX	CODE	PROGRAM	49203	C033	AD 16 D0	LDA	53270
000000000000	000000000000	000000000000	49206	C036	29 EF	ANDIM	239
49152 C000	78	SEI	49208	C038	8D 16 D0	STA	53270
49153 C001	A9 1D	LDAIM 29	49211	C03B	A9 06	LDAIM	6
49155 C003	8D 14 03	STA 788	49213	C03D	8D 21 D0	STA	53281
49158 C006	A9 C0	LDAIM 192	49216	C040	4C 55 C0	JMP	49237
49160 C008	8D 15 03	STA 789	49219	C043	A9 7E	LDAIM	126
49163 C00B	AD 11 D0	LDA 53265	49221	C045	8D 12 D0	STA	53266
49166 C00E	29 7F	ANDIM 127	49224	C048	AD 16 D0	LDA	53270
49168 C010	8D 11 D0	STA 53265	49227	C04B	09 10	ORAIM	16
49171 C013	AD 1A D0	LDA 53274	49229	C04D	8D 16 D0	STA	53270
49174 C016	09 01	ORAIM 1	49232	C050	A9 0E	LDAIM	14
49176 C018	8D 1A D0	STA 53274	49234	C052	8D 21 D0	STA	53281
49179 C01B	58	CLI	49237	C055	A9 01	LDAIM	1
49180 C01C	60	RTS	49239	C057	8D 19 D0	STA	53273
49181 C01D	A9 01	LDAIM 1	49242	C05A	68	PLA	
49183 C01F	2C 19 D0	BIT 53273	49243	C05B	A8	TAY	
49186 C022	D0 03	BNE 3	49244	C05C	68	PLA	
49188 C024	4C 31 EA	JMP 59953	49245	C05D	AA	TAX	
49191 C027	AD 12 D0	LDA 53266	49246	C05E	68	PLA	
49194 C02A	C9 FC	CMPIM 252	49247	C05F	40	RTI	
49196 C02C	B0 15	BCS 21	000000000001	000000000001	000000000000		
49198 C02E	A9 FC	LDAIM 252					

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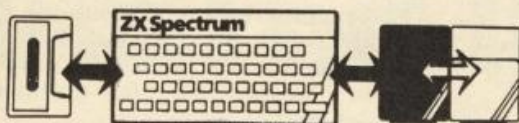
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MTX PLUS

Memotech users seeking more commands and subroutines should start with Stephen White's utilities.

Over the years articles have been published about the *FX commands and other hidden bits of interest on the BBC Micro, yet the Memotech machines, which are of similar calibre and have similar points of interest, have not yet had such extensive publicity.

Colour subroutines

The first subroutine on offer here changes the hideous blue and white

to the LOAD SCREEN and SAVE SCREEN commands on the Sinclair ZX Spectrum. They are not unlike the fourth subroutine included in the on-line Logo program at the end of this article. When the LOAD SCREEN routine is called via a GOSUB 1000 statement, a block of data on tape (previously recorded by you) will be loaded into memory, then transferred into part of your 16K video memory. The SAVE SCREEN routine, of course, will do the opposite: transfer data from video memory into main memory and from there onto tape. Be warned — it takes a long time to save and load a screen, so don't worry if you think it has crashed. These two subroutines save only virtual screen four; not Noddy screens or any other text on virtual screen five.

The next utility program or subroutine aims to correct an 'error' in the Memotech ROM. It isn't actually an error, but it would be more useful if this subroutine were included instead. When you want to change the background colour on virtual screen four using the command COLOUR 2.C: you'll notice you have to follow this by a CLS statement, which is a nuisance, especially when you have something valuable on the screen. However, all you have to do now is GOSUB

using for INK. Not only will it fill up circles, but it will fill up any shape — triangles or shoes, for instance.

Unfortunately, as the routine stands it has a few drawbacks. First, is the amount of notes it makes while filling an area, second is the time it takes to do it.

To get around the first problem, let it fill only small patches of the screen at one time, eg don't fill circles with a radius greater than 50. It is advisable to note that if the shape it's filling is not completely enclosed, the dot moving around will make its way to the edge of the screen and crash (go into the front panel).

Due to the lack of speed this routine is not suitable for fast action arcade games, but is satisfactory for computer aided design applications and graphical adventure games.

The on-line Logo program

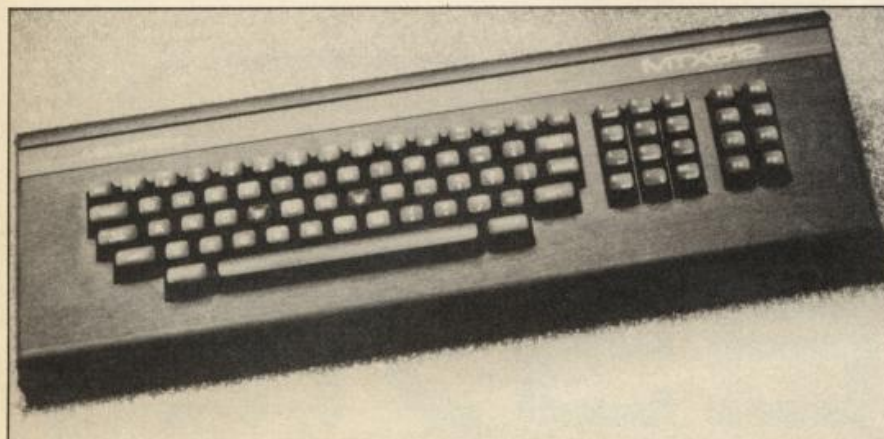
Logo is a language particularly catering for the graphics medium. This Logo program cannot be a complete language as it won't store a set of commands to be executed sequentially whenever required, but instead will execute commands where and when you give them. With this, you can design screens.

The commands available are:

CLS	clears the graphics screen
FILL	fills up an area of the screen
PLOT	sets a pixel to the current plot colour
COLOUR	defines colours for BORDER, PAPER and INK
DS1	allows you to type on the main screen
PENUP	you can move the pen around without it writing
PENDOWN	puts pen down again
FORWARD	moves pen forward
RIGHT	moves pen right by so many degrees
LEFT	moves pen left by so many degrees
FRAME	draws a frame around edge of screen (so you need not go off the edge accidentally)
JOY	hands control of pixel over to joystick (press fire button or home to get it back again)
QUIT	returns to Basic
LINE	draws line, as Basic command
CIRCLE	draws circle, around current plot position

If it is a command such as LINE which needs a few parameters after it you type: LINE (RETURN) 0, 0, 200, 150 (RETURN) and a line from the bottom left hand corner going across the screen will appear.

With Noddy handling text, it is only fair that Humpty Dumpty handles graphics — that's why I called this program Humpty Dumpty.



Getting Humpty Dumpty to handle graphics on the Memotech.

screen colours on the MTX. Why bother with a subroutine when you can use the CTRL D command to change the colours at the touch of a key? Well, as soon as you press Return, it goes back to white on blue, which is very bright when you're working late at night. It does this because early versions of the Memotech made a fuzzing sound when using certain other colour combinations and using white on blue was an attempt to conceal this. So, whenever you press RET, the ROM also changes the screen colours to white/blue.

However, by using interrupts you can make the screen change to colours of your own choice. Once the program is run, it can be deleted but not by using NEW or RESET. It is quicker to use the AUTO command to wipe over the lines. To change the black on green colour again, change the second digit in the data statement at line 90 to 16 X PAPER + INK.

The next two programs are equivalent

to the subroutine and the screen background will change colour. Obviously, you have to define the colour for the background, or paper as it's sometimes called, and this is done by setting the numeric variable c to the colour desired.

The last subroutine is a FILL subroutine, similar to that used in Melbourne House's *The Hobbit* and which is not available for the Memotech yet. This is also another program which might have been included in the ROM. The commands in Basic associated with graphics allow for windows (virtual screens), sprites, lines, points, circles and arcs, but don't cater for an area of the screen to be filled.

I decided pictures consisting of lines, sprites, and dots were inadequate so I wrote a routine which fills areas of the screen. It works by giving the routine a starting point — in the middle of a circle for instance. The routine will fill up the rest of the circle with the colour you are

◀21 Listing

Program 1 — change screen colour

```
10 FOR A=61440 TO 61448
20 READ B
30 POKE A,B
40 NEXT A
50 POKE 64152,195
60 POKE 64154,240
70 POKE 64862,159
80 STOP
90 DATA 62,28,211,2,62,135,211,2,201
```

Program 2 — save screen routine

```
1000 CODE
    LD A,0
    OUT (2),A
    LD A,0
    OUT (2),A
    LD HL,#D800
LOOP: IN A,(1)
    LD (HL),A
    INC HL
    LD A,H
    CP #F0
    JR NZ,LOOP
    LD HL,#D800
    LD BC,#1800
    LD A,0
    LD (#FD68),A
    CALL #AAE
    RET
1010 RETURN
```

Program 3 — load screen routine

```
1000 CODE
    LD HL,#D800
    LD BC,#1800
    LD A,1
    LD (#FD68),A
    CALL #AAE ;load from cassette
    LD A,0
    OUT (2),A
    LD A,#40
    OUT (2),A ;set VRAM pointer
    LD HL,#D800
LOOP: LD A,(HL)
    OUT(1),A ;send RAM into VRAM
    INC HL
    LD A,H
    CP #F0 ;is it finished?
    JR NZ,LOOP
    RET
1010 RETURN
```

Program 4 — virtual screen 4 'paper' routine

```
1000 CODE
    DI
PAPER: LD BC,#2000 ;VRAM pointer
    LD E,4 ;colour=4
LOOP: LD A,C
    OUT (2),A
    LD A,B
    OUT (2),A ;read byte
    IN A,(#01) ;from VRAM
    AND #F0
    OR E ;change colour
    PUSH AF
    LD A,C
    OUT (2),A
    LD A,B
    SET 6,A
```

```
OUT (2),A
POP AF ;write new colour
OUT (1),A ;into VRAM
INC BC
LD A,B
CP #38 ;check for end of
JP NZ,LOOP ;colours
EI
RET
1010 RETURN
```

Program 5 — fill routine

```
1000 REM ON ENTRY X VARIABLE IS
1010 REM X COORDINATE FOR STARTING
1020 REM POSITION AND Y VARIABLE
1030 REM IS Y COORDINATE
1040 POKE 64064,Y:POKE 64065,X
1050 CODE
    INIT: LD (#FA50),SP ;preserve system stack
    LD SP,#F000 ;set up routine stack
    PUSH AF
    PUSH 1X ;save registers
    LD HL,#FFFF ;set up stack
    PUSH HL ;bottom indicator
    LD HL,(#FA40) ;HL=XY coords
    LOOP: DEC L
    CALL POINTHL
    CP #01
    LP Z,LABEL 1 ;check below
    PUSH HL
LABEL 1: INC L
    DEC H
    CALL POINTHL
    CP #01 ;check left
    JP Z,LABEL 2
    PUSH HL
LABEL 2: INC L
    INC H
    CALL POINT HL
    CP #01 ;check above
    JP Z,LABEL 3
    PUSH HL
LABEL 3: DEC L
    INC H
    CALL POINT HL
    CP #01 ;check right
    JP Z,LABEL 4
    PUSH HL
LABEL 4: DEC H
    CALL PLOTHL ;plot position
    POP HL
    LD A,L ;check for
    CP #FF ;stack bottom
    JP NZ,LOOP
    POP 1X
    POP AF ;restore registers
    LD SP,(#FA50) ;restore stack
    RET
POINTHL: LD 1X,LABEL 5
    LD (1X+3),H
    LD (1X+4),L
    RST 10 ;equivalent to
LABEL 5: DB #85,27,67,0,0,1 ;GR$(X,Y,1)
    LD A,(#FE1A)
    RET
PLOTHL: LD 1X,LABEL 6
    LD (1X+2),H
    LD (1X+3),L
    RST 10 ;equivalent to
LABEL 6: DB#83,1,0,0 ;plot x,y
    RET
SYMBOLS:
1060 RETURN
```


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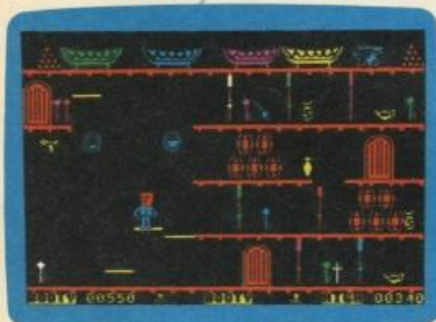
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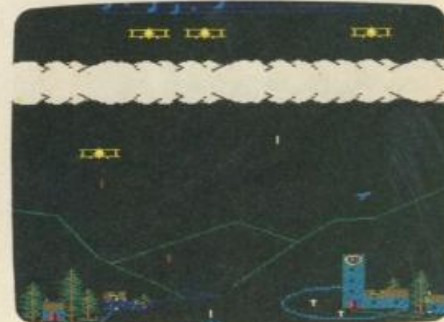
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DON'T MISS THE FLOAT

Atari assembly language programmers needn't do without floating point numbers. Frank O'Dwyer's routines and notes help you make the most of this facility.



One of the first things programmers miss when they use assembly language after using Basic is the ability to use floating point numbers. However, if you use an Atari computer the Floating Point Mathematics Package ROM gives you access to a library of over 20 subroutines which make handling floating point numbers easy. These subroutines fall into four categories:

Conversion routines: These include routines to convert between integers and floating point, and between ASCII strings and floating point. Similar to Basic's VAL() and STR\$() functions.

Mathematical operations: These include the standard operations add, subtract, multiply and divide. There are also functions to calculate logarithms and to exponentiate using base e or base 10. Regrettably, there are no trigonometric functions in the standard package. However, they are available in the Basic cartridge and work in both degrees and radians.

Assignment routines: There are routines to move values from one part of memory to another, this allowing you to save results of operations and conversions for later use.

Miscellaneous routines: Routines are provided to set the package's working registers to zero and to evaluate FP polynomials.

Since the details of the floating point representation are looked after by the ROM, there is no need to know them in order to use the routines. Suffice it to say that a floating point value requires six bytes to store and that a BCD (Binary Coded Decimal) format is used so that each decimal to digit is represented exactly.

Tell-tale signs

It is sometime useful to know that the

Figure 1: Important zero page locations for FP package

Name	Addresses	Comment
FR0	\$D4-\$D9	FP register 0.
FR1	\$E0-\$E5	FP register 1.
INBUFF	\$F3,\$F4	Pointer to ASCII string for ASCII/FP conversions. The memory from \$580 to \$5FF is free to store ASCII Strings. This tells the ASCII/FP conversion routine what character of the input string pointed to by INBUFF to begin at. Normally you store a zero here in order to use the whole string. However, if you store a non-zero value then the value will be added to INBUFF to yield the address of the string (similar to indirect indexed Y addressing mode). Note that the FP/ASCII conversion ignores INBUFF & CIX and always uses \$580 to \$5FF for its buffer.
CIX	\$F2	
RADFLG	\$FB	Store a six here if you want degrees mode, or a zero for radians.
FLPTR	\$FC,\$FD	Pointer to floating point number used by FP ROM's assignment routines. You store the address from or to which a value is to be fetched or moved. The low byte goes in \$FC, while the high byte goes in \$FD.

Figure 2: Input routine for FP numbers

This routine will input a floating point string and convert it to a six-byte internal form using the Floating Point Maths Package and page five space for the input string. The entry point is INPUTFP, the result is FR0 and the routine will refuse an empty line.

```

ERR      LDX #253      ;load x with the bell character
          JSR PRINTX    ;sound error
INPUTFP  LDX #'?'      ;load x with ASCII for '?'
          JSR PRINTX    ;output question mark prompt
          LDY #0        ;initialise index to page 5 buffer
GETLIN   STY $CD        ;save y in temp location
          JSR GETA      ;get 1 char input from editor
          LDY $CD        ;restore y
          STA $580,Y    ;store 1 char of input in buffer
          INY           ;advance index
          CMP #155      ;check for end line char
          BNE GETLIN    ;if not end, get another char
          CPY #1        ;was that an empty line?
          BEQ ERR       ;if so sound error
          LDA #580&255  ;low byte of buffer for string
          STA $F3       ;low byte of INBUFF
          LDA #580/256  ;high byte of buffer for string
          STA $F2       ;high byte of INBUFF
          LDA #0        ;tell FP ROM to use whole string
                   for conversion
          STA $F2       ;by storing zero in char index
          JSR $D800      ;call FP ROM routine to compute
                   VAL of string
          RTS           ;finished
    
```


first bit (MSB) of the first byte of a number gives the sign of that number. It will be 'on' (equal to 1) if the number is negative and 'off' (equal to 0) if it is positive.

This leads to an unfortunate situation where 0 (zero) and -0 (minus zero) have two different representations even though they are mathematically identical. Beware of this when testing for equality. A more useful consequence of the floating point representation is that if you want to compare two floating point numbers, assuming both numbers are positive, you can imagine the numbers are two six-character ASCII strings and use a string comparison.

The mathematics package performs its operation on two six-byte registers in zero page called FR0 (located between \$D4 and \$D9) and FR1 (\$E0 to \$E5). To perform an operation the user must first store the two numbers to be operated on in FR0 and FR1, then call the ROM subroutine to do the operation. The result of the operation will actually be left in FR0.

Functions and conversion routines all use FR0 as the storage space for their operands and results. The other important zero page locations for the mathematics package are listed in Figure 1. Conversions between ASCII strings and floating point normally use page 5 (\$580-\$5FF) for buffering ASCII strings, but you can direct the ASCII to floating point routine to use the buffer of your choice for its input. Figure 2 shows an input routine for floating point values based on the conversion. If you were to translate this into Basic, it would look like:

```
INPUT A$: FR0=VAL(A$)
```

You can use the opposite conversion (float to ASCII string) to print out floating point numbers. See Figure 3 for a routine to do this. This is similar to writing in Basic:

```
A$=STR$(FR0): PRINT A$
```

Putting it together

Figure 4 shows a main program using these routines. It is the machine language equivalent of:

```
10 INPUT X
20 INPUT Y
30 PRINT X*Y
Or, for a more literal translation:
10 INPUT FR0: FR1=FR0
20 INPUT FR0
30 FR0=FR0*FR1: PRINT FR0
```

Figure 5 has two routines to get characters to and from the screen editor. These are rather long-winded in order to make them compatible with all Atari machines. Rather than use a simple JSR, the routines go through all the OS vectors to make sure that the routines will work even if the OS is rewritten, as it has been in the OS B version.

I'm pretty sure that the screen editor routines are in the same location for all current Atari's with A and B versions of the OS, but it's better to be safe.

Figure 3: Routine to print contents of FR0

```
PRINTFP JSR $D8E6 ;compute STR$(FR0) result string is
           given by INBUFF($F3,$F4) which is
           updated by the ROM routine
PR        LDY#0    ;initialise index to page 5 buffer
          STY $CD   ;save index in temp location
          LDA ($F3),Y ;get char from string
          PHP       ;save status flags
          AND #$7F  ;convert to true video
          TAX       ;get ready to output char
          JSR PRINTX ;output char
          LDY $CD   ;restore index
          INY       ;advance index
          PLP       ;restore flags
          BPL PR    ;if not last char then do next
          RTS       ;finished
```

Figure 4: Program to demonstrate routines

```
MAIN      JSR INPUTFP ;input FR0
          JSR $DD86   ;move FR0 to FR1
          JSR INPUTFP ;input FR0 - now two operands are in
                    FR0 and FR1
          JSR $DADB   ;ROM multiply routine
          JSR PRINTFP ;Print the answer (in FR0)
          LDX #155    ;Print newline char
          JSR PRINTX
          LDX #155    ;Print another
          JSR PRINTX
          JMP MAIN    ;run program again
```

Figure 5: Screen editor I/O for characters

Routine to print a character whose code is in the x register, equivalent to PRINTCHR\$(X).

```
PRINT X   JSR FINDDEV ;find screen editor jump table
          LDY #7       ;extract 7th byte from jump table
          LDA ($CB),Y  ;high byte of jump address
          PHA          ;push onto stack
          DEY          ;get preceding byte from jump table
          LDA ($CB),Y  ;low byte of jump address
          PHA          ;push onto stack
          RTS          ;jump into routine
```

Routine to get one character from the screen editor into the accumulator, equivalent to GET #1,(if channel one is connected to the screen editor).

```
GETA      JSR FINDEV ;find screen editor jump table
          LDY #5       ;get 5th byte from jump table
          LDA ($CB),Y  ;high byte of jump address
          PHA          ;push onto stack
          DEY          ;get preceding byte
          LDA ($CB),Y  ;low byte of jump address
          PHA          ;push onto stack
          RTS          ;jump into routine
```

Routine to find jump table. It assumes 10c80 is opened to the screen editor, which is normally the case.

```
FINDDEV   LDY $340     ;get offset into handler table
          LDA $31B,Y  ;get low byte of jump table address
          STA $CB     ;save in zero page address
          LDA $31C,Y  ;get high byte of jump table address
          STA $CC     ;save in zero page address plus 1
          RTS
```

Figure 6: Mathematics routines in standard package

Name	Address	Effect	Comment
FADD	\$DA66	FR0=FR0+FR1	Add routine.
FSUB	\$DA60	FR0=FR0-FR1	Subtract routine.
FMUL	\$DADB	FR0=FR0×FR1	Multiple routine.
FDIV	\$DB28	FR0=FR0/FR1	Division routine.
EXP	\$DDC0	FR0=EXP(FR0)	Raises e to the power of FR0.
EXP10	\$DDCC	FR0=ALOG(FR0)	Raises 10 to the power of FR0. There is no simple Basic equivalent to this.
LOG	\$DECD	FR0=LOG(FR0)	Calculates natural log of FR0 (base e).
LOG10	\$DED1	FR0=CLOG(FR0)	Calculates common log of FR0 (base 10).

