August 21–27 1987 Vol 6 No 33 60p

POPULAR Computing WEEKLY

Acorn's Archimedes – RISC reviewed

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NEWS DESK

Sir Clive Sinclair gets wafer cash

Bootleg Amigas

HARDWARE

Magic Button

Utility interface for the Spectrum

GAMES

Sentinel on the Atari ST

Death Wish 3

Cascade's ACE 2

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COMMODORE SPECTRUM AMSTRAD

August 21–27

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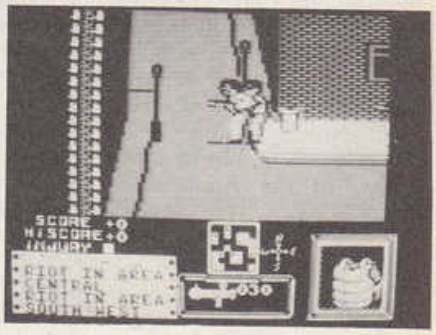

Editor Christina Erskine **News editor** John Brissenden **Features editor** Cliff Joseph **Technical editor** Duncan Evans **Production editor** Michelle Beauchamp **Marketing and Advertisement manager** David Osen **Advertisement executive** Athena Peerman **Classified manager** Susannah King **Classified executive** Robert Cole **Editorial secretary** Annmarie Allan **Administration** Carol Frith **Credit control manager** Gabriella Piscina **Managing editor** Peter Worlock **Publishing director** Jenny Ireland. **Published by** Sunshine Publications Ltd, 12-13 Little Newport Street, London WC2H 7PP. Tel 01-437 4343 Telex 296275 Fax 01-439 0681 **Typeset by** Magazine Typesetters, 6 Parnell Court, East Portway, Andover, Hampshire. **Printed by** McCorquodale Magazines, Andover, Hampshire. **Distributed by** S M Distribution, London SW9, Tel 01-274 8611, Telex 261643.
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ABC

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LETTERS

Business RISCs

What is the Acorn Archimedes meant to be? Certainly it is an achievement to get a RISC processor into a machine of its price but who is it aimed at?

It is surely too expensive for both the home and educational markets which leaves only business and specialist areas like CAD.

Both of these markets however are likely to be dominated by the new IBM PS2 which has stunning graphics and the massive advantage of being built by IBM.

There is also the question of supplied languages:

Assembler – by its very definition a RISC machine has a very simple instruction set requiring a large number of instructions to do something that a single CISC (Complex Instruction Set Computer, eg, 68000) instruction can do.

This is necessary to get the speed advantage gained by the pipelining techniques but makes it horrible to program directly.

Basic – this is only likely to be of interest to the home user who is lucky enough to be able to afford the machine. Why not supply a more widely used and structured language such as Pascal or C as standard?

I think that aforementioned people buying the machine would be willing to learn a new language in order to use their machine, and it would be much more useful to anyone intending to make a career in computers.

N A Ellerby
N Humberside

Letter edited for length.

See page 16 for our in-depth review of the Archimedes and RISC.

Wrong place for an argument

I feel compelled to write to you to comment on the topical subject of Amiga and ST bashing. Many people seem to go fore the 'higher specification' argument for the Amiga, or the 'glut of software' for the ST. I am afraid to tell all Amiga owners that in the *real* world of computers, specifications mean little. Just look at the popularity of the IBM PC which isn't exactly state of the art but which holds the market for serious applications (why else would everyone want to clone it?).

The Amiga has fantastic graphics and sound, and indeed it is used in Arcade games. Sound like a games machine? Too right, I can really see a system design engineer or an accountant needing all that resolution, all those colours and the fantastic sound! In the *real* world I'm afraid to say that the Amiga is nothing more than a games machine, no serious businessman would or should touch it.

Finally I must ask why this debate must continue, nothing we say can alter the facts. Further, I doubt if the people set to buy these machines, ie businessmen, will even be reading such a magazine as this!

G Thulbourn
Surrey

"So this is the sophisticated, highly-sensitive technology Cocom's been keeping from us, is it Comrades?"

Irresolute over resolution

I would be grateful for some advice, I would like to acquire an Atari ST or Amiga 500, and have a spare colour TV.

Is there any advantage (eg. picture quality) in getting a monitor as well?

If so, is there any advantage in getting a high resolution colour monitor, or is the resolution predetermined by the computer?

H S Aziz
Bishops Stortford

Low resolution programs on either machine are adequately displayed by a TV screen (if you buy an Amiga or the Atari 1040STF, you'll need a separate TV modulator), but a monitor will give you a much clearer picture.

Buying a high resolution monitor will give you an even clearer picture still compared to a lo-res monitor. The difference isn't great, but definitely noticeable.

Which has sold the most?

I wish someone could tell me the truth about which home computer has sold the most machines, and thereby has the most software and hardware support, assuming this follows.

I feel the AmSpec Plus 3 will have the same support and longevity of all Spectrums and therefore be a better buy than a 6128 which doesn't seem to have the same level of support or even the cheap software. And now the Ataris will be £299 with disc mouse and monitor (but very little cheap software).

Or even the 8256 has sold so many units that maybe that will be the most supported.

What would your advice be? All I want is a machine which will be better supported than the others. This I feel is reasonable as there must be a machine that has been the winner in this race. Is it a Spectrum or an Amstrad?

Surely there is a Ford Cortina of the computer world.

P J Morley
Whittlesey, Cambs

The computer which has sold the most in the UK is the Spectrum (in its many versions), followed by the Commodore 64.

Whether these two are *currently* outselling the rest is a moot point. Both are supported very strongly by independent companies, and this will continue for some time to come, because of the size of their user base.

User Group anniversary

I would like to inform other *Popular* readers that the United Amstrad User Group is one year old in September, and to celebrate the occasion we are offering some unbelievable bargains to members.

Over the past year the group has grown into a very successful club offering many services including, a bi-monthly Newsletter, a Public Domain software library, software/hardware discounts and a computer book library. The membership fee is now £4 but if during our first birthday celebrations any readers would like to join then they can join for only £3.50 per year!