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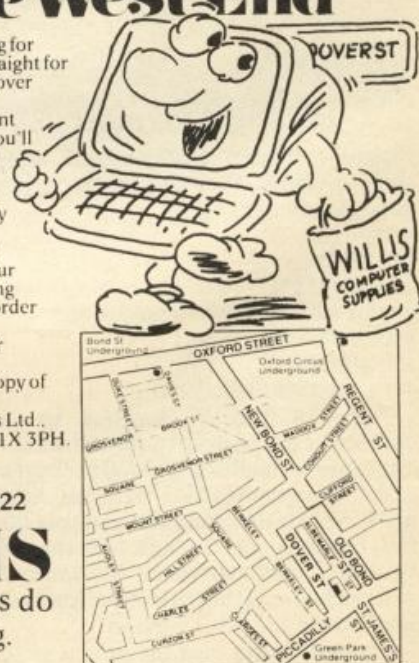
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◀ 27 If you assemble these routines (Figures 2-5) to page 6, you can run the machine language and get a feeling for how the conversion and multiply routines behave before using them in your own programs. Try replacing JSR \$DADB with a JSR to some of the other ROM routines and familiarise yourself with those. (See Figure 6).

It is often desirable when working with floating point numbers to save and recall intermediate results. The ROM contains seven routines to help with this. They are listed in Figure 7, along with examples of their use.

An important register for use with these routines is FLPTR (\$FC,\$FD). This normally contains an address from or to which a floating point value is to be moved.

This is stored in low byte/high byte form and the destination or source for the floating point number is taken to be either FR0 or FR1, depending on which subroutine you call.

There is also a special routine to move a value from FR0 to FR1. The subroutines are also available in a simpler form where you load the X register with the low byte and the Y register with the high byte of the address of the number you want to move. After execution, FLPTR will contain the address, so you can mix methods to speed up your programs.

Other routines of note are those which store zero in FR0 and FR1, and the Basic cartridge routines. These are listed in Figure 8. If you're using the trigonometric routines in the Basic cartridge you can set radians mode by storing a 0 in RADFLG (\$FB) and degrees mode by storing a six. Note that RESET and Basic's NEW command both set radians mode.

Conversion

Two interesting routines that I have not yet mentioned are the Integer/FP conversion routines. To use the integer to floating point conversion simply store the low byte of your 16-bit integer in \$D4 and the high byte in \$D5. Then call the ROM routine and FR0 will contain the floating point representation of the 16-bit integer. To do the reverse conversion call the FP/Integer conversion routine which will leave the low byte of the integer in \$D4 and the high byte in \$D5.

This conversion takes the *nearest* integer, ie it rounds the number. To get the equivalent of Basic's INT function, first subtract 0.5 from FR0, then call the conversion routine. The conversion routines are listed in Figure 9.

Finally, Figure 10 is a program in Basic which will allow you to type in a number and will print out the six bytes that represent that number.

These bytes are printed in decimal, but you will get a much clearer picture if you convert them to hexadecimal. ■

Figure 7: Assignment routines provided in standard package

Name	Addresses	Comment
FLDOR	\$DD89	Loads the FP number pointed to by the x,y registers to FRO.
FLDOP	\$DD8D	Loads the FP number pointed to by FLPTR (\$FC,\$FD) to FRO.
FLD1R	\$DD98	Loads the FP number pointed to by the x,y registers to FR1.
FLD1P	\$DD9C	Loads the FP number pointed to by FLPTR to FR1.
FSTOR	\$DDA7	Stores FRO into the space pointed to by the x,y registers.
FSTOP	\$DDAB	Stores FRO in the space pointed to by FLPTR.
FMOVE	\$DDB6	Moves the number in FRO to FR1.

Example: store FRO into a six-byte area labelled MEM.

```
LDX #MEM&255    ;low byte of storage address
LDY #MEM/256     ;high byte of storage address
JSR $DDA7        ;call ROM routine to save FRO for later use
;
;
MEM .BYTE 0,0,0,0,0,0 ;six byte storage area
```

```
LDA #MEM&255    ;low byte of storage address
STA $FC         ;low byte of FLPTR
LDA #MEM/256     ;high byte of storage address
STA $FD         ;high byte of FLPTR
JSR $DDAB       ;call ROM routine to save FRO
```

Figure 8: Miscellaneous and Basic cartridge routines

Name	Address	Effect	Comment
ZFR0	\$DA44	FR0=0	Clears FR0 by setting bytes to 0.
ZFR1	\$DA46	FR1=0	Clears FR1 by setting bytes to 0.
SIN	\$BDA7 (Basic cart.)	FR0=SIN(FR0)	Uses RADFLG to see if mode is radians or degrees (see Figure 1). Uses RADFLG.
COS	\$BDB1 (Basic cart.)	FR0=COS(FR0)	Uses RADFLG.
ATAN	\$BE77 (Basic cart.)	FR0=ATAN(FR0)	Uses RADFLG.
SQR	\$BEE5 (Basic cart.)	FR0=SQR(FR0)	Square root routine.

Note: Make sure that Basic cartridge is inserted before using the Basic routines.

Figure 9: Conversion routines

Name	Addresses	Comment
AFP	\$D800	ASCII string to floating point conversion. Uses INBUFF and CIX (see Figure 1) to point to its input string. This may be anywhere in memory, but \$580 to \$5FF is free for this purpose. The result of this conversion is left in FR0. Similar to Basic's VAL() function.
FASC	\$D8E6	Floating point to ASCII string conversion. Converts FR0 to a string in a similar fashion to Basic's STR\$() function. The result output buffer is at \$580 to \$5FF. Sometimes the two preceding bytes will be used to prefix characters such as a minus sign, or a decimal point. INBUFF (see Figure 1) will give the address of the first character in the string in such a case. The last character in the string is flagged by being inverse.
IFP	\$D9AA	Integer to floating point conversion. Store the integer in \$D4 and \$D5 in low byte/high byte form and call the routine. The FP equivalent will then be in FR0.
FPI	\$D9D2	FP to integer conversion. Store the FP number in FR0. The routine will leave the equivalent (nearest) integer in \$D4 and \$D5 in low byte/high byte form.

Figure 10: Floating point conversion utility in Basic

```
10 REM input no and print out 6 bytes
30 BCD=0: STORE=(PEEK(PEEK(138)+PEEK(139)*256+5)-128)
  *8+PEEK(134)+PEEK(135)*256+2: CONVERT=1000
40 GRAPHICS 0: ?"***FLOATING POINT UTILITY***"
50 ?:"ENTER NUMBER": INPUT NUM
60 ?:"REPRESENTATION = ":BCD=NUM: GOSUB CONVERT
70 GOTO 50
1000 ? PEEK(STORE): FOR I=1 TO 5: ?",";PEEK(STORE+I):
  NEXT I: ?RETURN
```




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CREEPY CASTLE

Bob Chappell ventures into a haunted castle in search of restless spirits and becomes an Arabian version of Robin Hood, sharing his loot with the poor.

It was the crack of dawn and the urgent knocking woke me from a troubled sleep. Opening the door, I was startled by the sinister black-garbed figure who stood before me. He stared piercingly into my face before thrusting a package into my arms. Without a word, he strode swiftly down the path, where a small scarlet vehicle awaited. I called out but he had already disappeared into the morning mist. I tore open the parcel and my suspicions were confirmed. The postman had delivered some new adventures.

Sadim Castle

Up on the test bench went *Sadim Castle*, a real-time text adventure for the BBC B and Electron from MP Software. As the legend has it, Lord Sadim and his wife Leonora were idyllically happy until she was unfaithful to him. Discovering his wife's infidelity, he sealed her up in a room in the castle.

Screaming and cursing, she lived but for a few days. Shortly after Lord Sadim was decapitated by a falling portcullis

tom is reserved for your commands. The text is attractively presented (using different colouring depending on the nature of the text) and response time is instantaneous. The adventure is played in real-time, with an update taking place around every 30 seconds. Other characters continue to do their own thing, even though you may be sitting back staring at the ceiling for inspiration.

To halt the real-time element (essential if you want to pop out to make a reviving cup of tea), you can freeze the game by pressing, appropriately enough, the escape key. The game will remain in this state of suspended animation until you press the space bar.

While I was playing, a sinister cloaked figure (no, it wasn't the postman again) kept flitting in and out of the shadows. A cowed monk also kept coming up to me, shaking his head and then blessing me before moving on.

Exploring a bit, I soon found a farm that grew garlic. All self-respecting adventurers

sign saying 'Beware of the Bull' was a mite discouraging. The chapel looked more promising. On the altar there was a gold crucifix, a Bible and an old prayer book. However, while trying to take the prayer book, I was struck by a thunderbolt.

Never one to forget a lesson (and thanks to the SAVE game feature), I tried a different tack

time and moves about at your command. As he trots to the left or right, the scene scrolls with him until he comes to a grinding halt at the limits of that particular location. When he moves to a location outside the boundaries (over a wall, for example), the picture is replaced by a new scrolling scene.

Text is displayed in capital



Our hero Zim is lost in the desert. Can you help him?

and was rewarded by seeing "Help Thyself" in fiery red letters appear over the altar! Being upright, kind and helpful pays dividends in this game.

The game allows you to enter quite complex commands, including talking to other characters. *Sadim Castle* is a first rate adventure, having plenty of puzzles, interest and atmosphere. I thoroughly recommend it to both BBC B and Electron adventurers. It costs £7.50 on cassette, £10.50 on disk, and is published by MP Software (051-334 3472).

Zim Sala Bim

The second adventure, *Zim Sala Bim*, was for the Commodore 64 and rather unusual it was, too, with its scrolling graphics, animation, music and text.

It takes place in Arabia, where Zim Sala Bim (you) has been set the task of penetrating the Sultan's castle and making off with the gold. A sort of Arabian Robin Hood, Zim has to take the loot to a secret cave to share it out among the poor.

Each location is depicted graphically in the top half of the screen. But here's the difference — Zim is on screen all the

letters, at the foot of the screen, the lowest part being reserved for your input. You can control the speed of Zim's movements by tapping a numeric key when he's stationary. A word of warning — the game starts in the slowest speed and it has a dreadful effect on your input. The keyboard scanning routine is almost brought to a standstill; not only do you have to key in at a snail's pace, but some of the key depressions don't register. The game is virtually unplayable at this speed. Switching it into the fastest mode (9) has an immediate beneficial effect.

The textual descriptions are terse and the game's syntax and vocabulary seem very restricted. For example, having found and picked up a pistol, neither shooting, firing or even examining it was understood by the program.

The game format and play is original, granted, but as an adventure it is very shallow. Text has been sacrificed on the altar of graphics. Give me a meaty, atmospheric text adventure any day.

Zim Sala Bim is priced at £9.95 and is published by Melbourne House. (0235-53001).

SADIM CASTLE

Copyright (c) 1984 By John Hudson & Helen Seymour
Produced by MP Software Ltd.

You are outside a pair of magnificent gates adorned with lethal spikes emblazoned across them are the words SADIM CASTLE - WEST GATES. The gates are set into a high unscalable wall which stretches N/S as far as the eye can see & a track runs beside it.
You can also see:
The gates are closed

Command>

Can you get in to deserted Sadim Castle?

(nasty) and it is rumoured that a woman in white looked on, laughing (gulp).

Forget about a treasure hunt, that's child's play. In this adventure you have been given the unenviable task of going to the now deserted Sadim Castle, to seek out Leonora's remains to give them a decent burial so that her spirit can rest in peace.

The screen is split into two text areas: the top part is used for descriptions, while the bot-

should know what that's likely to come in handy for. Nearby, the farmer's wife was using a pitcher to catch the drips from the leaking farm-house roof but when I tried to separate her from her jug, the farmer chased me off the land with his shotgun. Perhaps I should have helped her fix the roof first but I didn't fancy climbing that rickety ladder.

A meadow might have been worth investigating but the

SECOND THOUGHTS

You too can upgrade the BBC with the latest offering from Upgrade Technologies. And, says Trevor Jenkins, it costs significantly less than Acorn's second processor.

Are you a frustrated BBC micro user who can't quite afford a Z80 second processor? Or looking for a cheap machine to run CP/M on? Upgrade Technologies has put a Z80, with 64K of RAM and a floppy disk controller into one box for significantly less than Acorn's own second processor. In fact, Upgrade's is not a true second processor because it does not connect through the Tube but uses the RS432 port. This box will be of interest to BBC model A users, or model B users not able to get a DFS, as it does not rely on the Beeb's disk interface.

The Upgrade has also been used on a Lynx; the work for this was done by a member of the Lynx user group and they or Upgrade Technologies should be contacted for details. If you wish to replace your BBC or Lynx at any time you can still keep your Z80 CP/M system.

First impressions

The Upgrade is contained in a sturdy metal box the width and height of a 5.25in disk drive but considerably longer. I would not advise standing the drives on this box as there are ventilation holes at both ends. This metal box will cause problems to anyone who intends adding to the system as there is no space to bring connectors out. Up-

grade suggests you talk to the company if you want to do this. The box provides adequate radio frequency screening unlike the BBC itself.

The printed circuit boards that make up the system are well laid out but I have some misgivings over the mechanical connectors between them. They provide good electrical contact but the floppy disk controller board is left to flap around in mid-air. From the photographs in the advertising the other extension boards appear to be similar in both layout and mechanical connection.

A list of the available extension boards is impressive, particularly the expansion memory boards. These can be configured to work as RAM disks but may, with changes to the monitor, be used as banked switched memory. This latter may be important if you want to progress to CP/M plus.

The Upgrade places no load on the Beeb's power supply because it carries its own integral one, providing enough power for itself and a number of expansion boards. The use of an additional

power supply unit should be a relief to those with early BBCs that overheat.

Connection to the Beeb is made via the RS432 socket — model A users will need to buy this feature if it is not already fitted. The disk drives plug into the Upgrade rather than the BBC and are separate from the DFS if it's fitted.

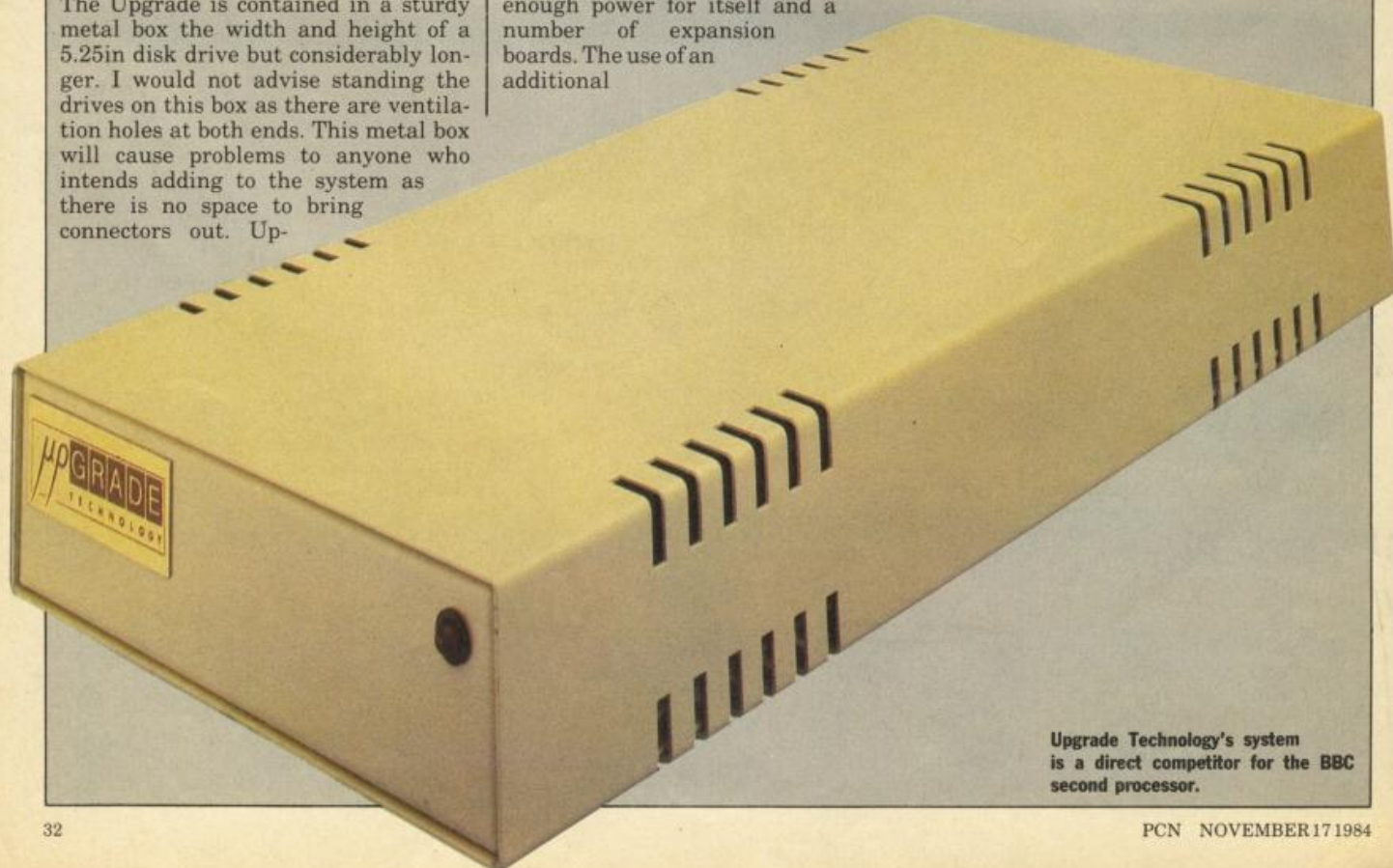
There is no hardware manual, and the only mention of these two connections is on one page of the introductory or CP/M document and is a very badly drawn diagram. In fact, the hardware documentation is disgraceful.

There are some nice features to the hardware: it has a single LED at the front to indicate if the power is on. The on/off switch is on the rear of the case as is the reset switch. Both these switches are accessible, but not too much so, and they are on opposite sides of the case. Using the reset switch does not affect the BBC and the micro's reset switch reboots CP/M. Pressing CTRL and Break will return the BBC to its own operating system without turning the thing off.

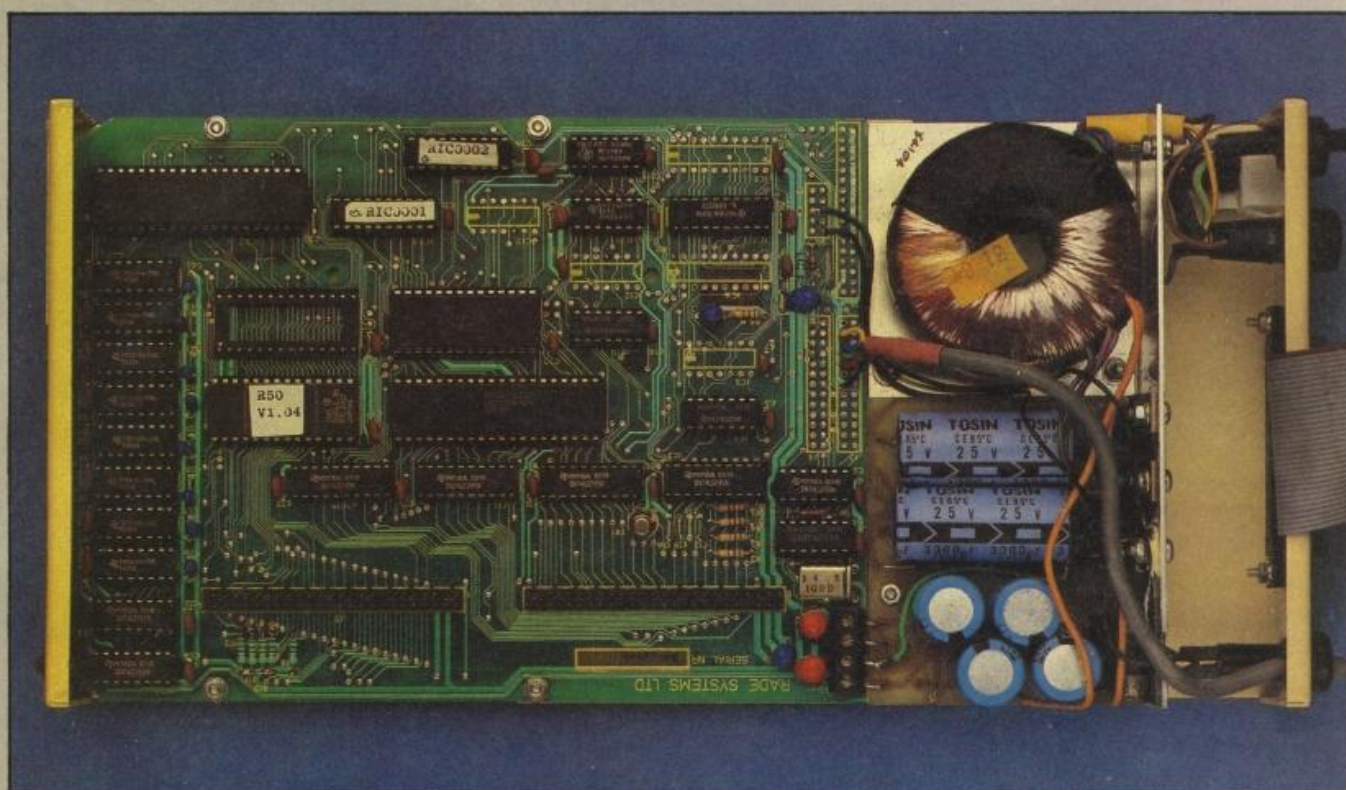
The floppy disk controller board supports 5.25in floppies and 3in microfloppies, in any combination of single or double density.