If any Amstrad CPC users are interested in the club, and want to know the kind of bargains on offer, then please send a SAE to United Amstrad User Group, 1 Magnolia Close, Fareham, Hants PO14 1PX.

Gary Carter
Secretary, UAUG

Memotech support group

It has occurred to me that with the Memotech MTX512 computer selling in vast quantities that there must be users out there not aware of a support group for the MTX.

The Memotech Owners Club has been founded for three years and currently has around 300 members. We produce 10 magazines per year and can offer a substantial library of software at £1.20 for two programs on cassette and £2.50 for around 20 programs on disc.

Subscription is annual and is £7.00. For fuller details our address is Memotech Owners Club, 13 Copse Road, Townhill Park, Southampton.

Alan Hamilton
Southampton

Spectrum user magazine

I and four of my friends are in the process of producing a new fanzine for the users of all Spectrums. It is called *Spectrum User* and costs 50p every two months and that includes p+p. We use a Spectrum 128 hooked up to a DMP 3000, Wafadrive and Multiface 1 (for the pictures!).

If any sensible *Popular* readers are interested in purchasing our illustrious mag then send the money to us at *Spec-*

trum User, 37 Raeburn Ave, Columbia, Washington, Tyne & Wear NE38 7DY.

Darren Green (Editor)
Spectrum User

Problem? What problem?

I know this letter may be a little belated, but I just read the Ziggurat column in the June 19 issue and have to let off steam and let my feelings known to the world.

Just to recap, the column was entitled "The Morality of Software" and was a sort of complaint against the games industry in general, regarding gory, sexy or nuclear-orientated games.

The question he seems to be asking is, "should the software houses be treated like the video or TV markets and have a board of censors?"

At least, that is what it seems to be saying. It is the only solution to the problem he describes. The question is, is there a problem?

Mr Lewis seems to have fallen into the same trap as many people before him, that is, he has underestimated the intelligence of us consumers, or to put it another way, he thinks he's cleverer than everyone else. His pious attitude pours scorn on just about every game ever written. I have, myself, played quite a few "violent" games such as *Blood 'n' Guts* and am not affected in any way by it.

I do not consider the on-screen action as real so it doesn't affect me in the same way as watching a real person's head being lopped off (which I still find as repulsive as I always have). "At what cost to the young minds playing these games?" he says. Again he fails to give youngsters credit for their intelligence.

His second point is soft porn entering the industry. If you think about it, youngsters rarely take notice of such things until they are, say 12 years old. The two examples he gave (Maria Whittaker on the *Barbarian* ad and Sam Fox's Poker game) are not as "bad" as, say, a copy of the *Sun* (which said youngsters can buy in any newsagent).

As for *The Loather Goddesses of Phobos*, this game is aimed at the mature adventure-gamer, so the people who are meant to be influenced by this game will never even see it. Influenced? I don't think any of the material in the game would be all that influential, do you?

The final, and most ridiculous point, is, will games such as *Raid Over Moscow* make people want to start world war three? I doubt it. The powers that be are usually quite informed about the realities of nuclear war, so their judgement will in no way be impaired by that game of *Raid Over Moscow* or *SDI* that they played when they were young.

If there is a problem, then it is always nice to know that 10 years ago, the Sex Pistols were said to signify the end of society, just as these video games are.

And where are they now?

N Davies
Crewe

We're sorry but Popular Computing Weekly cannot guarantee to reply to *all* letters requesting a personal answer. It helps us enormously if readers are prepared to have general queries answered on these pages, so, if possible, please do not send SAEs.

King's side attack

In Game Two of our readers' versus *Colossus* chess tournament. The readers, playing white, have continued their king's side attack by bringing the queen to g5.

Colossus has defended by moving its pawn to f6: kicking the white queen.

Incidentally, our apologies for missing out some of the moves in our game guide a fortnight ago – we've filled in the blanks this week!

Kicking back

What do you think the readers should do next?

Send your suggested move to either Inter-Mediates (*Popular* Chess), Freepost, Sawbridgeworth, Herts CM21 9YA (no stamp needed) *or Popular* Chess, Unit 2, The Maltings, Sawbridgeworth, Herts CM21 0PG (with a stamp).

Only one vote per person please, and all entries must reach either address by Wednesday, August 19.

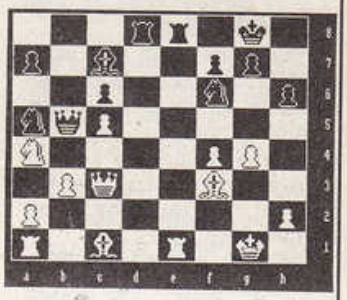
The move which gets the most votes will be entered into the game. Results and *Colossus's* response will be published in two weeks time.

Next week: we return to Game One, where the readers are playing back.

Game Two

The moves so far:

1	Pc2–c4	PC7–c5
2	Ng1–13	Nb8–c6
3	Pd2–d4	Pc5xd4
4	Nf3xd4	Pe7–e5
5	Nd4–b5	Pa7 a6
6	Nb5 d6	Bf8xd6
7	Od1xd6	Od8-l8
8	Qd6–d1	Ng8–e7
9	Nbf–c3	Pd7 d6
10	Bc1–e3	KeB–g8 o-o
11	Bf1-e2	Bc8–d7
12	Ke1-gf o-o	Bf8–C8
13	Od1–d2	Nc6–d4
14	Hal df	Nd4xe2+
15	Nc3–e2	Rc8–c6
16	Be3–g5	Qf6–e6
17	Bg5xe7	Qe6xe7
18	Ne2–c3	Bd7–e6
19	Rft–ef	Qe7–c7
20	Ref–e3	Rf8–c8
21	Re3–d3	Rc8–d8
22	Rd3–g3	Kg8–f8
23	Qd2–g5	Pf7–f6
24	?	



Psion warning

I would like, through the courtesy of your magazine to warn owners of the Psion Organiser 2 (model XP) who have had their Organiser for more than about three months and have only got the model with 16K of Ram and are thinking of purchasing the *Psion Spreadsheet* to take great care.

The only way that owners of the 16K Ram organiser can use the advertised 99 row by 26 col grid is to pay an extra £50 for the 32K upgrade which has to be fitted by Psion. This effectively makes the cost of the spread sheet £89.95 instead of £39.95.

Without this upgrade the memory available limits the spread sheet to a three figure entry (ie, 111) into 950 cells without the use of any formulae. If any formulae or headings are used the limit is even greater. This means that the size of the spread sheet is reduced from between less than a half to less than two thirds of its advertised size.

According to Psion, there is no alternative but to get the upgrade if you want to use a major part of the program because the battery powered 32K Rampack, which incidentally you have to discard when the battery runs out because it is not replaceable, cannot be used.

Please do not think that I am in any way criticising the Spreadsheet as a program, because if you own the latest organiser with 32K Ram it seems that it would be first class. The only trouble is, because this has only been available for a few months the majority of owners only have 16K models. The above details, incidentally, are valid only if the diary is empty and there has been nothing saved to Ram. If there are any diary entries or information in Ram then there are even fewer cells available.

I M Fisher
Croydon

Oric User magazine

Please could you give a mention to a magazine called *Oric User Monthly*. Anybody interested should send an SAE and 55p for an issue to OUM, 10 Thomson Avenue, Kings Norton, Birmingham B38 8YD.

R Cook
Birmingham

New mat avoids static

REDDITCH-based Praybourne Products has launched a new product designed to get rid of static electricity in computer systems.

The company's range of anti-static mats are placed under the keyboard and monitor, with a lead connected to a radiator, or other earthing point, to drain away excess static.

Praybourne claim that static build-up can cause odd characters to appear on screen, or corrupt programs. The mats come in various sizes and colours, and can be cut to shape without diminishing their effectiveness.

The mats cost £14.50 (8″ × 10½″), £22.50 (8″ × 20″), £34.50 (16″ × 20″) or £39.50 (25¾″ × 24″), plus postage and packing. Further information is available form Praybourne, Millsborough House, Ipsley Street, Redditch, Worcestershire B98 7BU, telephone (0527) 61221/61759.

Commodore warns of counterfeit Amigas

COMMODORE last week warned people to be on the lookout for fake Amiga A500 machines, after a few hundred were reported to have entered the country.

The bootleg boxes are understood to have come from Europe, and are being offered to dealers at very low prices. Commodore doesn't yet know which dealers are handling the fake items, but as spokesman said: "If we knew, we would be taking things rather further."

So how can people tell the counterfeits from the real thing? Firstly, the fakes run on a 220V power supply, rather than a 240V supply.

Secondly, the counterfeit machines have forged A1000 warranty cards. These offer an on-site warranty service, and are printed in a "luminous" shade of red, unlike the real cards, which are printed in a duller shade.

"Commodore's stance is that we will not be honouring the warranties, because the machines are not Commodore machines," the spokesman took care to point out.

A500: accept no imitations

"Our advice is go back to the dealer and sort it out with them."

The problem comes at a bad time for Commodore, which has just started a massive promotional campaign for the A500.

Commodore UK Consumer Division's sales manager Tom Hart was reported to be scathing in his views of dealers handling the dud machines, and described them in last week's computer trade press as "unscrupulous dealers who cannot get a Commodore dealership, and are trying to make a fast buck".

The company is currently taking urgent steps, here and in Europe, to discover which dealers are stocking the machines, and where they came from originally.

New from Thalamus

THALAMUS has announced the imminent release of *Quedex*. The game is the latest to be developed by Stavros Fasoulas, who was responsible for *Sanxion* and *Delta*.

Quedex is a maze game, with various puzzles in different sections, any one of which can be played at any one time.

US collection

US GOLD launches a six-game compilation later this month, in an otherwise very quiet time for the games houses.

Summer Gold features *10th Frame, Impossible Mission, Rebel Planet, Dambusters, Bruce Lee* and *Beach Head II*.

The collection is available from this month on C64 and Amstrad CPC at £9.99, and Spectrum at £8.99.

Sinclair gets backing for new superchip

SIR Clive Sinclair was reported this week to have won a major battle in his attempts to develop the wafer chip, a large "superchip" designed to replace the printed circuit board.

Anamartic, the Sinclair-owned company developing the chip, has finally obtained financial backing of £4 million from a variety of sources reported to include Tandem Computer, Barclays Bank, and a trio of venture capital firms – Advent, Baronsmead and Murray Johnson. The deal comes after over a year of discussion.

For Sinclair the wafer chip represents a long-held ambition. He has been developing the chip for over five years.

The chip directly connects hundreds of small chips on the wafer, and so does away with the need to have them expensively mounted on printed circuit boards. Other firms which have tried unsuccessfully to do this have included IBM and Texas Instruments.

Sinclair would neither confirm nor deny the reports but is understood to be planning more powerful configurations of the technology, currently at prototype stage only.

If he is successful, the new chip should go on the market in some form or other next year.

Sir Clive Sinclair

Shops wait for Plus 3 and Z88

CAMBRIDGE Computer's Z88 portable, and Amstrad's Sinclair Spectrum Plus 3 are both due to reach most retail stockists by September 1 – a full month later than planned.

The Z88 was initially delayed owing to problems supplying it to mail order customers. Those have now been rectified, and had to be sorted out.

King would not be drawn on the question of insufficient production facilities, and whether this had contributed to the delay.

"I can make no comment on production lines. That would pre-empt an announcement," he said.

product was being stockpiled for Dixons and Comet, the largest stockist of the machine.

The next priority, according to Cambridge marketing manager Peter King, was organising distribution for the other UK retailers, including many independent dealers. Finally, overseas distribution arrangements

Meanwhile, the Spectrum Plus 3 is expected to be in all retail outlets by the beginning of next month, and indeed is already with Currys, according to an Amstrad spokesman.