The COS system (see software section) was not supplied on floppies for the review — it was 80 track only, so check before you buy. The disk labels did not state this and it was only by finding another drive that was switchable between 40 and 80 tracks that the disks could be used.

I have one serious misgiving about the Upgrade and this is its requirement for lots of mains plugs and sockets. I had five



Upgrade Technology's system is a direct competitor for the BBC second processor.



sockets in use: one each for the Beeb, the Upgrade, the disk drives, the printer and the monitor. Most common mains distribution boards have only four outlets.

The problem is reduced slightly if your disk drive can be powered from the BBC's power outlet socket underneath the case. This works but does not really solve the problem.

If you are like me and turn the mains socket off at the wall, rather than every individual item, there will be a large power surge through the plug or distribution board when you switch the power back on. This is always going to be a problem with this sort of second processor add-on, and is not just restricted to the Upgrade.

The review model's polystyrene box is fine for storage and delivery but not much more. But with all the bits and pieces necessary to use this unit, you're not likely to be moving it around much.

Unlike the BBC, the Upgrade has a number of optional specialist interfaces available, ex-stock from the manufacturers. Of particular interest is the IEEE488 controller board for £90. However, Upgrade does not provide software for it — which involves understanding how some very sophisticated support chips work. If you cannot afford the official BBC add-ons and are confident that you can write the required software there's no problem.

Documentation

My initial optimism at seeing seven manuals was sadly disappointed. There was one manual provided by Upgrade, which attempted to be a hardware overview, an introduction to CP/M and

floppy disks, the hardware connector instructions and the BBC ROM installation instructions — all in 50 pages or so. Upgrade says this was an old copy and the manual has been rewritten.

Anyone proposing to use the system for programming should invest in a copy of the Digital Research manuals and a good book on CP/M. The version seen was very superficial and, for example, the documentation on ASM was condensed into two sentences and that on PIP

was a page or so but had many typing errors. The only reasonable section described ED (the text editor). Nowhere could I find how to use a printer with the system, so it was only by guesswork that the printer was connected to the Beeb's printer port. The Beeb's printer becomes CP/M's LST:.

The number of characters transmitted down the RS432 port is probably huge but at least it works.

Upgrade Technologies cannot be

35▶



The Upgrade is designed to fit in nicely alongside your Beeb.

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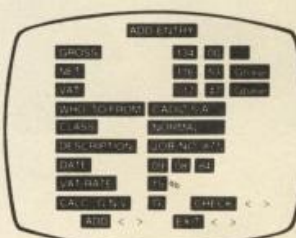
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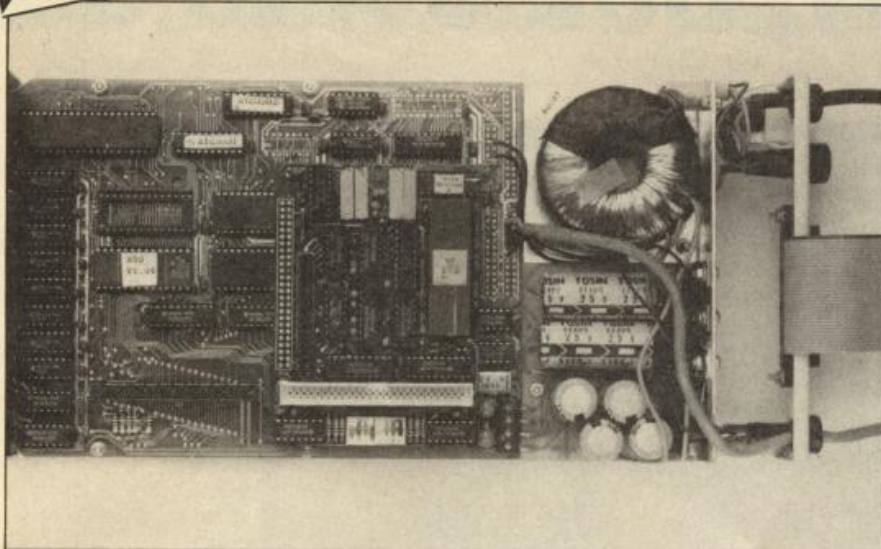
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SOFTWARE ★ ★ ★ SIMPLY THE BEST

PCN

HARDWARE PRO-TEST: BBC



The second processor, with the disk controller in place.

blamed for the other six manuals that arrived with the system, which describe COS, the Cobol compiler and so on. Well they seem to. These are probably the worst manuals I have seen since the early CP/M version 1 manuals.

The COS manual explains the philosophy of the system and then describes all the available statements of the Cobol language that may be used. Unfortunately, the pages are peppered with buzzwords. The Cobol language is described as JCL or 'Job control language'. It is patently not; it is a collection of Cobol programs and subprograms linked together to form a single program with the portion to be executed and selected in any way the programmer wishes.

Software

The review model came with Digital Research's CP/M version 2.2; unlike many of its competitors, this is the real one complete with all its attendant utilities. Microsoft's Basic interpreter is missing — indeed there are no languages except for the Digital Research giveaway assembler ASM.

In this cut-throat business, to offer only CP/M is probably not sufficient. It is nice to be able to run CP/M and compatible software but it is not incentive enough for the average micro-computer user to buy it. Who wants to fight through either ASM or CP/M itself just to get some simple programming done? The CP/M user group may have what you want but can they write disks in Upgrade format? Upgrade Technologies has gone halfway to providing a solution as it is offering an optional £50 package of an interesting extension to CP/M called Commercial Operating System or COS. It includes a Cobol compiler, a word processor (not Wordstar), a mailing system and other goodies.

COS is probably worth buying for any CP/M system as it provides additional features to make CP/M into a real operating system. It has better error

handling features than the ubiquitous CP/M "BDOS error" message. During the review, a disk was accidentally corrupted before any backup copies could be made and though COS allowed much of the disk to be used, CP/M would only give its infamous message. Since the corrupt disk contained the Cobol compiler it was quite important that the disk could be used.

Cobol is not the best programming language, but it is adequate for most business applications, more so than Basic. Anyone wishing to use this particular version should know that it is based on the previous ANSI standard of 1968, whereas most textbooks now only refer to the 1974 standard or even to the anticipated standard still being defined by ANSI. Also it does not implement the full language, allowable within the Cobol community and the unwary can be caught out. The saving feature of this implementation is its ability to run more than one subprogram at once (multi-tasking.) This is achieved with the provision of a number of subroutines in the language support system.

I cannot understand why CP/M still has no screen-oriented editor available for it. COS once again comes to the

rescue, this time with its word processor which is supplied on the COS disks. It is not Wordstar, nor does it attempt to look like it. If anything, it is reminiscent of the Research Machines 380Z editor.

My criticism of the software provided lies with ASM, *ie* why dish out an 8080 assembler on a Z80-based system? ASM does not recognise Z80 mnemonic instructions nor can it generate those instructions not actually implemented on an 8080. For serious assembly level programming throw away ASM, and DDT as well, and invest in either Digital Research's MAC and ZSID or Microsoft's M80. The latter recognises the Z80 mnemonics, while MAC does not.

Whether you have purchased 40 or 80 track drives, the CP/M distribution disk is a 'flippy' (forty tracks on one side, eighty on the other) — just make sure you put it in the correct way up for your drives. Once you have connected everything, booting the disk is simple — just turn on and put the disk in.

A word of warning about some disk drives: basically, the more expensive the drive the less likely you are to experience problems.

Single and double units were tried without any problems, apart from one where it may well be the drive that is at fault. If only one disk drive is available, you will still have an advantage over Apple Macintosh users.

Verdict

Overall this is a good piece of hardware and any major criticisms apply to similar products. As a BBC second processor it succeeds very well and is certainly better value than Acorn's. With the optional COS package it costs about the same as the Acorn upgrade, but I prefer Upgrade Technologies' device.

If you want a CP/M-based system but do not own a BBC, talk to Upgrade Technologies about your requirements as it may well have something more appropriate for you. If you're a BBC owner convinced of the superiority of a CP/M system, buy the Upgrade and throw your BBC away. ■

SPECIFICATIONS

Price	£299 + VAT (plus cost of a BBC micro)
Processor	Z80
RAM	64K standard Additional 64K (£140), 128K (£250), used as a RAM drive
ROM	2K plus 2K ROM for the BBC
Display	Uses BBC, allows all modes and colours
Storage	5.25in and 3in controller as standard (independent of BBC DFS) 8in controller £80 to BBC via RS432
Interfaces	IEEE488 (£90) Parallel I/O (£35) serial I/O (£50)
Software	CP/M version 2.2 supplied as standard, TurboDOS available POA, COS package (Cobol, etc) (£50) Budgeteer (Price not decided)
Languages	Digital Research's ASM supplied, Cobol compiler (with COS)
Distributors	Upgrade Technologies 01-451 4414/5/6

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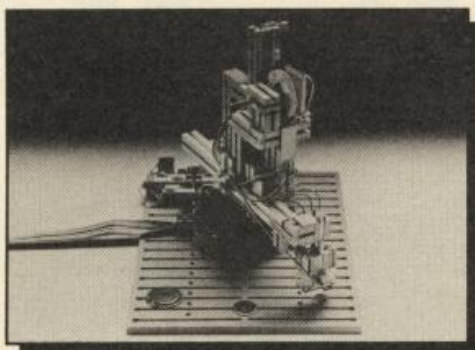
Micro Robotic Systems of Great Britain and Fischertechnik of Germany have co-operated to bring you a unique offer – the versatile Fischertechnik robot builder kit together with Micro Robotic System's interface package for just £115. The most exciting low-cost robotic system currently available to the enthusiast or educational user.

The Fischertechnik kit contains detailed instructions and all materials, including microswitches, motors, relays and potentiometers required to build any of the 6 robots described. Once built the device can be broken down and made into another. With a little imagination many other exciting projects can be developed with this kit.

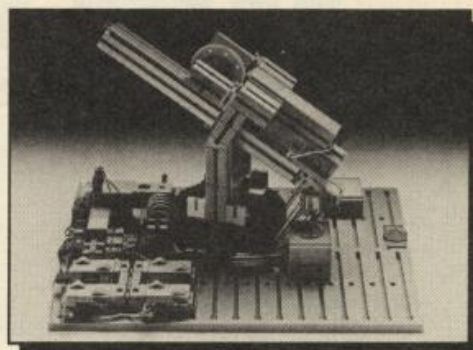
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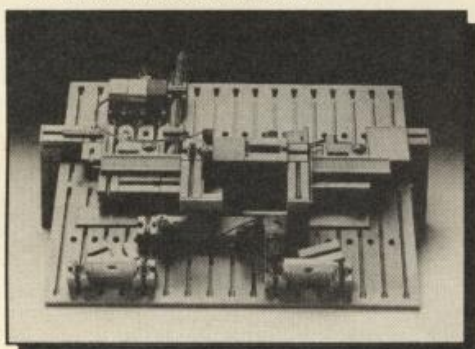
CONTROL 6 ROBOTS £112



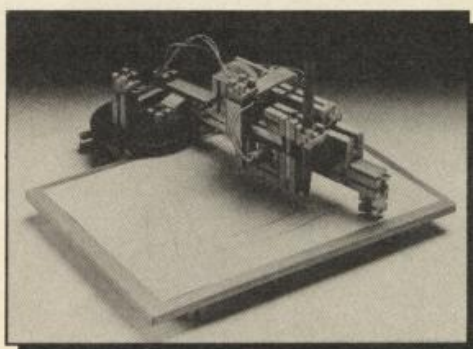
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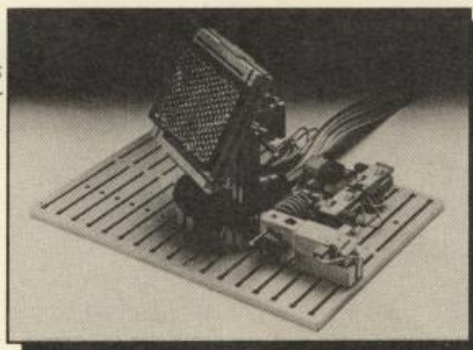


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MONEY BACK GUARANTEE

DESKTOPS GET

In this exclusive hands-on review, Peter Worlock takes the wraps off a major new desktop system from Digital

Things have been fairly quiet at Digital Research recently. Certainly, the company has released some useful products — DR Logo and DR Graph among them — but nothing to compare with the industry-shaping CP/M on which the company was founded.

However, a product announced last week should change that. At a secret location in the heart of London PCN was allowed an exclusive hands-on preview of a product that will shake a few people. Not least the people at Apple Computer.

DR's latest release is a full, Lisa-like desktop system that will run on any 16-bit machine. To call it a welcome development is a gross understatement — it should be met with open arms by users, programmers, software publishers and manufacturers. Everyone except those at Apple, in fact.

Consider the predicament of many computer buyers: everyone has found the desktop interface introduced by Apple's Lisa an attractive proposition, but Lisa is expensive. The Macintosh promised a cheaper way to get your hands on the system but with drawbacks; the single drive on the Mac has attracted criticism, and the tardy arrival of its software has not helped.

Now enter Digital Research with its Graphics Environment Manager — GEM. Suddenly here's the prospect of the desktop environment running on IBM PCs, Apricots, Olivettis, and the new Acorn Business Computers. And GEM is compatible with the massive range of existing software.

In terms of pricing, think about an Apricot F1 running GEM as compared with a Mac...

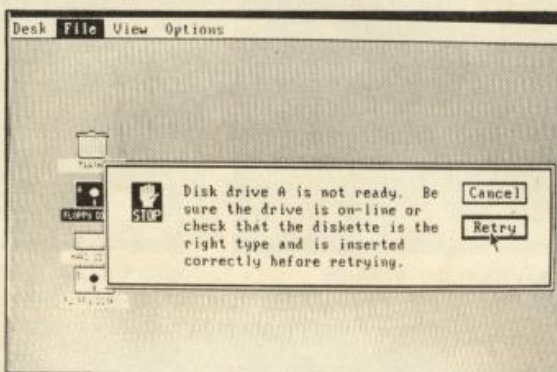
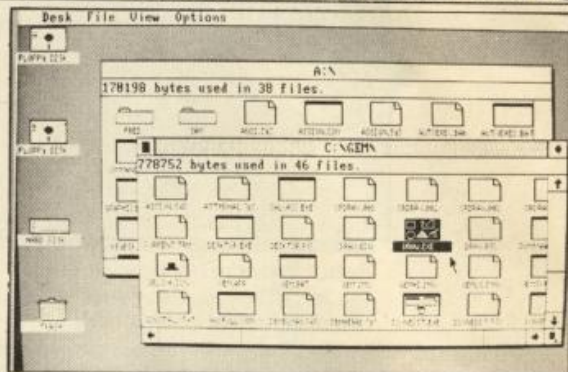
Features

So, what is GEM offering? All of the features you've come to know and love from Lisa and Mac — icons, pull-down menus and so on. However, in many respects GEM is closer to Lisa than to Mac, especially running under Concurrent DOS.

The basic GEM software sits between the operating system and the applications and on boot-up presents icons representing the disk drives. Open the relevant icon and you get an open folder containing all files on disk, again represented by different icons according to file type. Perverse users can select text mode and the icons vanish to be replaced by a more normal-looking directory complete with file types and length. Directories can be sorted alphabetically, by size or by type.

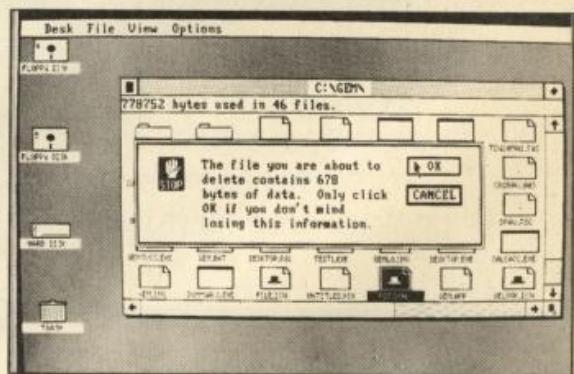
Your existing software — Wordstar,

The GEM desktop in action showing directories of drives A and C (a hard disk). The 'C:/GEM/' designation shows that the directory is one level — ie a directory of the folder GEM on drive C.



GEM features full error messages and demands a response before allowing you to continue operations.

GEM double checks before allowing you to dump files in the trash can.



1-2-3, Supercalc or whatever, will also appear in icon form. Position the cursor over the icon, select, and you go to the usual program environment and things work as normal. Exit the program and you find yourself back on the desktop.

The compatibility is achieved by using a GEM core which provides only the simple disk icons. Further into the system you're using more of GEM, but when you select another program the core flips out most of GEM and hands control to your application, loading GEM back in when you're finished.

DR will also be offering a number of utilities using the full GEM system. They include GEM Draw — a sort of

Lisadraw — and a program for creating presentation slides. Both offer facilities familiar to Mac and Lisa users — boxes, fills, a range of text sizes and fonts.

For the programmer, GEM offers a similar range of benefits. Not least of these is the fact that it's portable across a range of machines and offers a standard interface. So software authors can program the environment, not the target system.

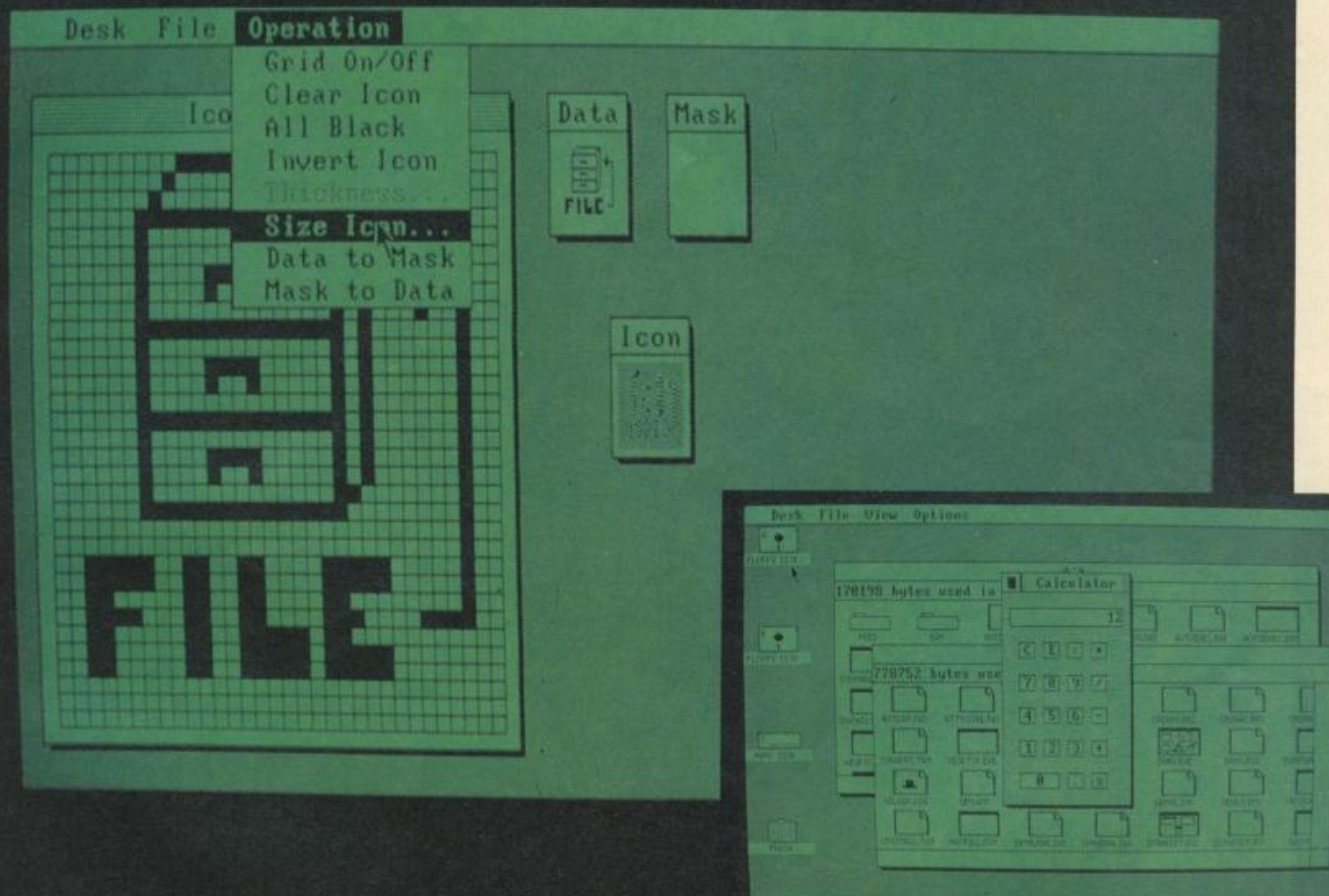
DR will offer a programmer's toolkit containing development tools and this should run with a range of languages including Pascal, Cobol and C. The programmer also gets complete redistribution rights.