This was originally scheduled for August 1 as well, but was delayed by a "shipment problem", the spokesman said.

September launch for Atari printer

ATARI'S new laser printer should be in the shops late next month with a £1,299 price tag, according to a spokesman for the company.

The unit forms part of Atari's desktop publishing system, along with the Mega ST range.

Eventually these will be available as a package, but Atari made it clear this week that the two are to be available separately, and that the printer will operate with any compatible micro.

For that reason no software will be bundled with the printer, but it will be fully compatible with the standard PostScript page description language, and DTP packages such as Mirrorsoft's *Fleet Street Publisher* and Softlogik/Silica Shop's *Publishing Partner*.

The spokesman said that the printer is currently undergoing British Standards Institute certification, and also awaiting an import licence.

MORE NEWS ON P.10

SOFTWARE HOTLINES

THE software companies, like the entire membership of the SDP, have gone on holiday in the sense that the new releases are few and far between. New products are generally being kept under wraps ready for (they hope) a triumphant unveiling at the *PCW* show in September.

This year, the PCW show is later than usual, opening on September 23 rather than during the first week, which means that the hanging around between the summer releases and the "triumphant unveilings" is rather longer this year.

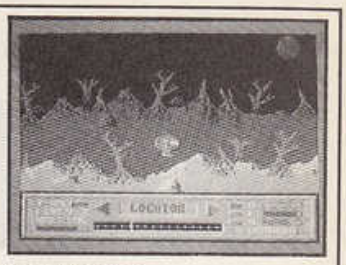
Some companies, however, have been giving us a foretaste of what to expect, not least **US Gold,** which is launching a new label called **Go!**

The Go! games, which will be shown at *PCW* are a mixture of coin-op conversions, and licensed titles featuring characters from comics, popular toys, etc.

Details are currently available on games licensed from arcade publisher **Capcom.** USG has selected three of these, *Sidearms, Speed Rumbler* and *Bionic Commandos*, for initial release under Go!.

Sidearms is no holds barred shooting as heroes Lieutenant Henry Sergeant Sanders battle it out against Bozon, who is, of course, intent on human extermination on a global scale.

Speed Rumbler has you haring through the 21st century in a car, gunning down the enemy, freeing innocent hostages before your encounter with your terrorist adversaries holding your family and generally being unspeakably evil.



Knight Games

Bionic Commandos is more of the same type of scenario, but here you are equipped with a bionic arm, which enables you to hurl yourself around all parts of the screen.

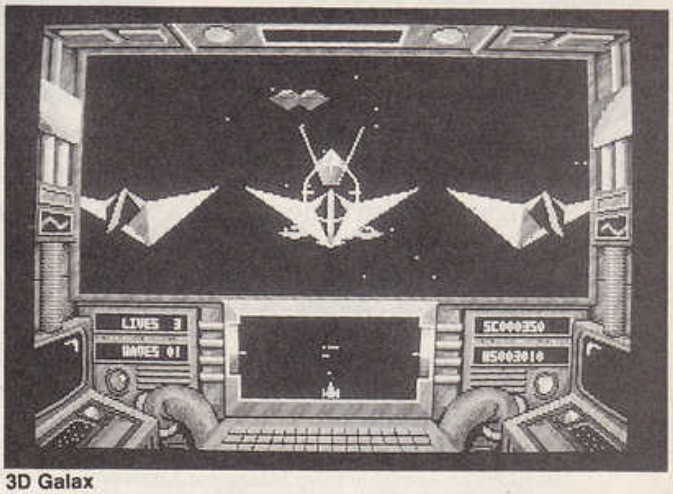
If you think there's too much violence in computer games already, I'm afraid it sounds as though you ain't seen nothing yet.

More shoot 'em ups courtesy of **English Software** are on the way. *Knight Games 2: Space Triology* (defend yourself against three different aliens in the final conflict) and Amiga and ST versions of *Leviathan*. English is also promising gentler things with the Amiga version of *Q-Ball*, the game which is sort-of-but-not-really snooker in a Rubik's Cube.

Activision's next contribution to defending the human race from certain elimination is *X-15 Alpha Mission*. You're at the controls of NASA's X-15, off to a space station occupied by yet more terrorists.

Gremlin also is not to be out done when it comes to you against the combined forces of darkness, with *3D Galax*, where the enemy are hordes of intergalactic pirates.

Christina Erskine



3D Galax

NEW AM
NOW OTHER HOME COM

Amiga 500 is here.

With a mind-blowing array of features and capabilities.

And a £499‡ price ticket (ex VAT), hundreds of pounds less than anyone could have predicted.

"...a miracle of compression..." writes *Popular Computing Weekly** "...it all adds up to a formidable system which is clearly better than anything else at the price."

This elegant little machine takes family computing into new dimensions of creativity, excitement and productivity.

It outruns and outguns office PCs as a business multi-tasker, performing a deskful of different jobs simultaneously, at over 7 million steps per second in realtime.

So other home computers may not be the only machines it consigns to the toy cupboard.

AMAZING SCIENCE FACT!

Amiga is used by Disney, Universal and other Hollywood studios for its dazzling 3D graphics manipulation and animation powers.

A sophisticated high-speed graphics processor called a blitter chip transforms images in realtime.

You can paint the screen with more than 4,000 colours. Create and modify designs and effects as you like, with pin-sharp resolution.

You command an almost limitless workshopful of stunning professional graphics capabilities.

With an optional Genlock interface, you can capture images off videotape. Manipulate and mix them with graphics. Then re-transfer them to videotape!

This means you can produce spectacular special effects like those created by Amiga computers for Channel 4's *Chart Show* and the American TV science fiction series *Amazing Stories.*

YOU AIN'T HEARD NOTHING YET

Concealed within the sleek Amiga shape, there is also a pro-quality sound synthesiser an four-track stereo sound system.

Driven by another powerful and unique custom chip, it can synthesise musical instruments an

‡Includes DeluxePaint from Electronic Arts worth £79 + VAT! (Excludes monitor or TV modulator.)

COMMODORE BUSINESS MACHINES (UK) LTD, COMMODORE HOUSE, THE SWITCHBACK, GARDNER ROAD, MAIDENHEAD, BERKSHIRE SL6 7XA. TELEPHONE: (0628) 770088. TELEX: 846057 CBMUK

IGA 500.
PUTERS ARE JUST TOYS.

sound effects.

An optional digitiser allows you to take onboard real sounds. Mix and modify the two. Translate your compositions from keyboard to sheet music. Play them back through the monitor's speaker or your hi-fi.

Your Amiga can also synthesise the human voice.

It can speak back anything you care to write on the keyboard.

So this is one computer that can not only word process with faultless professionalism, and incorporate superlative graphics into the text, it can also read the text back to you aloud.

GAMESMANSHIP AND WORKMANSHIP!

The new Amiga 500, in fact, dumbfounds its competitors in every way.

Graphics, stereo sound, multi windowing, multi screens, 512K to 1Mb RAM (expandable by an incredible 8 further megabytes externally**), 3½" internal disk drive with 880K of mass memory, 4 unique dedicated chips plus the 16/32-bit power and 7.14MHz speed of its central processor, communications and vast expansion potential all add up to a computer of immense professional capability.

Yet the same technology allows the Amiga 500 to play games so mind bending that only full-scale arcade machines have been able to play them until now.

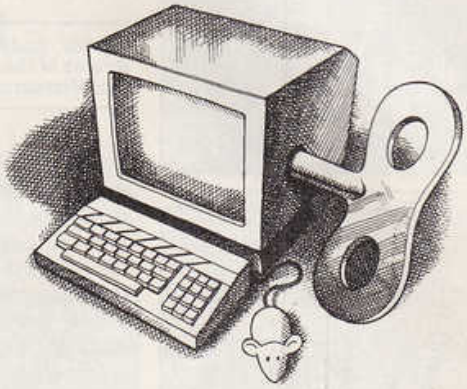
AND AMIGA MEANS 'FRIEND'!

However many of the Amiga's extraordinary talents you find yourself using, they will all be beautifully simple and natural.

You will be totally at home in the friendly and effortless Amiga environment, where everything happens by windows, icons, mouse and pulldown menus.

And the Amiga 500 simplifies life in another way too.

There is now no comparable home computer. At any price.



Try the astonishing new Amiga 500 at your nearest Commodore Amiga dealer.

And discover why *Personal Computer World*†, having tested the graphics performance of Amiga's latest and most powerful rival, concluded "...Amiga still reigns supreme..."

AMIGA

Commodore

* *Popular Computing Weekly*, 22-28 May 1987. † *Personal Computer World*, February 1987. ** *Subject to availability.*

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Microprose in Pirates dispute

A DISPUTE between Microprose and Cascade over two games featuring pirates appeared to have reached stalemate last week, with both sides claiming foul play.

The affair began last month, when Microprose sought an injunction over the packaging of Cascade's *Pirates of the Barbary Coast*, and claimed it was too similar to the packaging for its recently-released *Pirates*.

"We do not think there's any confusion about the game," said Microprose UK head Stewart Bell last week. "Our concern is purely about the logo on the boxes."

Bell wasn't prepared to comment any further, as the matter is now with Microprose's lawyers.

But Cascade has been vociferous in defence of its position, and marketing director John Lewis published a letter in *Computer Trade Weekly* immediately following the injunction, explaining his side of the affair.

Last week, Lewis commented, "Microprose are a very powerful American company who are trying to use heavy handed methods to stop us selling our game," he said.

"Ours was out first, and in any case the packaging isn't similar. We have used Letraset which happens to be similar, and the copyright for that rests with Letraset, not Microprose or anybody else."

Similar packaging? Cascade's *Pirates of the Barbary Coast* (left) and Microprose's *Pirates* (right)

Lewis added that to date Cascade has received no direct notice of any legal action over the affair.

"Where's the injunction, Microprose? All we've had so far is various threatening letters from their solicitors, it's a big bluff, and they know they haven't got a leg to stand on. They tried to frighten us, and it hasn't worked," he said.

Lewis made it clear that if and when the matter reached court, Cascade would fight to retain its packaging, and would be considering "other things we could do" in the meantime."

NEXT WEEK

Electronic Arts

One of the top US software companies, Electronic Arts has had a office in the UK for some months, and will officially launch EOA UK next month.

The company already has a reputation in the UK for high quality games, and next week, we'll be previewing its first UK range of 26 titles, and showing you what Electronic Arts has to offer the British games player.

Learning Lisp.

Kenn Garroch continues his guide to Lisp, and takes you further into using and programming in the language.

Video titling

The gremlins got at us agin, I'm afraid and we couldn't print this feature this week as promised, Fingers crossed that Chris Jenkins will indeed be looking at this package which will put captions on your video pictures.

Protext cut for PCWs and ready for PC

ARNOR has been making moves with its *Protext* word processing package.

The company has announced a version for the IBM PC and compatibles, plus a price cut for the PCW version.

The PC version will cost £59.95, and includes Arnor's spell checker and mail merge programs. Arnor's David Fisk hopes that the comparatively low price (for a PC wp) will attract buyers, particularly those with a low cost PC compatible machine.

The PCW version of *Protext*, which also runs on the CPC6128 under CP/M Plus, has been cut from £79.95 to £59.95, in line with the PC version's price.

KINGSTON CID APPEALS TO AIR CUSTOMERS

THE investigation into the affairs of Ahmed Innovations and Research last week appeared to be heading nowhere. And police and trading standards officials have made an appeal to disgruntled AIR customers please write in.

A number of people contacted the News Desk after ordering an ST emulator – the *STimulator* – from the firm by mail order, and receiving nothing in the post.