ACT FRIENDLY



ital

Research. Running on any 16-bit machine, with all the features you've come to love, it's a real gem, he says.



It may look familiar but the green screen gives the game away. Not Apple's Macintosh but an IBM PC running GEM.

Evidence of compatibility — Wordstar ready to run from within the GEM desktop.

In use

GEM is difficult to fault, even in the pre-release version we saw. Running on a standard 5MHz IBM PC it was very fast and smooth, and embodied the extreme friendliness of Lisa and Mac.

Once further programs appear using its facilities the software should be exciting. In the meantime, it scores heavily by allowing you to run the industry's best-selling applications on the most popular machines.

GEM will also support a variety of input devices: the mouse, of course, as well as standard keyboard cursor controls, joysticks, digital graphics pads —

even a touch screen (with an eye to Hewlett-Packard?) and voice input (with an ear to ACT's portable?)

DR is talking about a minimum system of 256K and single disk drive — the memory requirement allows for operating system, GEM and a larger utility like 1-2-3.

The origins of GEM are not hard to discern given DR's success with its GSX graphics system, now under license to more than 75 OEMs, and the company seems set to repeat that success on the same route. For the moment, it is talking about OEM deals, and Acorn is likely to lead the field with GEM running on its ABC range, probably by January.

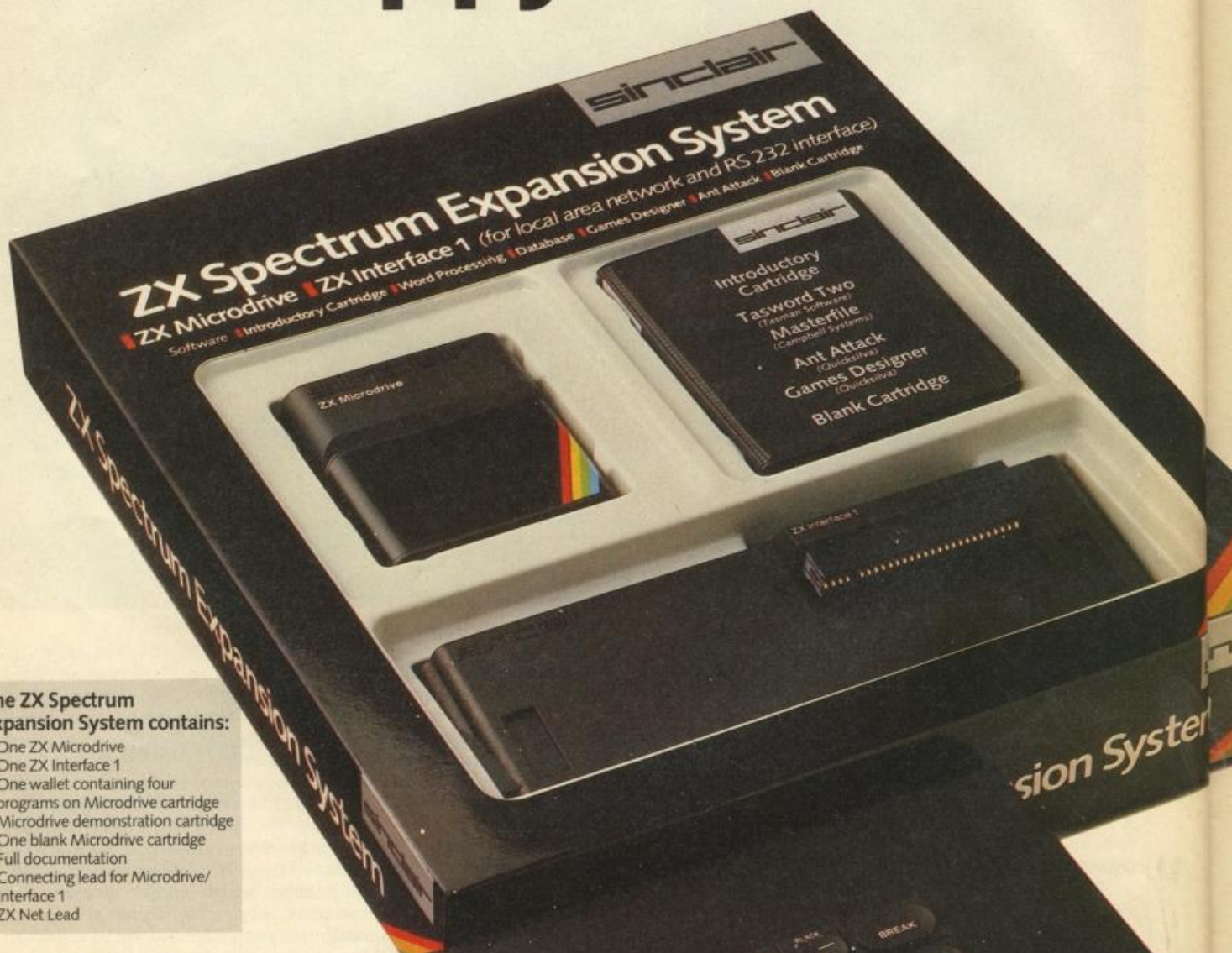
Conclusion

It's hard to see how GEM will fail. PCN has heard of several computer dealers who use the Mac's supremely friendly face to lure buyers into the shop, and who then sell them PCs and compatibles. DR may have heard similar stories; the company says: 'We think what the computer people find attractive should be the computer they buy.'

With Apple counting on Mac to fend off IBM, GEM will be as welcome there as a worm in your Granny Smith. But for other manufacturers it offers a springboard to that 'new age of user-friendliness' they're all talking about. ▀

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Turns your ZX Spectrum into a high-quality word processor!

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sinclair



EMINENT EPROM

With the advances being made in EPROM technology it's disappointing that EPROM programmers often leave much to be desired. This one, from Oasis Electronics, is a welcome exception, says Brendin Lewis.

Here's an EPROM programmer that doesn't, like so many others, fail to exploit the potential to be a versatile and invaluable development tool. The SPP1000, for the BBC, is virtually foolproof. Not only is the device easy to use, but it actually helps you avoid making mistakes.

First impressions

The unit comes packed in a sturdy cardboard box which contains the programmer, the disk-based software and the user manual. The 33-page user guide has all relevant operating procedures, screen shots of the unit in operation and descriptions of the secondary functions offered by the software. One of these functions is the EPROM personality editor which allows you to add to the list 15 EPROM device types already compatible with the machine. The devices available include all commonly used EPROMs from 1K bytes (eg the 2508) up to 32K bytes (27256) plus three of the EAROM (Electrically Alterable ROM) device types.

Externally the unit has a simple design — two leads, three indicators and a single 28-pin ZIF (Zero Insertion Force) socket are all that is visible. The two leads are a mains cable and a ribbon cable which plugs into the 1Mhz bus of the BBC. Two of the indicators are small triangular LEDs which point to the pin 1 position on the ZIF socket. Two LEDs are used because both 24-pin and 28-pin devices can be programmed.

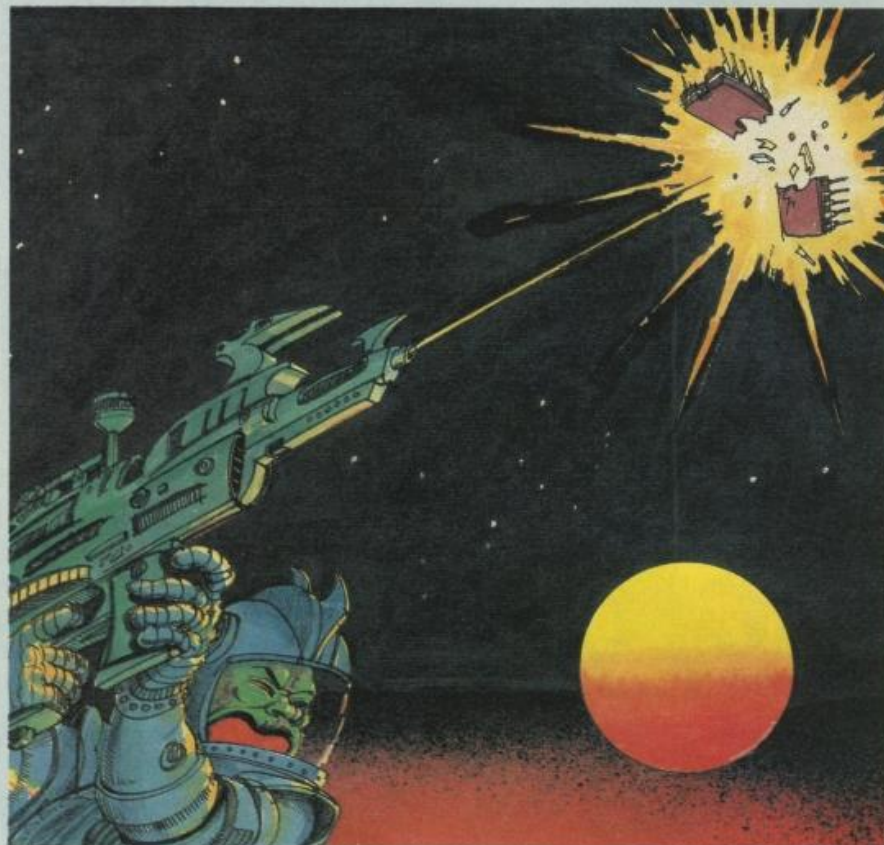
The other indicator, which serves three purposes, is a dual colour red/green type. When green, it indicates that the unit is powered up and that the ZIF socket is 'cold' or not in use. When it's red, the socket is 'hot' or busy. The chips themselves must not be inserted or removed while the LED is red.

One of the most impressive features is the number of protection facilities available. These are: a device present check, short circuit protection on all EPROM pins, current limit on Vcc (supply voltage) and Vpp (program voltage) pins, protection from Vpp appearing on any pin due to internal chip defect, and both data and address line integrity checks.

To add to this, the BBC is also protected with a buffered interface.

In use

The SPP1000 software is on a 40-track disk and contains a number of files which the main program calls when required. You load the software by a shift break combination from the



keyboard. All aspects of the program are menu-driven and are easy to use, though no help screens are provided.

Using the system is split into three main sections; the memory manager, the EPROM blower, and the EPROM personality editor.

The personality editor, as mentioned previously, allows the user to define new EPROMs to be used on the system by entering the electrical characteristics of the new device.

The memory manager allows the EPROM image to be created, edited and saved onto disk. The data to be programmed is held in a 16K image buffer which is mapped from &3C00 to &7BFF. Using this method is called image mode. Another mode is available whereby the image buffer uses true locations in the system eg &0000 to &3FFF.

When used in true mode, all memory locations outside the legal boundaries are checked for system corruption. All usual memory manipulation commands are available eg wipe, search, move, checksum etc. It is also possible to read data from an existing EPROM and then write that data to a new one.

The blower section of the software deals with the programming of the chip

itself. The process consists of selecting the required EPROM type from a menu and checking the chip is, in fact, empty and blowing it. The screen displays a count of the memory locations as the programmer gets to them. When it's done the EPROM may be verified with the contents of memory to ensure correct operation.

Verdict

This is an excellent piece of equipment, though rather expensive at £200 — a price to put the SPP1000 out of the range of most hobbyists. Schools and colleges, where there may be a number of systems, would find it good value. By the way, the copyright laws that govern disk and cassette-based software also apply to ROM-based software.

REPORT CARD: 1 TO 5

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

Product SPP1000 EPROM programmer
Price £199 **Supplier** Peter Nelson
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FEBRUARY 5-6 Russell Hotel, London W.C.1.

BUILDING & CONSTRUCTION

FEBRUARY 13-14 Regent Crest Hotel, London W.1.

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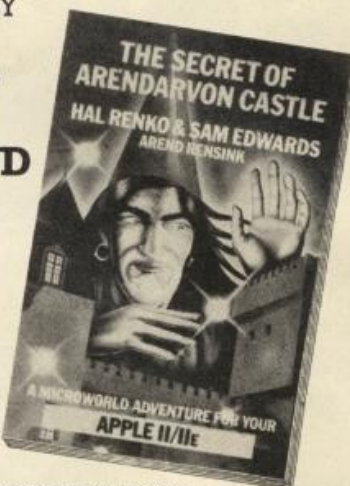
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PERIPHERALS: SMITH CORONA

PRINTS CHARMING

This Smith Corona printer could be a welcome and flexible friend, says Kenn Garroch. It interfaces with different types of micros, including an IBM.

Printers are becoming more sophisticated at lower prices, and since most business machines are IBM compatibles, it is good idea if the printer can cope with IBM character sets and control codes, as well as the standard Epson type. The Smith Corona D200 can do all of these things plus a few more.

It has a 0.8 or 2K selectable input buffer, downloadable character set capability, near letter quality (NLQ) font, normal or proportional spacing, IBM or standard (Epson) control codes and character sets, a speed of 160 characters per second in normal mode, a 9x9 dot matrix, twin Centronics and RS232 interfaces, and standard Epson bit image graphics.

Setting up

On removing the printer from the packing it immediately struck me that you need a lot of energy to heave it around. Weighing in at 8.5 kilograms it is solid and well-built.

With the printer comes a manual, a power lead, and a paper rack to stop your fan folds tangling. The power plug is unusually placed on the side of the machine with the on/off switch, which proves awkward if you frequently turn the machine on and off.

In use

The most difficult task to perform before getting any printout is to set up the dip

switches at the back. There are three banks of these, 20 in all, each of which, and especially the serial/parallel switches, should be set to the desired position.

The manual is quite helpful here as it gives a picture of the switches with their individual functions named, plus detailed tables explaining these switches.

Setting up the printer with a 0.8K buffer and ordinary character set and commands showed the impressive speed of the machine. After running this I tried the 2K buffer. This was great, especially when listing short programs, as everything goes out to the buffer and gives back command of the computer before you can say Bingo.

There are a number of fonts available: NLQ, Italic, Elite and Pica. When the printer is in NLQ mode, the speed drops to around what you would expect from an Epson MX. If you want to improve the quality it's possible to mix and match print modes, such as overstrike and emphasised, but this can slow things down to the rates you would expect from daisy wheel printers. The results can be seen in the example listings. When proportional spacing is implemented with emphasised mode, the results were quite acceptable.

An unusual feature of the D200 is its hex mode. This prints the hex code numbers of the characters instead of the characters themselves. It appears to be

purely a test mode since it is accessed by turning the printer on while pressing both the form and line feed buttons.

One of the more difficult aspects of the machine is the facility for downloading your own character set to it. This is a very flexible way of defining your own symbols in place of some of those already there, or redefining the whole character set to give a different font.

This is NLQ + emphasised + proportional spacing

This is italic

This is condensed

Examples of the hard copy.

Unfortunately, this is a complex procedure involving quite a few escape codes and numbers. The characters are defined on an 11x8 matrix with descender control, starting position and stopping position.

Since the print head is a 9x9 matrix, the descender control specifies whether the top eight bits or bottom eight bits are to be used; ie it moves the character up and down one bit. To redefine one character means sending 17 characters to the printer, so redefining the whole set means quite a lot more.

The characters are stored in what would normally be the 2K print buffer leaving 0.8K left for the buffer itself.

Another major facility of the printer is its dual interfaces, Centronics (8 or 7 bit), or serial. It isn't possible to switch between the interface via software, which is a shame, but the serial port (RS232) is flexible giving the baud rates 110, 300, 600, 1200, 2400, 4800, and 9600. Even the highest speed (9600) was reliable, and using the 2K buffer meant short print runs were over quickly as far as the computer was concerned.

One aspect of the RS232 connection is that the TX and RX, and RTS, CTS pins are not reversed which means the connection is fairly simple, with no need to resort to Suss boxes and Smart cables.

Verdict

The Smith Corona D200 printer is a good piece of kit, especially if you have a number of computers you wish to use it with. The provision of both Centronics and RS232 interfaces plus NLQ and a large internal print buffer make the machine a very good buy if you need something flexible, fast, and of good quality. ▀

REPORT CARD: 1 TO 5

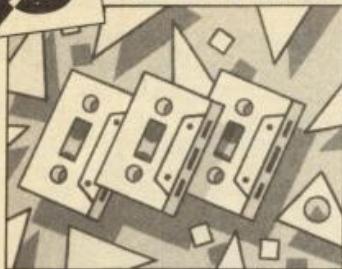
Features	●●●●●
Documentation	●●●●
Performance	●●●●●
Overall value	●●●●●

Product Smith Corona D200 Printer **Price** £483 **Availability** Smith Corona dealers.



Speed, compatibility and quality make the D200 a good buy.

SOFTWARE PRE-VIEW



We take a peek at the new software packages, and give you a taste of things to come. Note to software publishers: If you wish your company's product to be included, please send only the very latest releases to **Bryan Skinner, Software editor, PCN, 62 Oxford Street, London W1A 2HG.** Don't forget to include prices and telephone numbers.

AMSTRAD



Number 11 is a game called *Sum Fun*, an economics simulation of the UK, much along the lines of *Great Britain Limited*. It's rather simple but has some quirky touches and the price shows that you can at last buy programs for the Amstrad at reasonable prices.

If you're into management games, then you'll be pleased to see that Addictive Games has converted its popular *Football Manager*.

You take on the role of

manager, and try to get your team to the top of the football league by buying and selling players, arranging matches and the like. One of the high points of the simulation is watching your team play.

For those wanting to delve deeper into their machines, a copy of *ZEN*, a book on Z80 machine code and the firmware manual should have you hacking in assembler.

ZEN has its limitations, but apart from Hisoft's *Devpac* there just isn't much in the way of assembly programming tool-kits around. Roll on *White Lightning*.

Football Manager	£7.95	Addictive Games 0202-296404
ZEN Assembler	£19.95	Kuma 07357-4335
Number 11	£5.50	Camel, Wellpark, Willys Ave., Exeter

BBC



An old arcade game of the space invader era, that's how I would class *Er & Bert*. You spend your time jumping around a pyramid colouring squares while avoiding various perils, such as snakes.

Artsystematic allows you to design pictures in any of the Beeb's modes — features include rubber banding, freehand, fill, box, circle/ellipse drawing and much more.

The automatic load and display system allows you to chain up to 30 pictures with freeze, backstep and special effects facilities.

Artsystematic	£10.00	Tecnation (Highclere) 253588
'Er & Bert	£4.95	Microbyte 06373-6886

COMMODORE 64



Best game of the week looks to be *Psi Warrior* from Beyond. It was programmed by the duo responsible for *Psytron* and comes with a five-chapter background story. Your task is to knock out the Source, a psychic powerhouse somewhere in the building.

The hero's animation is superb as he glides about on his power sled, looking from left to right, psy-net gun at the ready. There are ramps, teleporters and shimmer psychic entities which have to be netted and drained before they drain you. It's an original theme, and as you build up your energy there's more to tax your brain.

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Micro Magpie is the database of Audiogenic's Micro packages and includes mailing list and stock control facilities. *Micro Wordcraft* is the disk version of the company's *Wordcraft 40* cartridge and uses help screens. *Micro Swift* is another new package. The spreadsheet of the suite, uses pop-up menus and

comes with four household applications.

Stock Market won't help you predict bulls or bears. It's a simulation of the London Stock Exchange for up to four players. Financial advice is given by the computer which also acts as banker and will eliminate bad debtors.

Psi Warrior	£9.95	Beyond 01-837 3699
Stock Market	£6.95	Kuma 07357-4335
The French Mistress	£8.95	Kosmos 05255-3942
The German Master	£8.95	Kosmos 0525-3942
Fort Apocalypse	£9.95	US Gold 021-359 3020
Drelbs	£9.95	US Gold 021-359 3020
Micro Magpie	£39.95	Audiogenic 0734-664646
Micro Swift	£19.95	Audiogenic 0734-664646
Micro Wordcraft	£24.95	Audiogenic 0734-664646
Payroll Plus	£85.00	Landsoft 01-878 7044/7
Di's Baby	£6.95	Bad Taste Software 0726-73456
London Blitz	£7.95	Longman 0279-26721
Legionnaire	£7.95	Longman 0279-26721
Andromeda Conquest	£7.95	Longman 0279-26721
Telengard	£7.95	Longman 0279-26721
Ripper	£12.95	Longman 0279-26721

SPECTRUM



Software houses are scrabbling busily for ideas for new games and one effect of this has been the borrowing of ideas and scenarios from films. Taking the idea further, we're now seeing TV characters appear on our monitors, the latest being *The Magic Roundabout* from CRL.