The matter was put in the hands of Kingston Trading Standards service, and its officials have now alerted police. But Detective Constable Burch of Kingston CID admitted that they needed written complaints from members of the public before any progress would be made.

"We've had one or two complaints about this company," he said. "The last thing that happened was that it was put in the hands of the VAT people, and they were going to see what was going on," he said.

Burch added that if people waiting for goods or a cash refund wrote to the police or the Trading Standards office, they could then confront AIR boss Hassan Ahmed.

Meanwhile Ahmed is understood to be back in this country after a brief visit to the United States. Last month he claimed that he had sold the rights to the ST emulator to an Amierican company, PAD Investments, of Houston, Texas.

Ahmed also told a customer that he had sold the same rights to another American company, Tecknic. But when *Popular Computing Weekly* telephoned the number given for Tecknic by Ahmed, it turned out to be a doctor's office.

Anybody who is owed money by AIR, or who has other information, should write a detailed account of what they know to either E R Forsythe, Trading Standards Office, Guildhall, Kingston-upon-Thames, Surrey KT1 1RV, or D/C Burch, CID, Kingston Police Station, 5-7 High Street, Kingston-upon-Thames, Surrey.

Iron Curtain export rules to be relaxed?

THERE may be increased opportunities for UK and European computer companies to export personal computer equipment to Iron Curtain countries from September.

That is when the 15 nation Co-ordinating Committee for Multinational Export Controls (Cocom) is expected to announce an updated list of restricted Western goods.

Under the review, a large number of computer goods previously considered too sensitive for export to Communist countries, is expected to have export restrictions lifted.

Reports last week suggested that items affected could include the Apple II, IBM PC XT and AT, although the Personal System/2 is unlikely to receive the go-ahead.

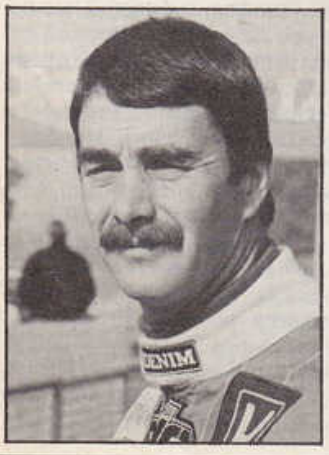
The announcement is part of an attempt by the committee to reduce the number of restricted items, in order to make compliance with the policy easier to enforce. The United States in particular has attracted criticism from several European quarters for its aggressive demands in restricting exports to the Eastern bloc.

But Cocom, which operates under the auspices of the United States embassy in Paris, was unwilling to comment on any announcement last week.

Mansell to endorse Grand Prix game

MARTECH is confident of Nigel Mansell winning the 1987 Formula One World Championship – so confident that it will be releasing *Nigel Mansell's Grand Prix* on November 19, four days after the last race in Adelaide.

The game will be available on all major formats, and prices are expected to be announced shortly.



HMV shop takes on games software

GAMES players shopping in London's Oxford Street now have another large store worth a visit. The HMV store at 363 Oxford Street recently opened a games department on the first floor, and HMV claims it's the biggest range of software entertainment in Oxford Street.

MasterScan aims to turn PCW into a fax machine

DATABASE Software is releasing a scanner for the PCW machines, the operation of which give the PCWs facsimile-like abilities.

The *MasterScan*, fitted to the PCW's bundled printer, will automatically transfer text and illustrations to the computer screen.

The fax-style operation comes into play if you have a modem and software, since the contents of the screen can then be transferred through the modem to a separate PCW.

Scanned copy or graphics from the printer, once transferred to the screen can also be incorporated into your word processing documents or used in conjunction with desktop publishing packages.

MasterScan costs £69.95. Details from Database Software on 061-429 8008.

DIARY DATES

AUGUST

22 August
ZX Microfair
New Horticultural Hall, London SW1
Details: Latest innovations for Sinclair users
Price: £2.00/£1.50 on door, £1.50/£1.00 advance
Organiser: Mike Johnston 01-801 9172

SEPTEMBER

23–27 September
Personal Computer World Show
Olympia, London
Details: Latest hardware, software and peripherals for business and leisure computing
Price: £3, £2 – (parties over 10)
Organiser: Montbuild 01-486 1951

OCTOBER

15–17 October
Desktop Publishing Show
Business Design Centre, London
Details: Demonstrations of latest hardware and peripherals, plus seminars and user clinics
Organiser: Database Exhibitions, 061-456 8383

NOVEMBER

14 November
National Einstein Exhibition
National Motorcycle Museum, Birmingham
Details: Einstein software etc.
Price: 50p
Organiser: UKEUG (0473) 49507

Prices, dates and venues of shows can vary, and you are therefore strongly advised to check with the show organiser before attending. We cannot accept responsibility for any alterations to show arrangements.

DIY MAGIC FOR YOUR SPECTRUM

Mick West demonstrates how you can alter your Spectrum 48K to allow you to break into programs, examine and alter memory, dissassemble sections of the program and much more – all at the touch of a button.

This article shows how you can make yourself a 'magic button' for the Spectrum 48K. This button, when pressed, will allow you to break into any program, examine and alter the memory, dissassemble any section of the program, save a screen$, hack it about as much as you want and then carry on where you left off. There is even a free arcade game thrown in!

There is only one snag with this, you need to have some experience with a soldering iron, or to persuade a friend who has to do it for you.

"Before starting, you are advised to read all the way through these instructions so that you know what you are letting yourself in for: then you will have no problems"

Components

First of all you will need:
one Eprom with the Magic Button software on it
one 28 pin integrated circuit (IC) socket
one 74LS27 Triple 3-input NOR chip
one 74LS32 Quad 2-input OR chip
one 74LS74 Dual D-type latch chip
one bit of stripboard (eg Maplin Vero 14354 63x25mm)
one push to make switch (the magic button)
Some thin insulated wire for making general connections, a soldering iron, a Philips screwdriver, wire cutters

This is all available from any good electronics supplier (eg, Maplins) except the Eprom which you have to obtain from me, Mick West – details later.