Dougal's task is to use sugar cubes to build a house. Twelve cubes have to be pushed then loaded on a train, and in the process Dougal has to eat some of the cubes to keep up his strength. He must avoid the other characters, or bark at them to scare them off. Nicely done, but definitely for the younger player.

Historic adventure are gaining in popularity, *Jewels of Babylon's* story line goes back to 3000 BC, and is set in the late 19th Century. With over 100 locations and fast graphics you'll need all your wits about you to reclaim the jewels from pirates.

If you want to protect your programs, *Padloc 9* is designed for you, but £19.95 for information about how to read the cassette port in machine code seems rather steep. Nor will the program protect programs from tape-to-tape copying — surely the main pirating method.

Word Games With The Mr Men is Mirrorsoft's latest for early learners. Designed by Widgit Software, it should help five- to eight-year-olds learn position words like on, next to, or under.

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Run Your Own League	£6.95	Silicon Joy 0202-296404
Grand Prix	£6.95	Silicon Joy 0202-296404
Championship Strategy	£5.95	Matec 0366-382804
Padloc 9	£19.95	CSP Systems 0532-696415

SPECTRUM

TIR NA NOG



The development of cartoon adventures, where you control a figure moving around a landscape, still has some way to go. But only a year ago you'd have said that what Gargoyle Games has achieved here was impossible. The company has managed an astonishing degree of realism in the animation of the hero, Cuchulainn, and the characters which populate the world of *Tir na Nog* and has come up with a worthy successor to Legend's *Valhalla*.

Tir na Nog is Celtic for Land of Youth, or our land of the dead. Cuchulainn's task is to collect and activate the four fragments of the Seal of Calum to lighten the burdens of the world; the seal has the power to imprison the Great Enemy — Evil Incarnate. The 20 page booklet called *Sealltuinn* that comes with the game is worth ploughing through, for there are many tips and hints.

The screen is split into three horizontal panels. At the top is the background, which shows one of the four backdrops — the limits of the kingdom. The castle of Dhum Dhonuill with its fluttering *Badh'ua* (Battle

Ravens) lies to the North, to the South is the volcanic Ceardach while to East and West are the rocky outcrops of Snathad — the Needle and Dudh Sgorr, beneath which lie the catacombs called An Lin, The Net.

If you find it hard to orient yourself, there's always the compass at bottom left which alters as you alter the viewpoint. Also in this lower panel are the location's name (so keep the map handy), your inventory and any messages.

The central panel is what really makes the visual aspect of the game — Cuchulainn stands almost one third of the screen high, and the animation is superb. He strides along with a lilt to his gait, hair flowing behind, arms swinging. You can make him thrust with whatever items he's carrying, which you pick from the inventory list by means of an asterisk.

The view can be chosen from any of the compass points. You'll need to use this to help Cuchulainn take the many roads and doors of *Tir na Nog* in his quest. For an epic like this there are save, restore, freeze and quit to restart options.

Press a key and you're looking at our lad from the back; another and you're to his right or left; another and you're face to face, all in the blinking of an eye. Cuchulainn's a bit hard to direct at first, especially in this labyrinth of interesting paths



and doors to who knows where. A good deal of my first few hours were spent just wandering around, picking up various potentially useful bits and pieces. It was quite a shock when the representative of Sidhe appeared. The Sidhe are the remnants of the last guard, the ones who originally imprisoned the Great Enemy, but whose carelessness led to the fragmentation of Calum's seal and Evil's escape. Whoever they are, it's bad news to cross them, so make young Cucu leg it if they come on the scene.

I found it easiest to think in terms of 'to the left', 'to the right' etc, but each to his or her own. As Cuchulainn strides about, he remains central to the screen and the background immediately behind him scrolls smoothly by. However, the un-

per panel stays put — a bit disturbing at first.

The graphics, apart from the animation aren't brilliant, but then there's so much to the land of *Tir na Nog* that there can't be much RAM left.

It's interesting that both *Valhalla* and this game take ancient myths for their settings, but perhaps they betray some important human truths. In *Tir na Nog* you'll find action and adventure, and you might even have to pop into your local library if you really want to solve it. If you want state-of-the-art software, Cuchulainn's your man.

Bryan Skinner



Price £9.95
Publisher Gargoyle Games 021-926 9509
-835 1358

VIC 20

MYSTERY OF THE JAVA STAR

This adventure is neither textual nor an arcade quest. *Java Star* is a set of four programs, each of which is a puzzle. The puzzles must be solved in order, the accumulating solutions leading you on to the final discovery.

The purpose is to find the wreck of the *Sea Witch* which sank in 1767. Much gold and a mysterious ruby, the *Java Star*, were on board. You must locate

A	B	C	D	E	F
1	19SEP1767	SHIP	RTH		
2	BERKEHOSTYDS888	15			
3	MAYDSP	LTOHLS	NO		
4	KY	QVDS	SHIORM	INSHO	
5	CON	ERBRO65OFF	S	O	
6	CHIL	3888	QVDESTH	NHON	
7	RUBST	SOLDST	TH	RE	

the wreck and claim the treasure.

The first two parts involve gathering information. Part one has you trying to reassemble a log entry and a map which have been shredded. You reassemble documents by swapping

around the pieces. The game has a help facility but there's a catch. You begin with £12,000 — every time you ask for help, your new-found wealth diminishes.

Part two has you selecting various locations from a menu. Part three confronts you with a map, any area of which can be searched. Once you've plumped for a location, you explore it, looking for something that will point you to the right island.

The last part has you diving (in real time) in search of, and if you've been clever enough finding and exploring, the wreck

itself. Very much out of the ordinary, *Java Star* is certainly engaging.

Graphically it is quite simple but the attraction and entertainment lie in the puzzles. Sound effects help create a salty atmosphere. The levels of difficulty plus a random element ensure the family will get its money's worth.

Bob Chappell



Rating 7/10
Price £7.95 Publisher Shards Software
01-514 4871

COMMODORE 64

TOY BIZARRE

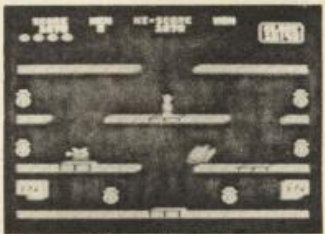
Most of Activision's recent releases have been conversions of its successes on video games machines, but *Toy Bizarre* comes straight to the Commodore 64 and it's a fine effort.

At first appearance it looks like a standard platform game but there's more to it than that. You control Merton the maintenance man during a night at the toy factory. Your job is to make the toys behave.

There are four valves you can control. If left turned on they blow up balloons, if you miss the balloons they pop and produce rebellious toys. Thwarting your efforts, however, is the leader of the toys, Hilda.

If you bump into Hilda or any of the toys you lose one of your five lives. You score points for popping balloons and having all valves off at the end of each hour.

But there are many other complications. On each level are a number of paired pistons. If any character jumps on one,



the matching piston rises, stunning or killing any character standing on it — which either costs you a life, or earns you extra points.

Every hour you have the chance for a coffee-break. Dur-

ing breaktime Merton becomes invulnerable which gives you the chance to score points. If you knock out all toys within an 'hour' you gain bonuses for every minute remaining.

The action is fast and furious with smooth animation and some pleasant soundtrack music. An enjoyable game for all the family.

Peter Worlock



Rating 7/10
Price £9.99 Publisher Activision
0628-2448



PAGES OF POSSIBILITIES FOR YOUR COMMODORE 64/VIC 20



Artsystematic £10.00 Tecnation (Highclere) 253588
 'Er'Bert £4.95 Microbyte 06373-6886

COMMODORE 64



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SIXTY PROGRAMS FOR THE COMMODORE 64 £5.95

Contains space games, war games, word games together with utility and educational programs.

INSTANT ARCADE GAMES FOR THE COMMODORE 64 £3.95

NEW Shows newcomers to creative coining busily for ideas for new games and one effect of this has been the borrowing of ideas

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SPECTRUM

RIVER RAID

No prizes for its graphics, but the game should win friends among people who enjoy playing for a while without being zapped into oblivion or, in this case, into the River of No Return, which is the waterway you're following in your assault jet. It's length makes the Amazon look a mere stream — I've gone through 35 bridges already.

Mention of *Zaxxon* might create the wrong impression, as this isn't in the same league, but it's a similar style as you control your fighter flying over a landscape. No 3D here, just a bird's eye view of the river scrolling (a little jerkily) from



top to bottom, with your plane at the foot of the screen. Sinclair, Kempston or any cursor-controlled joystick can be used instead of the keyboard, the controls being left-right, accelerate-decelerate and fire. There is a rapid fire. Accelerate-decelerate merely alters the scrolling speed of the screen. You can halt the game.

The objects you blitz are crudely done, and all you ever see on the riverbank is an

occasional mountain. Hardly realistic, and neither is the sound, unless a ship being exploded really does make a squelching sound. The other sound is an audible reminder of the state of your fuel supply, as you can either bomb fuel dumps or fly over them to somehow suck up the fuel. One or two people can play, and you can start on any of four different bridges: the first, fifth, twentieth, or thirtieth (not the ones the notes say). The documentation could be said to be lacking, and I wish it was lacking the two notes about the program designer's Californian cycling activities.

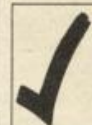
Despite the limitations, the game's not at all bad. You move along a stretch of river, sometimes divided, with intermittent bridges to blast, well,

squelch. If you can hit one when a tank's crossing, so many points the better.

Hazards include boats, planes, choppers, and tanks on the river-bank. Of course, these get more numerous, with the gaps between fuel dumps increasing. By the time you reach about the twentieth bridge, you need all the fuel you can get... frustrating to be rapid-firing and realise you've just zapped the only fuel dump as it emerges at the top of the screen.

A jolly enough game then, perhaps more for the junior champs than the heavyweight brigade.

Mike Gerrard.



Rating 7/10
Price £9.99
Publisher Activision
0628-2448

BBC B

SPACEMAN SID

Sid is out for a Sunday drive in his canary yellow buggy. He is not motoring through England green and pleasant but on the surface of planet Tribos. The Tribos road system is non-existent and the natives far from friendly, so Sid must prepare for a bumpy and hectic ride.

Reminiscent of *Moon Buggy*, spaceman Sid bombs along the bumpy surface in a six-wheeled vehicle.

It can leap into the air — vital as the surface is pitted

with pot-holes and riddled with rocks. Just to make the road that teeny bit more interesting, the odd land mine or two has been planted.

Sid's buggy has a sneaky weapons system. Not only can it fire horizontally to blast rocks, mines and sundry approaching aliens, it also fires vertically to capture the enemy unawares.

The skyward rocketry is needed as a defence against flying aliens who, unaware that Sid is merely out for a relaxing ride, try to bomb his socks off.

Whenever Sid's car strikes an oncoming object or receives a direct hit from on high, the



wheels fly off and bounce about creating more havoc.

There are five sectors to navigate, each containing five subsectors; a clear display at the top of the screen reports your progress.

Later sectors have sliding bridges and meteor storms, adding to the challenge. Com-

pleting the quintet motif, Sid has five lives.

As Sid's buggy joggles along, the landscape scrolls smoothly past. The graphics are first-rate — large, sharp and colourful with realistic animation. Sound effects are excellent too — there's even a snatch of the *Star Wars* theme to start Sid off. Pity there's no joystick option. Never mind, this is a great game that will keep you amused for hours.

Bob Chappell



Rating 9/10
Price £7.95 Publisher
English Software
061-835 1358

VIC 20

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6	SHIL	999	QVDESTH	HHOR		
7	RUBST	SOLDST	TH	RE		

H FOR HELP

the wreck and claim the treasure.

The first two parts involve gathering information. Part one has you trying to reassemble a log entry and a map which have been shredded. You reassemble documents by swapping

around the pieces. The game has a help facility but there's a catch. You begin with £12,000 — every time you ask for help, your new-found wealth diminishes.

Part two has you selecting various locations from a menu. Part three confronts you with a map, any area of which can be searched. Once you've plumped for a location, you explore it, looking for something that will point you to the right island.

The last part has you diving (in real time) in search of, and if you've been clever enough finding and exploring, the wreck

itself. Very much out of the ordinary, *Java Star* is certainly engaging.

Graphically it is quite simple but the attraction and entertainment lie in the puzzles. Sound effects help create a salty atmosphere. The levels of difficulty plus a random element ensure the family will get its money's worth.

Bob Chappell



Rating 7/10
Price £7.95 Publisher
Shards Software
01-514 4871

COMMODORE 64

TOY BIZARRE

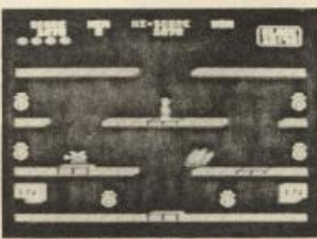
Most of Activision's recent releases have been conversions of its successes on video games machines, but *Toy Bizarre* comes straight to the Commodore 64 and it's a fine effort.

At first appearance it looks like a standard platform game but there's more to it than that. You control Merton the maintenance man during a night at the toy factory. Your job is to make the toys behave.

There are four valves you can control. If left turned on they blow up balloons, if you miss the balloons they pop and produce rebellious toys. Thwarting your efforts, however, is the leader of the toys, Hilda.

If you bump into Hilda or any of the toys you lose one of your five lives. You score points for popping balloons and having all valves off at the end of each hour.

But there are many other complications. On each level are a number of paired pistons. If any character jumps on one,



the matching piston rises, stunning or killing any character standing on it — which either costs you a life, or earns you extra points.

Every hour you have the chance for a coffee-break. Dur-

ing breaktime Merton becomes invulnerable which gives you the chance to score points. If you knock out all toys within an 'hour' you gain bonuses for every minute remaining.

The action is fast and furious with smooth animation and some pleasant soundtrack music. An enjoyable game for all the family.

Peter Worlock



Rating 7/10
Price £9.99
Publisher Activision
0628-2448

How to write for Personal Computer News

PCN WANTS YOU!

Whatever you want PCN will try to bring you . . . but we need your help. You tell us you want more programs, more features to help you get the most from your machine. Well, we've listened and we're offering more programs, projects and useful information than any other magazine. But if your machine isn't featured you've only yourselves to blame.

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We're looking for programs and articles on any aspect of using personal computers — including games, graphics, utilities, and applications.

If you're sending a written contribution we require it in typed form (dot matrix printout is fine), with double spacing on one side of the paper only. Where possible include short, example



programs to illustrate the article.

If you've written a program we require a working version, on tape for any machine, or on disk if you prefer for Commodore 64, Atari, BBC or Apple. We'd also like notes on how the program

works, what it does, and any special features that you've included. A printed listing would be nice but isn't essential — on the other hand we can't consider listings without a working copy on tape or disk.

If you would prefer to make preliminary enquiries before submitting material, you should write — don't phone — to *Personal Computer News*, Evelyn House, 62 Oxford Street, London W1A 2HG. Questions about articles should be addressed to John Lettice, Features Editor; program queries should go to Nickie Robinson, Programs Editor.

If we decide not to use your contribution it will be returned to you if you enclose a stamped, self-addressed envelope but give us at least six weeks. You should receive payment four weeks after publication.

If you want to enclose photographs and screen shots, feel free to do so but make sure they are of good quality and make them colour transparencies or black and white prints. Do not send colour prints.

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SPECTRUM

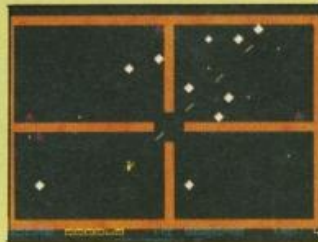
ODYSSEY 1

And you thought that Spectrum games had come of age? *Odyssey 1* is a throwback to early days of games software.

The inlay is almost more interesting than the game itself. It is the duty of Algorh (that's you), an incredible fighting man-machine, to protect the Star Gate; 'The Riggos will attack with the dreaded Blind Mutons', and so on.

What all this boils down to on the first screen is you at the

intersection of four red walls, surrounded by four quadrants. It's in these that the dreaded



Blind Mutons are assembled; they're somewhat indistinct purple blobs which fire more or less at random.

Algorh is yellow and can be rotated to fire through the compass points as well as diagonally. Shown as a rectangular torso and a blob for his head, his firing arm stuck out to one side, or elbow bent, he's one of the worst UDGs I've ever seen. At the foot of the screen there's your score, a high-score and lives left. You can move Algy into the quadrants, blasting away at your adversary.

Here you control a space ship and have to fire at diagonal waves of coloured enemy vessels — the awesome Astro-Fleet. Got to watch out though,

as each destroyed vessel changes the craft into a homing missile.

If you survive this, on screen three you'll meet the Rigossans — pterodactyl-like creatures of incredible ferocity. I was almost tempted to have a bash, just for a laugh.

Leave it out, this one's a bad egg; even at just under a fiver.

Bryan Skinner



Rating 3/10

Price £4.95

Publisher
Softstone, 01-486 5266

COMMODORE 64

PACMANIA

The old favourite, Pac-Man, is now available for the Commodore 64.

The game has options for one or two players and you can use either the keyboard or joystick to manoeuvre your munching man around the maze. The game can develop into quite a competition.

In the end you develop a vendetta against the ghosts and have to play it one more time to see if you can reach a further screen before they gobble you

up. The danger is developing blisters on fingers and thumbs from holding the joystick too tight, too long.

In case you haven't come across the game before here's a brief outline. You move round the maze eating up the dots which gains you points, and avoid the gnashers of the ghosts.

If you manage to eat a power pill (which appears as a flashing red dot in each corner) the ghosts turn blue for a period of time, and you can eat them for extra points. Once you've eaten a ghost its eyes return to the ghosts' den and a new ghost comes after you.

The eight different mazes are available and 64 levels of difficulty in this version, and not to be out-done by the space games



there are also hyper-maze ports. These can be quite handy until they sit you right on top of a ghost.

It would be better to have the

choice of whether to have these in the maze. You may be doing quite well without any ghosts being near you, then run into a hyper-maze port and end up somewhere different.

As well as eating the dots and ghosts there is a selection of fruit which appears randomly for Pac-Man to eat. It has a bad habit of disappearing just when you've struggled through a throng of ghosts to reach it.

Susan Cooke



Rating 8/10

Price £6.95 Supplier
Mr Chip Software
0492-79026.

COMMODORE 64

SEE-SAW

This game from Quicksilver has one of the oddest heroes I've seen in a long time — he looks like a cross between a blue chicken and a ladybird.

A Nasty Piece Of Work has trapped your mates in his castle. To rescue them, you've got to catapult your plump little body over the castle ramparts. You haven't got wings or grasshopper legs — to achieve world fame as a high-jumper, you use a see-saw.

What happens is this: the NPOW is aloft, patrolling the ramparts. Although he's hidden behind the stonework, you



can just about see his deely-boppers poking above.

The stones are loose, convenient for the NPOW who pro-

ceeds to have them down upon your unsuspecting person. While he's trying to brain you with the masonry, you are busy positioning yourself on a see-saw. When a falling brick hits one end of the see-saw, it will catapult anything on the other end up into the castle.

The castle is filled with green gremlins which reach out to grab any passing waif or stray catapulted skywards from the see-saw. They're a pretty dumb bunch and will grab anything, including a brick. Your objective is to shuffle bricks along the see-saw so that sooner or later one is shot into the air. A

gremlin will grab it as it passes but the force will drag him out and drop him into the moat. Once you've cleared a sizeable gap in the gremlin ranks, you must position yourself on the see-saw so that you will be catapulted through the hole in the defence when the next convenient brick falls.

The game is very simple, utterly barmy and I loved it.

Bob Chappell



Rating 8/10

Price £7.95 Publisher
Quicksilver 0703 20169

COMMODORE 64

ROCKET ROGER

Throw equal parts of *Manic Miner*, *Defender* and *Son of Blagger* into your computer and you'll come up with a game that is very similar to *Rocket Roger*, the latest release from Sheffield-based Alligata Software.

Our intrepid hero Roger has been stranded light years away from Earth without any fuel for his rocket. His only means of escaping from the planet is to collect vital power crystals that are scattered around and beneath the planet.

Basically *Rocket Roger* is yet

another platform game. Collect all of the crystals — there are 99 of them — and you will win. However, there is one difference — *Rocket Roger* can fly.

Leaving his spaceship, Roger must fly over lava-splitting volcanoes, avoid asteroids falling from the skies and dodge purple space ships. Of course, while doing all of this he must also pick up the crystals that are scattered around on the floor. No easy task.

If you manage to guide Roger through this then you can descend into the depths of the planet and collect the crystals that are below. Of course there are plenty of nasties: moving stairs, sliding doors and force

fields which you must avoid.

The actual playing area is much larger than the screen and scrolls around smoothly as



you guide our intrepid spaceman on his tortuous journey. All the graphics are well defined and it is definitely worth taking Roger on a trip through the caverns, ignoring the crys-

tals, in order to see them.

One extremely nice feature of this game is the landing pads scattered around the planet. If you land on one of these and then later get killed, your next man will appear on the pad that you last landed on. This is much better than having to keep going to the start, which is what happens in some games.