Before starting it is a good idea to read all the way through these instructions so that you know what you are letting yourself in for. Neither I nor *Popular Computing Weekly* can accept any responsibility arising from the use of these instructions. If you are careful and you follow the instructions properly, then you will have no problem.

Note: all chips are numbered anti-clockwise, starting at the top left of the chip with pin one and ending on the top right. The top of the chip is the end with the U-shaped indentation.

Step 1. Open up the Spectrum by removing the five Philips screws in the base and taking off the keyboard, which will then leave the circuit board exposed.

Step 2. Locate the Rom (this is fairly easy). It is the only chip on the board with 28 legs, about one centimetre smaller than the big two. In Spectrum issue one and two it's by the edge connector.

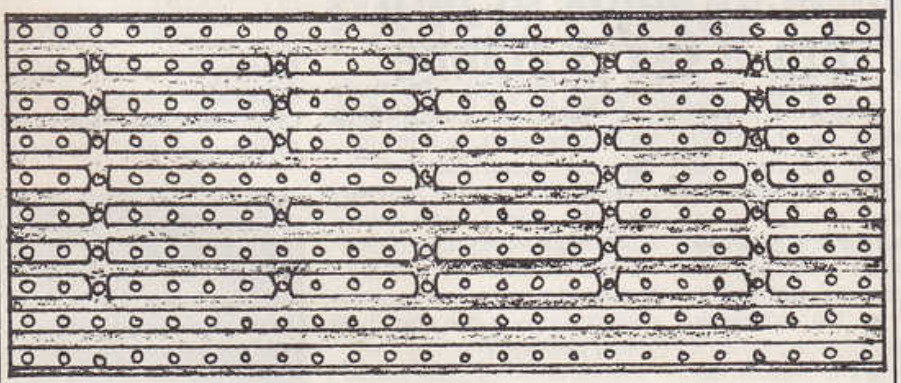
Step 3. The tricky bit. Take the IC socket and locate legs 27 and 22 and bend these so that they are at right angles to the rest of the legs, pointing outwards. You now have to solder the IC socket on top of the Rom. There are two possible ways of doing this. If the Rom is already in a socket then remove it, stick it in a piece of cardboard and then solder the socket on and put it back in its socket.

If, like me, your Rom is soldered into the board then you will just have to press the socket on top of the Rom so that it sits there fairly firmly, then solder diagonally opposite corners to secure it in place. Then solder the other legs using a minimum of heat, but ensuring that a proper connection is made.

Step 4. With a sharp implement cut the track leading to pin 22 of the Rom. This will be on the underneath of the Spectrum's PCB so you will have to unscrew it completely from its case. When you have cut the track then solder a wire about 15 cm long to the disconnected pin.

Step 5. Solder a wire link from pin one to pin 28 of the Rom (the two top pins) and another one from pin 28 to pin 27 of the

Fig. 1



Eprom which you bent out before.

Step 6. With a sharp knife cut the copper tracks on the vero in the places indicated in fig. 1. Make sure that the track is fully cut on both sides of the hole and that there are no loose bits of copper that could short two tracks together.

Step 7. Turn the vero over and insert the chips in the places indicated in fig. 3. Make sure that the U-shaped indentation is at the top of the chips. Check that you have the vero the right way up so that the cut tracks will be under the positions marked by Xs.

Step 8. Solder the legs of the chips on to the copper tracks. The best way to do this is to apply a small amount of solder to the iron and then hold it so that it touches both the chip leg and the copper for a couple of seconds. Then apply some more solder.

Allow this to flow all the way round the leg and then remove the iron and solder at the same time. Make sure that the solder does not bridge tracks.

If you do get solder across two tracks then wipe the iron free of solder and then reheat the offending solder and it should flow back onto the tracks and the iron.

Step 9. There are nine connections on the vero that are internal to it. Do these now. You *must* use insulated wire for all of these connections. Cut the wire to the right length and strip about a half centimetre of insulation from each end and twist the strands together. Now heat the end of the wire and allow some solder to flow over it. This is called 'tinning'. Put the ends of the wire through the appropriate holes as indicated in fig. 3 and solder them to the copper tracks as you did for the chips. Clip off any excess length of wire.

Step 10. Now for the external connections. The board will eventually sit over the six small logic chips in the middle of the computer so use this as a guide when deciding the lengths of wire for these connections.

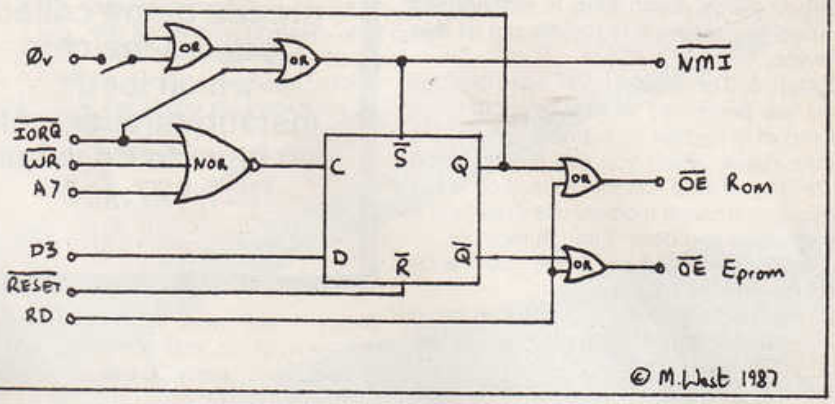
All but two of the connections are soldered directly to the Z80 chip's legs, the other two being connected to the Rom/socket's legs. The numbers next to the connections in fig. 3, refer to leg numbers.

The connection to the vero is the same as before. The connection to the chip requires a little more care. The wire must be tinned as before. The leg of the chip will already have a thin layer of solder on it.

Hold the wire against the relevant chip leg and then press it on with the iron, holding it there for about two seconds then remove the iron but still hold the wire firmly against the chip leg to allow the solder time to set. This sounds tricky but is in fact very easy once you have done a couple. It helps, as before, for the iron to have a small amount of solder on it while doing this. Also keep the iron free from dirt.