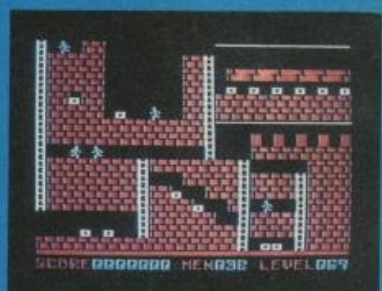
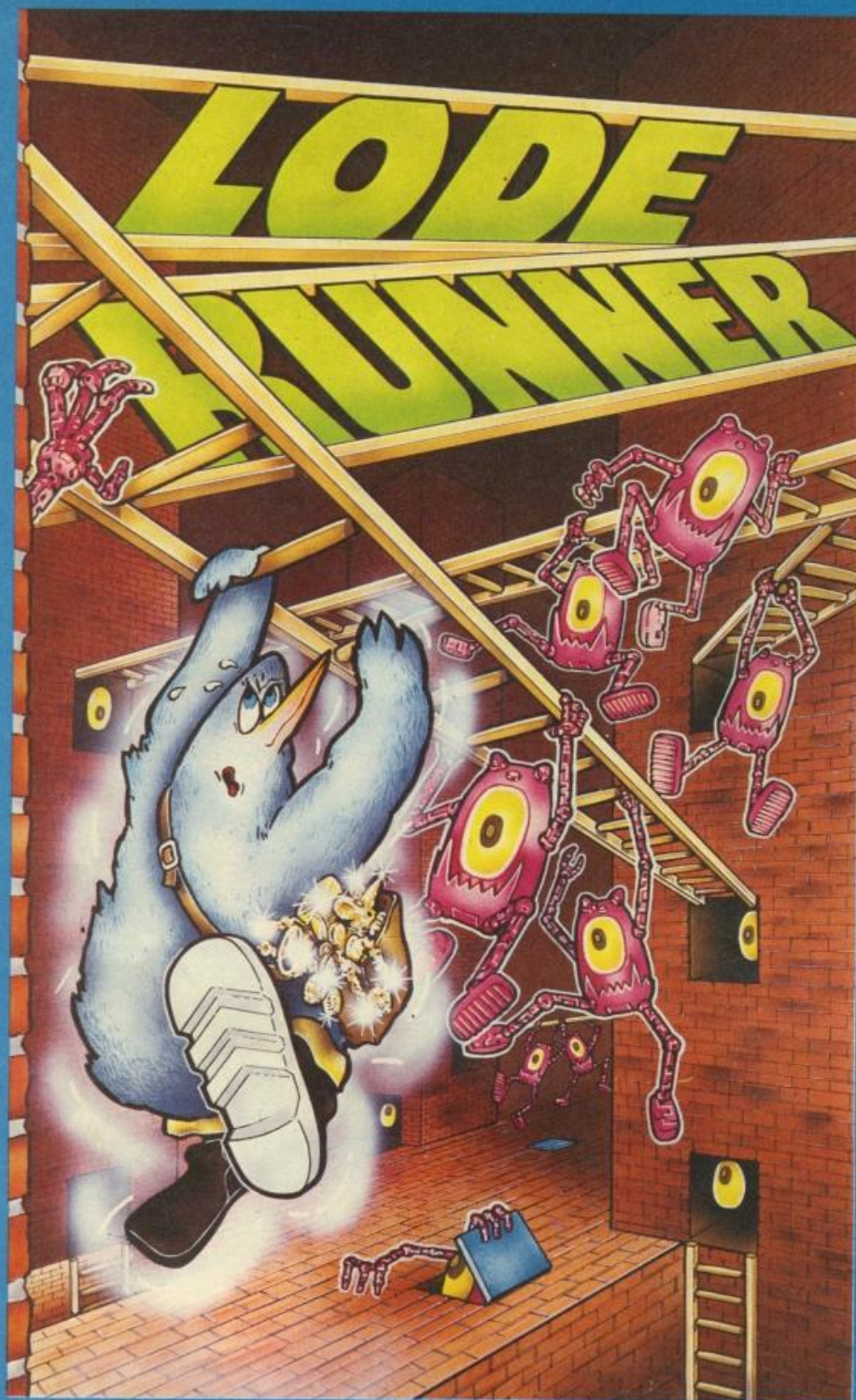
All in all, an excellent game combining some of the best features from many old favourites.

Susan Cooke



Rating 9/10

Price £7.95 Publisher
Alligata Software
0742-755796



You are a highly trained Galactic Commando deep in enemy territory. Power hungry leaders of the repressive Bungeling Empire have stolen a fortune in gold from the peace loving people, and you have just discovered their secret underground treasury. Your goal? To recover every last ingot of Bungeling booty. You'll be running, jumping and climbing heroically, solving perplexing puzzles and drilling passageways through stone floors and barriers using your laser drill pistol. You'll need more than fleet feet and good looks to get through this mission alive. You'll need quick wits and brains!

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Available on the 48K Spectrum

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Can Thor save Cute Chick from the hungry dinosaur? Only you can help. At first he only has to jump rocks and holes. Then he must jump and duck, almost simultaneously, to avoid the logs and low hanging tree limbs in the Petrified Forest. The only way Thor can get across the river is to hop on the turtles' backs. These turtles sometimes get tired and submerge at the wrong moment, much to Thor's dismay! To add to Thor's difficulties, his arch-enemy Fat Broad is waiting on the other side to ambush him. If Thor's timing is good, the Dooky Bird is overhead, the prehistoric bird will pick him up and carry him across!

Thor must build up plenty of speed during his downhill run before the cliff. Timing is crucial, too. If Thor's balance is off or he is too slow he will crash into the ravine or the face of the cliff. Once over the cliff, Thor faces his most difficult challenge: the volcanic eruption. In addition to the obstacles on the ground, he is showered with boulders from the sky.

Once again Thor must cross the river on the turtles' backs. Then, at last, he must face the dinosaur! If Thor can get past the dinosaur and into the cave, he has only a short way to go to rescue Cute Chick. On his way, Thor must duck under stalagmites and jump over stalagmites to avoid crashing.

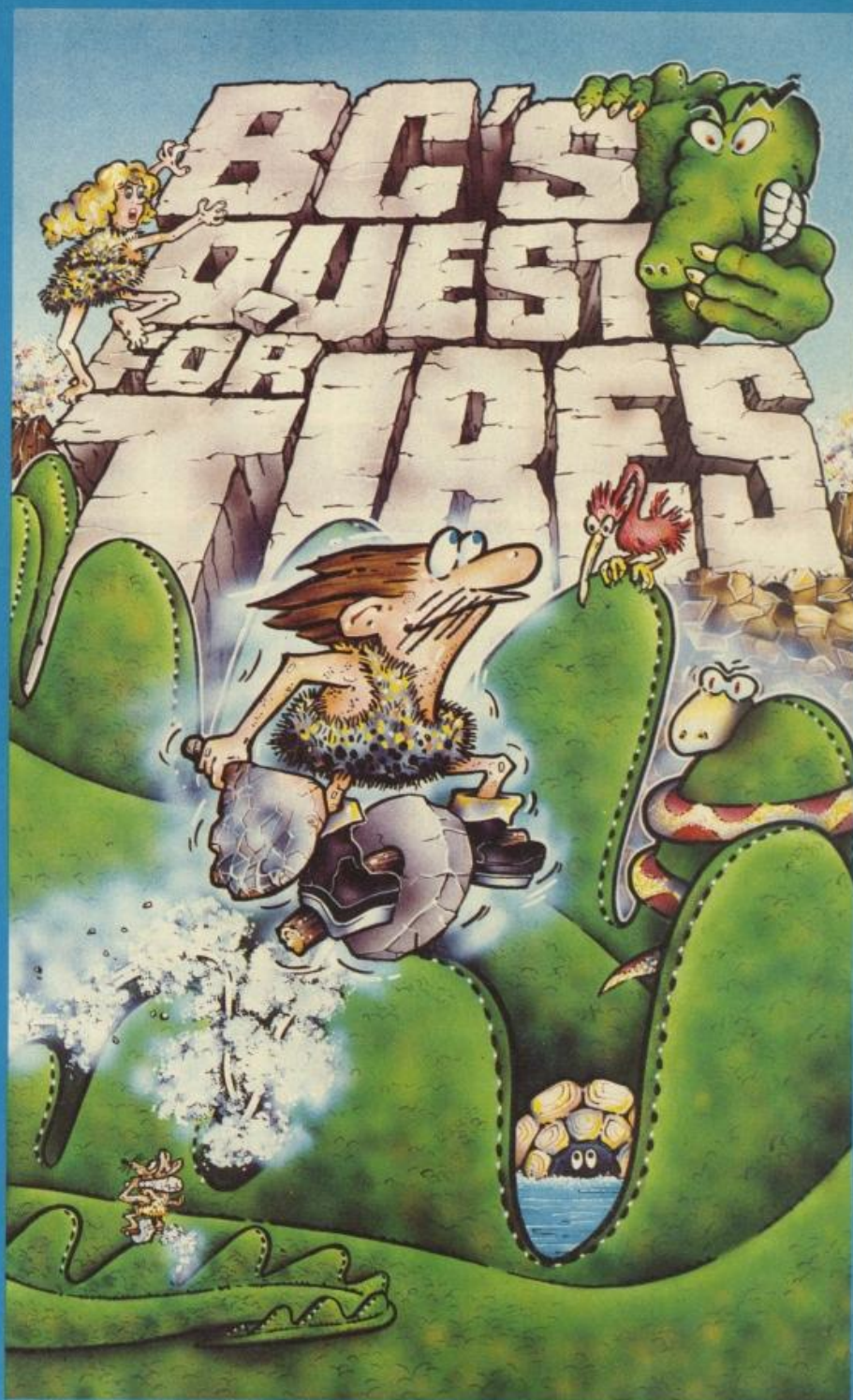
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SOFTWARE PRO-TEST: SPECTRUM

CHART TOPPER

Projector 1 claims to be an advanced business graphics, forecasting and presentation system. Programs aimed at the small business operation are plentiful, but very few of them offer much in the way of graphics.

Presentation

Projector 1 comes in a large plastic wallet with a 16-page manual inside, which you'll certainly need, even if you are well acquainted with linear regression, standard errors and the like.

Pity there's no index, nor even a list of contents — it's a case of start at the beginning, plough your way through and try to remember where that bit about swapping the colour options was. Even so, it's quite well written and even includes 'A word about statistics', which many users will find somewhat impenetrable. The main criticism is that there simply aren't enough examples. It's all fairly obvious if you've had experience of business software, but not for the first-time user who is faced with a screen with no prompts, and little by way of explanation in the manual.

Features

As all such programs should, Projector 1 includes a demonstration mode to give you some idea of how things can look when everything's going well. And the demo's impressive. There are examples of just about all the program's features, beginning with pie charts and histograms, passing through simple line graphs to linear regression and lines of best fit. The examples use a variety of different labelling techniques.

KEY POINTS slides

- Such as this can have
- bullets
- 3. numbers
- or just spaces
- You can mix colours.

Designing a key point slide.

Perhaps the nicest aspect of Projector 1 is that it's not just another 'enter data and print a bar or line graph' package. There are facilities here for making a full public presentation using the Spectrum more or less as you would an overhead projector. You can build up a series of graphs, save them on tape or Microdrive, and link them with screens giving key points in large coloured text. The presentation can be automatic, or you can elect to have it pause after each frame for a key press. And, of course, you can dump any screen or series to the printer. What's more, you can chain existing presentations, but you can't use recursion.

Graphic accounts of your finances are possible with this package, says Bryan Skinner

The limits are fairly generous. Histograms can have up to 63 bars, enough for about two months' daily data and quite adequate for most uses. For pie charts you're not recommended to exceed ten sectors, because you lose the clarity they can provide.

In use

Naturally, as it's a business graphics package it ought to cope with a wide range of printers. The Spectrum being what it is, this involves matching an even more exotic range of interfacing. Options include Interface 1, Kempston (port or E), Hilderbay, Tasman, ZX printer, and no printer. Other printer driver software can be loaded into high memory, but mustn't be more than 256 bytes, not that you'd know that because it's not on the cover, nor does it tell you in the manual. However, the printer selection system is well programmed, requiring you to confirm a choice before proceeding to load the main program.

The main menu has 14 options, each selected by moving the cursor, then pressing Enter. One of my pet hates is when the programmers can't be bothered, or just didn't think to let you run the cursor from first to last or vice versa, without having to plough through all 12 intervening choices. Despite this, the two options you're likely to use most often (New data and Directory) can be selected by single key presses, well, shifted numbers at least.

That's another thing — most of the controls are odd. They're quite logical, but at the same time rather awkward. For example, cursor movement in the menu is shifted six and seven, Stop (to quit a section) is symbol shift A. Yes, I know that's the combination for Stop on the keyboard, but some of the other combinations are symbol shift plus another key, you get a bad case of twisted digits after a while.

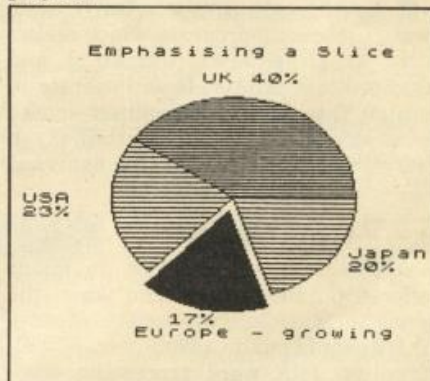
You can have your data drawn up in pie, bar or line form, and there are facilities for linear regression and curve fitting. All this is pretty comprehensive and among the best I've seen in programs of this type. For example, you can choose to have any slices of a pie chart pulled out for emphasis. Axes are scaled automatically, but you can alter this at will. Colour selections extend to background, ink, border, as well as different colours for negative values in the histogram section.

The projection facility will prove dear to many a businessperson's heart. Here you can take a set of data (which, by the way, you can enter as quarterly, monthly, yearly, or plain ordinary), and have a line fitted to it to show how that set of

data is likely to continue over the next few samples. This can be very handy for picking out trends that may not be apparent from a scattergram with its numerous data points.

You can also have a background grid, axes, points joined and so on. The program will calculate the line of best fit, or — quite impressive this — a curve, and will display the equation, together with statistics such as corrected R squared, the standard error of regression, the F value and degrees of freedom.

The most impressive facility is the presentation aspect. Data, graphs and key point screens are stored in a directory, which details the types, titles and code numbers. You can select presentation order, automatic or pausing and so on. This means you could use the Spectrum at a meeting to show sales figures, or to impress upon your bank manager why he or she should invest in a project.



You can pull out a slice of the pie.

Because there's a lot of calculation and validation to be done, it's not a fast program. It can take up to 30 seconds to sort out a lot of data, but that's not bad, given the quality of the results.

Verdict

Projector 1 covers just about everything you could want. There are some niggles — it asked if I wanted to print out some data after I'd taken the no printer option, for example. The keys are awkward and the manual inadequate, but you could learn to live with this. All in all, it's a flexible and neat package and many will find it an invaluable aid.

REPORT CARD: 1 TO 5

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

Name Projector 1 Application Business graphics/presentation Price £13.95 Publisher McGraw-Hill Format Cassette Other versions None Outlets Retail.

SOFTWARE PRO-TEST: AMSTRAD DOUBLE HEADER



Simon Williams has been busy looking at two word processing programs for the Amstrad. Here are his verdicts on Easi-Amsword and Tasword.

The *Easi-Amsword* word processor from Juniper Computing, marketed by Amsoft, is a fairly basic word processing program which allows text to be entered, formatted and dumped to a printer. It will operate in either the 40 or 80 column modes available on the CPC 464 so that, if you have the colour monitor, you can view the text without strain.

In use

There are eight major functions offered on the main menu when the program is loaded from cassette. None of these should puzzle anyone who is at all familiar with word processing programs.

The Create option sets up a document from scratch. Having decided on a name and in which screen mode it will be presented, the processor automatically enters the Edit mode. This is where most of the work is done, and offers a blank screen of 24 lines with a status strip along the bottom, offering the document name, the number of lines currently within it, the number of letters entered since the beginning of the last paragraph, and the status of the INSERT/OVERWRITE toggle.

I would give quite a lot for a current word count rather than the line and letter counts actually offered. The text cursor takes the form of a copyright symbol, and is not as clear as it might be in the 80 column mode; a solid block would be better.

It may be moved around with the cursor keys (although the auto-repeat is uncomfortably slow) or to the beginning or end of the current paragraph or document using these keys in conjunction with CTRL.

Tabs may be set and characters

inserted or deleted, but it is quite possible to type ahead of the deletion buffer and wipe out more than you intended. Text movement is sluggish, but usable.

The Name option is mainly used for retitling a document when you want to keep more than one version of it. This can be used for holding preset letter heads, for example. Retrieve will load a document, previously saved to tape, and shares a sub-menu with the Save option.

Selecting PRINT displays another sub-menu, offering a number of options for print formatting. If all is ready, the printout may be started from this point. The last two options from the main menu allow a whole series of documents to be printed from cassette — each may use a print format saved with the text — and to change the default colour scheme of white on black, if using a colour monitor.

The 16-page manual for *Easi-Amsword* is small in all respects, fitting comfortably inside the cassette case. It does, however, cover all the functions of the system in adequate detail.

Verdict

The choice of some of the control codes could have been a little less obscure and the occasional stop for garbage collection can be a bit distracting, but overall the program is usable for letters (and short articles such as this one).

It would, however, prove annoying for anyone trying to use it on a regular business basis. For the asking price, though, that is not unreasonable.

Product Easi-Amsword System Amstrad Price £9.95 Manufacturer Amsoft 0277-230222

The full word processor, *Amsword*, is in fact a revised version of the *Tasword* program which found considerable favour when released for the Spectrum. The Amstrad version operates only in the 80 column mode and right from the start presents itself as a more serious piece of software.

It offers quite comprehensive facilities for formatting and printing text, but relies almost exclusively on the use of CTRL key operations to get at these options. I do question, however, the design philosophy adopted by Tasman in assigning control key letters as groups of adjacent keys on the keyboard.

In use

The confusion created is moderated somewhat by the comprehensive help screen incorporated into the system. At any time during text entry this screen may be called up and includes all the various control key definitions.

Two further display options allow seven lines at the top of the display to show part of the help screen, or to remove all but the bottom two lines, leaving 23 available for text. The bottom two lines offer a ruler, showing margin and tab settings, and a status line giving various information. Again, there is a lack of a word counter, but this facility is available by calling up the main menu, which also lets you know the number of characters used and remaining (just over 14,000 characters — about eight A4 pages — are available) and the number of lines of text currently created.

Printer control codes are shown on the text display as inverse video characters and most of the common options for dot matrix and daisywheels are covered. These characters may be set to produce the desired codes for your own printer, although there is no single code designed to set up the printer initially. My own daisywheel needs a single escape code to set it to print bi-directionally rather than performing a carriage return at the end of each line. There is no legitimate way of producing this.

The documentation runs to 45 pages and covers most aspects in a fairly protracted way. The whole package gives the feeling of doing its job pretty well, but sometimes in an annoyingly fiddly way. When returning from the menu to the text display, for example the cursor is always positioned at the beginning of the text file. How much more useful to return to the point from which you left?

When you perform the necessary control function to move to the end of text, you find that you're left with the cursor sitting over the last character, instead of to the right of it.

Verdict

Overall, *Amsword* is well worth the asking price, but may prove to have a longer running-in period than some word processors for other micros. ■

Product Tasword 464 System Amstrad Price £19.95 Manufacturer Amsoft 0277-230222

Acorn

BBC B, six months old, immaculate condition, Panasonic computer recorder. Cost £442 sell £320 including dust cover, leads, tapes, books. Tel: Larbert (0324) 558278.

Acorn Electron + tape recorder + many games (inc Aveator and Chucky Egg) + books + many mags. Everything fully boxed as new. Offers. Tel: Billingham 551049.

BBC disk users! Would you like to swap disks? If so write to Paul Phillips, 13 Mountain Rd, Conwy, Gwynedd enclosing your software list.

EPROM programmer for BBC with 2 blank 16K EPROMs and 1 blank 8K EPROM and a few commercial ROMs. All for £100. Tel: 05827 69152.

Wanted BBC Model B 1.20/5 with disk drive and any software. Pay around £320. Write to 31 Tamerton Ave, St Budeaux, Plymouth, Devon.

BBC B software. Brand new. Unused, still in sealed packs. Monsters, Rocket Raid, Planetoid. All Acornsoft games. £7 each. Tel: Southampton (0703) 552724.

BBC B computer with Cumana disk drive and 32K Solidisk sideways RAM. Five months old. Little used. £575. Tel: Basingstoke 51623.

Acorn BBC B, DFS, Acorn disk drive, view ROM chip, software £60, books £30, hardly used. Total value £888, sell all for £600. Tel: 01-952 3891.

BBC Model B, unwanted prize, still in carton, Acorn guarantee etc, £340. Tel: Harefield 3086 (Middlesex).

BBC Model B computer with DFS. Hardly used. One year old. Cost over £470. Best cash offer secures. Tel: 01-444 5499.

BBC original software for sale or swap. Tel: Romford 63638 or write to John Lee, 18 Pettits Close, Romford, Essex RM1 4EB.

Wanted BBC software, hardware, anything considered. Books, mags, utilities, modems, or W.H.Y. Must sell or swap Atari 800XL 1010, ROMs, disks. Tel: 0526 21187.

Electron and BBC software and books going cheap (40% original cost). Tel: 0255 814523 for details. All as new condition. All originals.

BBC software to sell. Titles include Hunchback, Fools, Chuckie Egg. All 13 for only £40 or sold separately for £4 each. Tel: Banchory 4186.

Wanted: BBC original software on disk. Tel: 05827 69152.

BBC B: £120 of software, loads of mags, books, and cassette recorder. Worth over £500. £360 ono or will swap for CBM 64 with disk drive. Tel: Walton-on-Thames 242674.

BBC quickshot joystick with adaptable software and all leads for only £10. Tel: 0966 32830 for details.

Apple

Apple IIe, two disk drives, 80 column, 164K card, parallel and Epson interface cards, Applewriter and Business Graphics software. £1,100 ono. Tel: Hitchin (0462) 50779.

Apple II Europlus, 64K, 12 inch green monitor, manuals, £350. Or swap Daisywheel typewriter with interface, peripherals, disk drives etc. Tel: 01-602 1530.

Atari

Atari 400 plus data recorder worth £50, Quickshot II joystick + 4 tapes (16K), £100 ono. Tel: 0293 31870.

Atari 800XL. Brand new. Never used. £160. Tel: 0602 782310.

Wanted Atari peripherals 810 working or not considered. 850 interface wanted. Also machine language listings would be of interest to me. Tel: Mark, 0495 272358 (10am-2pm).

Atari 800/400 cartridges. Super Break-out, K. Star Patrol, £4 each. Multicart cartridge to tape/disk backup copier £20. Tape to tape backup £3. Tel: 01-741 3361.

Atari 800 48K Basic programmer kit + books + 1010 program recorder. Excellent condition £150. Tel: 09277 64584.

PCN Billboard

Atari Basic cartridge, plus two manuals. Swap for Trakball and Super Joystick, or sell for £25. Tel: 01-673 5819.

Atari 600XL, program recorder, manuals, books, programs, listings. Plus one year's Your Computer. All for £180. Tel: Tetbury (0666) 52902 (eves).

Commodore

Vic 20 and cover plus data recorder plus 8K cartridge, 3K hi-res cartridge, joystick and £150 of cassette games, books. All boxed as new, £140. Tel: Caterham 47768.

Commodore Vic 20 package for sale, computer cassette recorder software and magazines. Price £80-85. Tel: 01-767 0623 after 5pm. Ask for Mr J Doshi.

plus £100 software, 1 year old, £150. D Benham, 4 Market Place, Houghton-le-Spring, Tyne and Wear DH5 8AH.

Commodore 64 calc result spreadsheet on cartridge £20. Solo Flight cassette £7.50. Two books £4 or £24 the lot. Tel: Fleet 4655 (eves). 01-934 5962 (office).

Commodore Vic 20. Compatible cassette deck. 3K RAM pack. Monitor and toolkit chips. Four games tapes. £65. Tel: 01-451 0520.

Vic 20 cassette deck; joystick; 8 games; lots of magazines in folders; intro to Basic part 1; two books and cassettes. Worth £250. Selling £110. Tel: 775 8463.

Swap Commodore 64 games, many titles, on disk and cassette. Please contact Gary on 0760 338387 anytime between 4pm and 12pm. Please have list.

Swap CBM 64 software on cassette or disk. 100 plus titles plus some American. Write to Colin at Harmony House, Vicarage Rd, Marham, Kings Lynn, Norfolk PE33 9HY.

CBM 64 software to exchange. Many titles including lots of American software (disk only). Tel: 0276 35168 and ask for Ian.

Wanted for Commodore 64 disk drive or printer for b/w television plus Atari 2600 VCS with accessories plus electronic chess traveller. Tel: 0754 68420 (Skegness).

Vic 20 with 16K Rampack cassette recorder; 3-slot Motherboard speech synthesiser; Quickshot II joystick; stack light; rifle and two cartridges. Excellent condition, all for £120. Tel: Penketh 6439.

Vic 20 with C2N. Lots of software: Vicmon; Gridrunner; Sargon; several books; programmers reference guide. Worth £380, accept £200. Tel: 0702 710076 (after 4pm).

CBM 64 software to sell or swap. Spriteman; Arcadia; Purple Turtles. £3 each, or £8 the lot. Also CBM 64 games book £3. Tel: 01-808 4684. Ask for Errol.

Vic 20 Pharaoh's Curse and Bongo wanted. Swap for other games — Jet Pac, Night Crawler and Myriad. Also, swap Vic Revealed for programmer's reference guide. Tel: 01-673 5819.

CBM 8096, C2N data recorder, books would suit serious user, £320 ono. Tel: 061-480 4600 anytime.

Swap £415 of original CBM 64 software for disk drive. Titles include Loco, Beach Head etc. Tel: Ardrossan 63570.

Sell over £416 of original CBM 64 games. Titles include Loco, Beach Head, Skramble, Rabbit. Tel: Ardrossan 63570.

Commodore 64 software disk and cassette to swap or sell. Many titles. Tel: Bill, Havant 471550 (eves).

Commodore 64, programmers reference guide, dust cover, Commodore magazines, £150. Tel: Gwyneth, 01-821 3145 (8.30am-4.30pm).

Vic 20 starter pack + 16K switchable RAM, joystick. Lots of books and magazines and over 25 games worth £250. Will accept £130. Tel: St Helens (0744) 811146.

CBM 64 software for sale. Zim Sala Birn cost £9.95. Revenge Mutant Camels cost £7.95. Sell both for £9 (originals). Tel: Blackpool (0253) 55588.

Vic 20+ cassette recorder, joystick, 7 cartridge games & 10 cassette games. Manual intro to Basic I & II. 2 books sell for £94. Tel: Knowle (05645) 3268.

Vic 20 C2N recorder, Quickshot II, joystick, Audiogenic toolkit, programmers reference guide understanding microprocessors programming, 6502 games including Sargon II chess. £100 ono. Tel: Hartley Wintney (025126) 3307.

CBM 64 software to swap or sell. Games incl: The Evil Dead, Hunchback, Micro Olympics, Attack of Camels, Hobbit and more. Tel: Rossendale 229875.

Software for 64 worth £47.74. Hunchback, Kong, Scuba Dive, Felix, Sting, Bionic Granny and Munchmania. Bargain at £30. Tel: Tavistock 4953 after 5pm.

Commodore 64, cassette deck manuals etc, 3 months old, £125. Tel: Richard, 01-607 3693 after 5.30pm.

Vic 20's, 4 cartridge games £26. 8K RAM £26. Joystick £5. Introduction to Basic £10. All for £55. Tel: Imran, Slough 823913 (5pm to 9pm).

CBM 64, joystick, C2N and over £270 of software. Will sell for £270 or swap for BBC-B or Amstrad. Tel: Chris, Fraserburgh 26126.

Dragon

Dragon 32, joysticks, Dash/Demon and edit cartridges. £100 worth of software, books, mags, etc. Excellent condition, £105 ono. Tel: 01-689 0531 (Croydon).

Dragon 32, boxed, 2 joysticks, £40 software, Cheshire Cat, Teach Yourself Basic, mags. £100 the lot, good condition. Tel: Burton (0283) 48123 (7-9pm). Ask for Richard.

Dragon 32 for sale, £60. Tel: 01-986 2658 (after 5pm or weekends).

Dragon 32 plus disk drive; 2 joysticks; spare disks; software including telewriter w/p. Cassette recorder. All leads. £320 ono. Tel: Nigel on 01-485 1383 (will split package).

Lynx

Lynx 48K C.W. manual, leads, joystick, interface cassette deck, two user magazines and £100 software. Only £150 ono. Tel: 93 769570 (after 6pm).

Lynx software. Snowball, Adventure Quest, Centipede Power Blaster, £5 each. Hangman, Connect Four, £3 each. Will swap for Atari games (16K). Tel: 061-439 6198.

Oric

Oric 1 swaps: Dallas; Airline; Starfighter; Graif; Dinky Kong; Jogger; Orcade; Zodiac; Flight; Multigames; Time Bomb. Tel: Mark on Needham (0449) 721835.

Oric 1 48K, excellent condition, plus £100 software including Hobbit, Zorgons, Xenon, etc. Manual and books for £140 ono. Tel: West Chilton (Sussex) 2826 after 6pm.

Oric 1 48K, unwanted present, boxed, plus books and software. Cost £200, selling for £85 ono. Tel: 01-624 5138 after 5pm.

Oric owner's high quality listings of your programs (M/C or Basic). Cheap rates. Send see for details. D L Carter 37 Pennidens Road, Freshbrook, Swindon, Wilts. SN5 8QF.

Oric software for sale, all half price including Zorgons, Gravitor, Trickshot, 50 others. Oric 1, good condition plus joystick, interface, ten games, £75. Tel: 01-485 8393.

Oric 1 48K, vgc, + lots of software inc. Xenon, Hunchback + books + leads. £90 ono. Tel: James 01-651 4803 evenings.

Oric 1 48K with boxed colour printer/plotter (both in vgc with leads + manuals), £120s worth of software + books. Everything £175 ono. Tel: Brecon (0874) 2154.

Oric software. Over 20 games at half price, as selling Oric 1 48K for £20 + software. Tel: 01-485 8393 after 4pm. Best bargain ever.

Oric Atmos 48K, boxed, in excellent condition + cassette recorder and over £70 worth of software, inc Hobbit, Xenon 1, and two books. Worth £280+. Sell for £120 ono. Tel: 01-876 4332 (evenings).

Oric software, all originals, Dinky Kong, Oric Flight, Killer Caverns, Multigames One, £2.50 each. Tel: Lancing 762361.

Oric 1 48K, with software, book and cassette leads, £75 ono for quick sale. Buyer must collect. Tel: Leeds (0532) 775296 most nights after 4.30.

Oric 1 48K software Zorgons Revenge, Galaxians, Golden Baton. A bargain at £17. Write to M. Webb, 11 Hollis Road, Hatherley, Cheltenham GL51 6JL.

Oric 1 48K, boxed, many magazines, dis/assembler, M.C. monitor, games including Xenon 1, Light Cycles, Mushroom Mania, Defence Force. Games book. £85. Tel: Biggin Hill 29-71329.

Oric 1 48K, very good condition, all leads, manuals, £50. Software including Hobbit, Mr Wimpy. All originals. Tel: Middlesbrough 0642-597597.

Oric Atmos 48K, with 14 programs inc. Author, Hobbit, OricAid, Defence Force, £125. Tel: 01-940 2549.

Oric software, over 20 games for around half price including M.A.R.C. Lohi, Ghost Gobbler Gravitor. Tel: 01-485 8393 after 4pm. Mark.

Atmos 48K and £150 software including Hunchback, Hobbit, Zorgan, Scuba, Joystick and Pace interface + six books, £220. A bargain. Tel: 0733-264641 evenings.

Oric 16K, Oric printer, cassette recorder, all leads, also Mushroom Mania and The Ultra. Sell for £110 ono. Tel: 01-368 8468.

Oric software, originals. Zenon (AT), Starfighter, Centipede (AT), £2; Chess (AT), Toolkit, Wordprocessor, £3; Hobbit (AT), £4. (AT) equals Atmos compatible. Tel: Ripley 860653 (Derbyshire).

Oric software. Large choice includes Hunchback, Harrier Attack, Dinky Kong. Also joystick interface. Total value over £70. Sell for £40. Tel: Patrick; Belfast 772500.

48K Oric £180. Software including Hobbit, Forth, Chess. Dust cover, leads, magazines (Oric listings). Worth £200, asking £130. Tel: Ashford (Middlesex) 57787 after 6pm.

Oric Atmos (4 months old) plus 9 books; 13 tapes; joystick; interface; 2 folders, many mags. £110 ono. Tel: Lea Valley 9711927.

Oric 1 software: Painter; Hunchback; Following Atmos compatible Zodiac; Oricmunch; Invaders; Green X; Toad; Rat Splat; compendium. £3 each. The lot: £20. Tel: Martin on Bexhill 222102.

Oric 1 48K, good condition, cassette player and lots of software including Hobbit, Xenon, CAD, Wimpy plus many more. Sell for £150. Tel: Cambridge 870644.

Oric 1 48K, good condition, manuals, leads, books, £80+ software including Defence Force, Hobbit, Zorgons Revenge, Ultra, Meteors, M.A.R.C., Forth. Only £135!!! Tel: 0494 445087.

Oric User magazines. Numbers 1, 2, and 4 wanted. Your price. F. Lino, 5 Faenol Avenue, Abergelle, Clwyd LL22 7HT. Tel: Abergelle 824261.

48K Oric, unwanted present still boxed and guaranteed. Over £80 software incl Zorgons, Hobbit, Harrier, Scuba, plus books, £130 ono. Tel: Steve, Littlehampton 713416.

Oric 1 48K + £100 software + books + leads. All boxed, cost over £270. Sell £125 ono or swap for CBM 64 compatible disk drive. Tel: 0276 27115.

Oric 1 48K including all leads, two Oric books, nine games (Defence, Zorgons etc), Oric Owners', all excellent condition, sell for £80. Tel: 0953 55729.

Compiler for Oric wanted. Needed to compile games from Basic to machine code. Tel: 0742304316. John Hayes, 24 Whitworth Rd, Sheffield S10 3HD.

Oric 1 48K games for sale. Zenon 1, 3D-Maze, Candyfloss & Hangman, £5 each. Tel: 01-445 5989 (eves).

Sinclair

Spectrum 48K, complete leads psu and manuals. Software, value £30 quick sale wanted. £85 ono. Tel: 01-958 7175 eves.

Ex Spectrum professional beginners pack including blank tapes (4), stencils, plotters, overlay cards + free game for ZX Spectrum for sale. £12 max, open to offers. Tel: 0994 240 612.

Spectrum Psytron, Fighter Pilot, Code-name Mat Yalhalla, Jetpac, Jetman, Atic Atac, Psst Bugaboo, Mugsy, Full Throttle, Deathchase, Zzoom, Zipzap, half price. Tel: Robert Bradford 562734.

Spectrum 48K, Kempston joystick and interface, lightpen, Fifth, Scope, FP compiler, sprite generator, Melbourn draw, 3 books, £140 of software, still guaranteed £250. Tel: 0302 65887.

Spectrum 48K with Kempston interface and data recorder, with over £80 worth of software. Also lots of books and mags £160 ono. Tel: 061 881 1144.

Spectrum, Blue Thunder, Psytron, Hunter Killer, Ad Astra, Timegate. Plus 5 others. Worth £65, will sell for £35. Tel: Scott on Dundee 68197.

Spectrum 48K with Alphacom printer and VTX5000 modem for Micronet etc, also numerous software. All new condition and boxed only £175. Tel: 0403 732242.

Spectrum 48K, keyboard, tape recorder, telesound, Kempston joystick interface, £250 plus software and books. £210 ono. Tel: 0753 889988 (office hours) and ask for Nik.

Spectrum 48K, Dk Tronics keyboard, interface one, two microdrives, ZX printer, ZXL print 3 interface. All boxed. Software including Tasword 2, manuals, books vgc £240 for quick sale. Tel: 01-898 0482.

Spectrum 48K, joystick + Cambridge interface, books, games, magazines. Very good condition. Or exchange for Commodore 64. Tel: 061 928 9787 after 5pm and ask for Mark.

Spectrum 48K with ZX printer and b + w television £85. All excellent working order. Some extras available if required. Tel: 0274 873935.

ZX Spectrum, cassette recorder, games, interface 1, interface 2, 2 joysticks, Microdrive, cartridges, books, mags, posters etc, as new. Worth £350. Will sell for £205. Will sell separately. Tel: Hythe 0303 69096 (evenings).

Spectrum computing tape magazine 1-9. £1.50 each. 16/48 tape magazine 1-10 £1.50 or complete £10 each set. Fuller FDS £37. Tel: 01-951 0007 after 8pm.

Spectrum 48K, Quickshot joystick, DK tronics interface £100 of original software £30. Books and magazines total worth £280, yours for only £150 ono. Tel: 504 5409.

Spectrum, The Hobbit, Arcadia, Orbiter, Ground Attack, The Spectrum Handbook. offers? Write to Chris Heppell, 8 Garden Terrace, Hexham NE46 3PX.

Spectrum 48K tape recorder, stack light rifle £75. Original software, mags, leads and manuals, cost £265, sell £150 ono. Tel: Steve on Coventry 0203 418809.

PCN Billboard

Spectrum 48K, software. Four cassette games Paragram, Jerico Z, Ringo, Kosmik, Pirate £10 the lot. Tel: Windsor 54075 after 6.30pm.

Spectrum 48K interface one, microdrive, three cartridges, cassette recorder, RAM turbo £140 plus Best software. Worth over £420, sell £240 ono. Tel: 01-642 6777 evenings.

Spectrum 48K, for sale, with Microdrive plus Interface 1 plus Microdrive cassettes plus 14 games. All for £250. Tel: Karim, 748 0013.

Spectrum 48K, + recorder, 2 months old, still on guarantee. £37 worth of software, including Snooker Snowman, Blue Thunder. £110 the lot, or nearest offer. Bognor 829856.

48K Spectrum, I/F1, I/F2, 2 off Microdrives, 4 off Microdrive cartridges, six games, all brand new, £270. No offers. 25 Napier Road, Wembley, Middlesex.

ZX81 16K RAM, good condition, still in box. Manual, all leads, books, Space Invaders, magazines, around £45. Friday-Saturday, 5-6.30pm. Tel: 01-521 1459.

ZX Spectrum 48K tape recorder, joystick interface, over £250 software, 100 mags, boxed, perfect condition, guarantee. £165 ono. Swap for BBC-B or Electron. Tel: 01-995 1874.

30 Spectrum games worth £220. Sell £115 ono. Includes Valhalla, Hobbit, Penetrator, Pyramid, Atic Atac. Tel: Cookstown 63708.

Sinclair Microdrive with Interface 1 and three cartridge, £75. 6 months' guarantee remaining. Tel: Gosport 581040.

48K Spectrum I/F One M-drive, 6 cartridges, joystick, printer, paper, sixty tapes including Sherlock Holmes, Matchpoint, Fighter Pilot, £350 ono or swap for QL. Tel: (0908) 565465.

Spectrum games, Pyjamarama, Lunar Jetman, Android 2, Oracles Cave, JSW Bugaboo, Psytron, Code Name Mat. All originals. £3.50 (includes postage). Tel: John 01-520 5203.

ZX Spectrum 48K + joystick interface + software, manuals, hardly used. Worth £170, sell for £95. Tel: 01-806 7614 after 5pm.

Sinclair software 48K, Daley's Decathlon, £6.00. Brand new and Gnasher for 48K or 16K, £1.00. Tel: 01-205 6622 after 4pm.

48K Spectrum Interface 1, Microdrive + 3 cartridges, Protek interface + Quickshot 2 joystick, cassette recorder, software, books + magazines. £230 ono. Tel: 01-352 1004 (evenings).

48K Spectrum, four months' old, little used. Amstrad CTR 6000 recorder, compatible. Both in original packing. Cost £145; sell £95. Saunders 01-648 1199 Mitcham, Surrey.

48K Spectrum. Over £500 worth of software, speech synthesizer, Interface 2, joystick, recorder, printer, 4 rolls paper, perfect condition. Worth £765. £250 ono. Tel: 0695-76181 after 5pm.

Wanted. Sinclair 48K Spectrum, possibly on its own. Write Mr D. Britton, 10 Cicely St, Liverpool 7.

48K Spectrum Interface 1, 2 Microdrives, VTY modem, 4 Microdrive cartridges + software worth over £1,000, £300. Tel: 09598-260 after 6pm.

Spectrum Software for sale or swap, 200 titles. Lists and offers to Brian, 5 Almeida Tce, Kilmawham, Dublin 8.

48K Spectrum, keyboard, cassette recorder, VTX 5000 modem, Currah U Speech, joystick with interface and over £175 software. Will sell for £250. Tel: 0493-853920 after 6pm.

Spectrum and Microdrive for sale, reliable and trusty friend, must sadly be sold with software, etc. £175 will ease the pain of parting. Tel: 021-706 5189.

Spectrum 48K computer wanted. Pay £30. Tel: 04446 41198.

ZX Spectrum games for sale or swap. JSW, Zoom, Psion, Flight-Simulator, Atic-Atac, Lunar Jetman, Flippi and more. All original. Tel: High Wycombe 881429 Sun-Mon.

Wanted 48K Spectrum. Willing to pay up to £65. Commodore 64 also required, price up to £90. Tel: 01-904 7884 eves or weekends.

48K Spectrum + Protek interface + Q'shot II joystick and computer stand, books and £500 worth of software. Cost £700, bargain at £275 ono. Tel: 01-573 7148 after 6pm.

48K Spectrum, RAM Turbo joystick + cartridge interface, Quickshot II, ZX printer, four rolls paper, light pen, tape recorder, B/W TV, books + magazines. £100's software, £260 ono. Tel: Peterborough (0733) 241354.

48K Spectrum and a few games going for just £85 ono. Tel: 01-524 8343 and ask for Robert.

QL for sale, will swap for Apple Imagewriter printer or £350 cash. Also parallel interface, £40. Tel: Tony 01-578 7704 after 7pm.

An 'AH' QL, hardly used, offers around £380. Julian. Tel: 01-378 2623 days, 01-435 1738 evenings.

Spectrum FDS keyboard and Currah Microspeech with software. Will sell for £40. Tel: Scott on Dundee 68197.

Spectrum 48K Interface 1 Microdrive, Currah Speech, Dktronics keyboard, Dktronics joystick interface, Quickshot joystick, software, books, value £450, swap for CMB64 + extras. Tel: 0604 719730. Mornings only.

Sinclair printer and five rolls of paper, £35. Also lots of software to swap (your list for mine). Philip. Tel: Bolney, Sussex (044 482) 617 evenings only.

Spectrum 48K joystick and interface, B/W TV, magazines, software, £210. Write: John Bell, 22 Pethererton Road, Highbury, London N5.

ZX Spectrum 48K + Kempston interface with Quickshot and Atari joystick, cassette recorder, lots of software, Sinclair mags and one book, + more. Sell for £175. Tel: (0709) 65280 after 5pm, ask for Carl.

Spectrum originals, Penetrator, £3; Avenger, £2; Aquaplane, £3; Race Fun, £3; Maze Death Race, £3. Mr P Mank, 2 Knights Close, Pembury, Tunbridge Wells, Kent TN2 4EL.

Spectrum 48K, Kempston interface with lots of books, magazines, software and tape recorder. Sell for £170 ono. Petar Petrovic. Tel: 061-881 1144.

Spectrum 48K, cassette recorder, Kempston interface, Quickshot II joystick, over 140 games, including Sabre Wolf, lots of magazines, paraphernalia, £250 ono. Tel: Glenn, (0742) 337877 after 6pm.

ZX81 software for sale, includes 3D Defender, Monster Maze, Phoenix, Breakout, Adventure A and B, + others. Once only offer £15 ono, all tapes originals. Tel: 01-407 7462. Ask for Room 117 (Paul).

Spectrum 48K Dktronics keyboard, data recorder, £105. Latest software titles, accept £250 or will separate. Tel: Billericay 02774 51395.

48K Spectrum, cassette recorder, Currah Microspeech, Cascade 50 games cassette, PCW, 25 games cassette plus books plus 15 game cassettes. £160. Tel: Sheffield 884183.

Spectrum 48K, Fuller Box, Quickshot, Interface cursor/Kempston 100 + progs, books, mags, £155 ono. Casio PT30 keyboard, £35 ono. Tel: High Wycombe (0494) 443184.

Tandy

TRS 80 pocket computer, inc interface, software, books, and batteries (all Durcell). Worth over £160 new, only £60 ono. Tel: Wael, 0206 561391 after 7pm.

Colour Genie 32K. New Basic ROMS, joysticks, voice synthesiser, manuals, books and software, £120 ono. Tel: 0263 554840 after 6pm.

TRS 80 Mod 1, 48K, twin disk, video monitor, modem, RS-232, sound generator, New Dos-80. Many programmes, assemblers, monitors, communications, Eprom programmer. £600. Tel: 02302 4420.

Linux 48K in excellent condition. Boxed with leads, manual, joystick, interface and over £60 worth of games and utilities. £130. Tel: 02313 44566.

Linux 48K for sale. Perfect condition. Unused, boxed, and complete with all leads/manuals etc. Price: £90. Tel: Ian on 051-708 8275 after 5pm (week-days).

Texas Instruments

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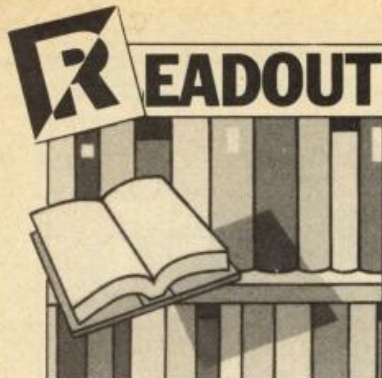
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'The BBC Micro Machine Code Portfolio' by Bruce Smith, published by Granada at £7.95 (paperback 212 pages).

One advantage to the BBC is that it can be easily programmed in machine code.

The first chapter of this book is an introduction and covers the differences between Basic I and Basic II, and how to overcome them. The next chapter covers the reading of the function keys with two programs virtually copied from an old edition of *Acorn User*. The author makes no bones about this and offers profuse thanks. Next comes a chapter on machine status, with routines that will tell you your program

size and what variables are currently in use.

Eventually the book gets down to a little meat with a selection of routines to provide multi-byte arithmetic. There is very little explanation of how this works, which is a shame, as they use standard methods which would be of interest to anyone wanting to modify them.

The most unusual part of the book is a list of some of the programs in bar code form. If you happen to have an MEP (Micro Electronics Educational Program) bar code reader you will save yourself a lot of strain.

Overall, the book provides useful reference material for people who have just begun writing machine code programs. On the other hand, if you are writing machine code already you probably have these programs in stock. **KG**



'QL Computing' by Ian Sinclair, published by Granada Publishing at £5.95 (paperback, 176 pages).

Whenever a new micro appears there is a rush by the book

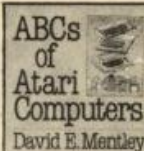
publishers to be first out with a book about the machine. The trouble with these 'instant' books is that the contents tend to be a little too instant, and give the user little more than what can be found in the manual.

Ian Sinclair is no stranger to this kind of book and QL Computing definitely falls into the instant category.

True, it is based on use of the QL (it is surprising how often someone writes a book about a micro that no-one has yet got their hands on), but Mr Sinclair (no relation to Sir Clive) has to admit his QL was one of the early versions which came with the decidedly 'provisional' manual.

Like so many of the instant books it is padded out with such essential information as how to wire on a 13 amp plug, tune in your television, and the virtues of using a proper four-way expansion box.

This is followed by an idiot's guide to writing simple programs in the QL's SuperBasic, as though the only thing that is worth writing about the QL is the language it uses. (Granada publishes another title that might be more appropriate called 'QL SuperBasic'). And that is about all you get for £5.95. **RB**



'ABCs of Atari Computers' by David Mentley, published Prentice/Hall at £14.50 (paperback 228 pages).

I did not see a need for another book on "How to Write Basic Utilities for the Home" or "2,000 Games for Your Atari", says David Mentley.

From this refreshing opening he goes on to give a compendium of hints and tips on using Atari micros.

Mr Mentley is well placed, as president of a large Atari user group in the US to pass on this information.

But don't expect all the pages to be brimming with previously unknown information. One of the strengths of the book is that it takes the reader through from the level of knowledge and then introduces more complex and technical subjects.

The book undoubtedly has its weaknesses. Some keen Atari users might feel the depth and scope could be greater. And UK readers might experience some frustration with the frequent reference to US suppliers.

Despite these drawbacks, it is a book that should grace the a worthwhile book. **RB**

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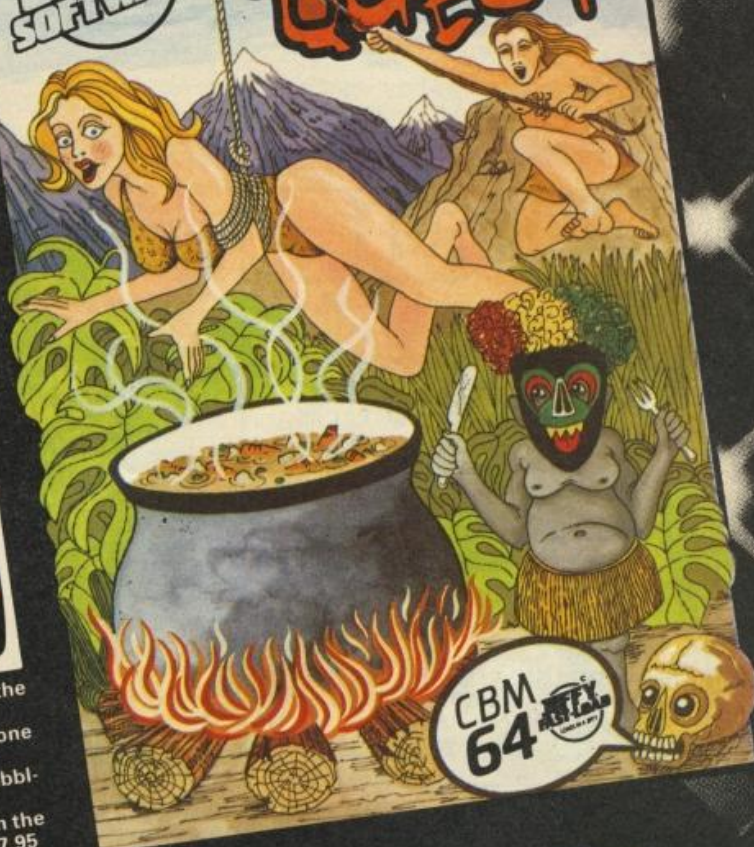


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Welcome to the Wacky World of Computers... this week news of two unsung aspects of the technology. First, a case of out with the old, in with the new for 50 pathologists who, it seems, are taking a big interest in the computerised aspects of death. Fortunately, they're also using computers to help stop you

reaching that interesting state. Second, Computer Systems Technology reveals that it 'has come to the rescue of a fishing tackle manufacturer'. The rod makers were unable to analyse the casting and striking characteristics of glass-fibre and carbon rods. CST, with a package of black boxes hooked up to a BBC Micro, saved the day.



There was a poor response to our Laughlines competition in issue 82 but 11-year-old Neil Laidlaw, of Fife, Scotland, has an eye for topicality and wins the traditional £20. Our recent piracy articles were obviously behind his caption: 'OK Smith, hand over the Manic Miner listing.'

Next development is 'a radio link between rod and control box which will allow the equipment to be used at the waterside with a specially packaged micro resting under a large angler's umbrella'. You think we're kidding...

Meanwhile Microsoft's support for the Mac was bolstered last week. Youthful chairman Bill Gates was in London for the launch of MS-Net but events were overtaken when Bill was faced with a rich junket. A flunkey was swiftly despatched for a Mac — cheeseburger variety — and chips. Where does that leave Apple? Taking a hard look at the individual fruit pie business, we imagine.

ACT's Roger Foster was at the event, chirping over the launch of the Apricot 32, the first commercial micro with an MS-Net capability. Did the name signify that only 32 machines could be networked? On the contrary, said Roger, 'we just chose 32 — in fact the network will support 64.'

Quick question: who sold the most business computers in 1983? Apple? IBM? ACT? Wrong... Commodore. Now, 1984 — that's a different matter.

SYNTAX ERROR

Although the BBC cannot produce a c with cedilla below it, PCN's printer can. The character before the comments in the Output listing for the BBC (issue 86, Commanding Performance) should be a back slash, or a half in Mode 7.

Last week, in the OEL Telemod 3 modem review, we blamed BT for rejecting modems with Bell telephone tones. In fact, all approvals are made by BABT — not British Telecom — and Bell tones are permitted provided they fall within certain limits.

NEXT WEEK

And they're off

Could you outdrive James Hunt? See next week's issue for details of PCN's most exciting competition yet.

BBC retrospective

We celebrate the BBC micro's third birthday with a retrospective look at why it continues to sell so well and what its drawbacks are.

Dial up 64

We get to grips with the Commodore modem and check out Compunet, the Prestel competitor for Commodore owners.

Price conscious printer

The Smith Corona Fastext 80 costs £225. Cheap and cheerful?

Spectrum countdown

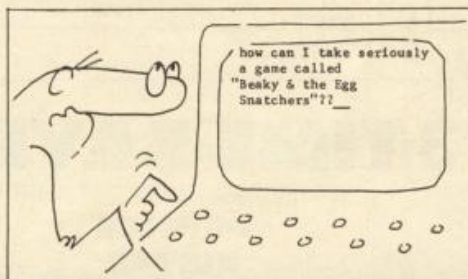
Type in our listing to add a wordcounting utility to Tasword.

BBC extras

You can extend the range of commands with a handy plug-in ROM and we put it through its paces. Plus some handy routines to type in.

RAL2000
by Mollusc

Will you please
take this game
seriously!!



PCN DATELINES

Event	Dates	Venue	Organisers
COMPEC	November 13-16	Olympia, London	Reed Exhibitions 01-643 8040
6809 Show	November 17-18	Royal Horticultural Halls, London SW1	Computer Marketplace Exhibitions, 01-930 1612
Artificial Intelligence Seminar	November 17-18	Middlesex Poly, London	Intellect Seminars, Steve Torrance, 01-801 3434
ZX Microfair	November 17-18	Alexandra Palace, London N22	Mike Johnstone, 01-801 9172
Humberside Computerfair	November 18	Winter Gardens, Cleethorpes	Grimsby Computer Club, 0472-694047
Videotex Europe Exhbn & Conf	November 20-22	Amsterdam, Holland	Online Conferences, 01-868 4466
Penwith Computer Club Exhibition	November 24	St Pauls Old School, Penzance	Jeremy Hewitt, 0736-787159
Computer China	Nov 25-Dec 1	Xiamen, China	Beta Exhibitions, 01-405 6233
Intl Exposition for Technology Transfer	Nov 27-30	Metropole Hotel, Brighton	Concorde Services, 01-749 6171
Electron & BBC Users' Show	Dec 6-9	New Horticultural Hall, Westminster, London SW1	Database Publications, 061-456 8383
CAD/CAM Intl Show	Jan 8-10	NEC, Birmingham	EMAP Intl Exhibitions, 01-837 3699
High Technology & Computers in Education	Jan 23-26	Barbican, London	Computer Marketplace Exhibitions, 01-930 1612

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BASIC LIGHTNING

WHITE LIGHTNING

MACHINE LIGHTNING

LIGHTNING STRIKES AGAIN

ORBIT SOFTWARE

Totally dedicated to writing very fast, video games, BASIC Lightning is a fully structured extension to the Commodore BASIC which adds a staggering 200 reserved words. It allows up to five tasks to run concurrently (one in foreground and four in background). Most of the commands are dedicated to games writing and the sound and graphics commands are unparalleled. Procedures and PASCAL type structured programming commands are also a feature of BASIC Lightning.

As well as the Commodore's own 8 hardware sprites, BASIC Lightning has its own software sprites. Up to 255 can be defined with user selectable dimensions. These can even be several screens wide. They can be scrolled, spun, mirrored, enlarged or inverted with phenomenal speed and smoothness.

A Sprite Generator Program (written in BASIC Lightning) is also supplied and can be used to design, edit and store all your sprites for use in your main program.

THREE HIGH POWERED GRAPHICS DEVELOPMENT SYSTEMS FOR THE COMMODORE 64.

White Lightning is a complete games writing package comprising a high level, Forth based, multi-tasking games writing language, the extended BASIC (see BASIC LIGHTNING) and a powerful sprite Generator Program. Programs can even be written in a combination of Forth and Commodore BASIC and the final program, which will run independently of White Lightning, can be marketed with no restrictions whatsoever.

The Basic Lightning part of the package can be used to experiment quickly and easily before the Forth program is developed.

The speed of White Lightning has to be seen to be believed and a full demo is included. As with Basic Lightning, hardware sprites are supported, together with 255 software sprites which can be scrolled, spun, reflected, enlarged or inverted.

MULTI-TASKING Without doubt the most powerful feature of the Lightning series of languages is the multi-tasking facility. This allows two programs to be run concurrently and makes those smooth landscape scrolls etc. effortless.

The BASIC Lightning Sprite Generator Program is also included in the package.

Commodore 64 Machine Lightning is probably the most advanced games writing utility available on any micro. It comes in 4 parts:

MACRO ASSEMBLER/MONITOR/DISASSEMBLER This is probably the most comprehensive machine code development system available for the Commodore 64 with features too numerous to mention.

BASIC LIGHTNING BASIC Lightning, the multi-tasking BASIC is also provided to facilitate experimentation in preparation for later assembly.

SPRITE GENERATOR Used to develop all the graphics for the final game. The Sprite Generator has numerous functions including enlargement, rotation and reflection.

OBJECT LIBRARY This is Machine Lightning's most powerful feature. 10k of re-entrant code with more than 130 documented entry points. These are the routines that provide all the superfast graphics routines in White and Basic Lightning. They contain virtually every routine you'll ever need to write an Arcade Game and multi-tasking in Machine Lightning is covered in the comprehensive accompanying manual.



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(disk) £29.95

Machine Lightning (tape) £29.95

(disk) £39.95

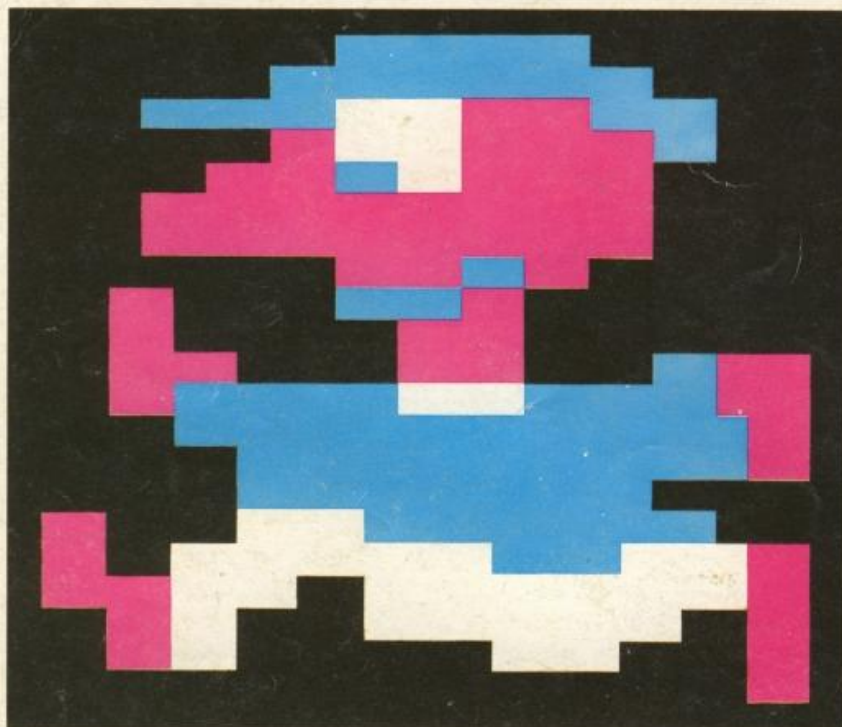
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Name

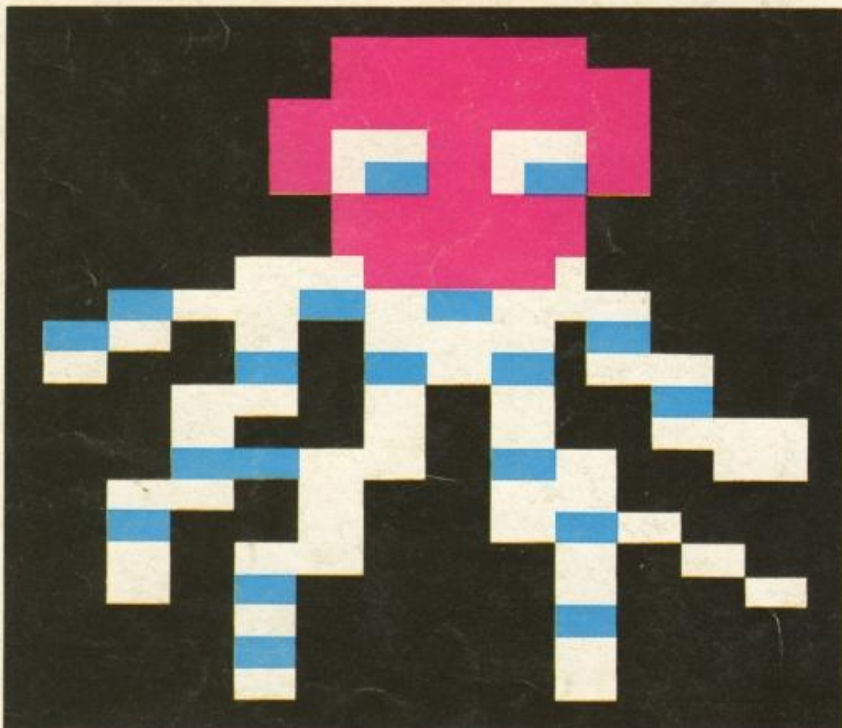
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and enemies.



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GAMES CREATOR

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For the CBM64, the Games Creator comes with a step-by-step manual and three ready-to-play games. Each demonstrates some of the programs exceptional features: shapes, movement, speed, scrolling backgrounds, scoring, music, sound effects and many more. And you don't need to know any program language to work it.

On fast loading cassette for the CBM64. £12.95.

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A space fantasy. Earth is threatened by attack from Alien life-forms hatching out in space. You must first overcome the Guardians. Then into the Hatchery, up and down escalators and ladders to crack the eggs before the aliens escape.

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Use a helicopter to build a hotel on an island paradise. But you have to move fast and design your building carefully because earthquakes, floods, storms and lightning can strike at any moment.

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HI-BOUNCER

An arcade type game featuring Mr. Bounce and the Mr. Men. But don't get the idea that it's just a kids' game. Far from it. There are four main screens each with eight levels of difficulty and complexity. Don't worry, there's also a practice program with slower speeds.

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CEASAR THE CAT

Cesar's cute and quick. Help him hunt the crowded shelves for mice who eat all the food. He must catch the mice before the food disappears. Outstanding graphics, animation and sound.

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