Be especially careful of dropping solder on the main circuit board. This could seriously damage your computer so check very carefully. The Rom 22 connection is connected to the piece of wire you soldered to pin 22 of the rom underneath the board. The Eprom 22 connection goes pin 22 on the IC socket which is sticking out. Ensure that the two pins do not short out.

Fig. 2



Step 11. The magic button! Solder two fairly long wires to the button and connect these to the vero as shown in fig. 3.

Step 12. Nearly finished. Check all connections carefully for shorts. If any of the soldering looks a bit messy or lumpy then reheat it to let it flow around the connection better. Cover the bottom of the vero board with generous helpings of insulating tape so you don't blow up the computer.

"When you press the magic button you will get a distinctive border. If you then press any other key, you will get a menu containing four options"

Plug the Eprom into its socket, with the indentation at the top like all the other chips. Put the vero in place over the six small chips and replace the keyboard, leading the wires for the magic button out through one of the holes in the back of the computer. Replace the keyboard and the screws.

Step 13. Disconnect any peripherals (except interface one) and switch on. The computer should work as normal. And now the bit you have been waiting for – Press the magic button! The border should light up with a pretty pattern. If you have got this then it has worked and you should go off and read the section on how to use it. If not, then you have got problems, so go to step 14.

Step 14. If the computer does not work normally, check all the connections, especially the ones which connect the IC socket to the Rom. Check that you have got the pin 22 connections the right way round. Check for drops of solder everywhere.

If it still does not work at all then desolder the vero completely and repair the track you cut. If it still does not work then I am afraid you have broken your Spectrum and it will have to be sent off for a short holiday to your friendly micro repair company, explaining what you have done. If, however, it works without the circuit then that is what is wrong. So check it again, then go back to step 13.

Step 15. If nothing happens when you press the button then go on to step 16. Otherwise, your problem is almost certainly the soldering of the IC socket to the Rom. Check this very carefully. Reheat each join to allow the solder to flow a bit more. If it still won't work, then go to 16.

Step 16. Check that the button works. If you can't do this then cut it off and try just touching the wires together to make the connection. If the button is fine then one of your connections must be at fault. Check that all the wires go to the right places. Check all the solder connections. Check the chips are the right way up as shown in Fig. 3. Then go back to step 14.

Using the button

Press the magic button. You will get a distinctive border. If you now press S then a SCREEN$ will be saved to tape under the name 'A PICTURE' and then the program will carry on as normal. If you press any other key you will get a menu of four options.

Option 1. This will simply restart the program from the point you left it. Use this after hacking, etc.

Option 2. The back-up program (see note below). This is used for saving the program to tape or Microdrive. You will be presented with a self explanatory menu. Option 4 lets you put in pokes in decimal. Option 5 lets you set the border colour as it is impossible for JR to work out what this is by itself. Also you can have an optional 'press a key' message.

Note that these saved copies of the

continued on page 14 ▶

◀ continued from page 13

program can only be loaded into the computer which saved them, with the chip in place. Each chip is individually coded to prevent any illegal use of this device.

Option 3: The Hacker. On selecting this you are presented with a hex and Ascii dump of a section of memory. There is a white cursor which you can move around with the shifted cursor keys. For quick skimming through memory use *Enter* and *P* to move up and down through memory.

There are various single key commands for use with the hacker:

N – new address. Type in the new address. This must be four hexadecimal digits (eg, 7FE2).

A – alter bytes at the cursor in Ascii. Just type in what you want and press return. Useful for customising messages in games etc.

H – alter bytes at the cursor in hexadecimal.

S – search for the first occurrence of two bytes. Type the bytes in without a space (eg 3E04) and press enter. The display will move so that the first occurrence of the two bytes is at the top of the screen. Experience has shown that you always look for two bytes. It is either an address or LD A,n.

F – find the next occurrence. After using *S* use this to find all the next occurrences of the two bytes. Just press it and the display will move to the next occurrence. Repeated presses will eventually step through all the occurrences in memory.

D – the disassembler. You will get a page of disassembly from the address at the top of the hex dump page. Press enter to get the next page. Or type in a new four digit address to disassemble from somewhere completely different. To exit from the disassembler press the space key.

Q – this returns you to the main menu.

Option 4. This will attempt a return to Basic. It will work with most programs written in Basic and some machine code games, but usually it will just reset the computer.

"There is a small arcade game called *Dotty* on the chip, which loads instantaneously. All you have to do is type OUT 127,11,"

The Game

Totally free there is a small arcade game called *Dotty* on the chip, which loads instantaneously. All you have to do is type OUT 127,11 (OUT is Extended shift-0). The controls for the game are Q: left; W: right; space to fire. It is also compatible with Sinclair and Cursor joysticks – but not Kempston, despite what it may say on the main screen.

The idea of the game is to Shoot the wiggling pixels whilst avoiding the bouncy ones before the time runs out. It sounds simple but is quite addictive and has ten levels of varying difficulty.

A note on compatibility. The magic button is fully compatible with Interface one and Microdrives, just as long as you don't press it while the micro drives are actually going round. Anything else I'm not sure about.

The saving is done from Basic so it may be compatible with disc drives which use Microdrive syntax – but I'm not sure if the hardware will interfere.

The problem is that there are only three free ports on the Spectrum and other peripherals software may page the Eprom in at the wrong time or the magic button software may do things to the external peripherals.

The first problem can be solved by desoldering the wire from pin 8 of the Z80 and connecting it to any hole in the second row up from the bottom. This ensures that the Eprom can only paged out from software and thus renders it invisible to *any* peripherals when it is not being used.

This unfortunately means that you cannot now load in any programs you may have saved with JR and that you cannot get to the game any more. The solution to this is to install a switch so that the input can be connected to either pin 8 of the Z80 or to the hole. The second problem can only be solved by removing the offending peripheral.

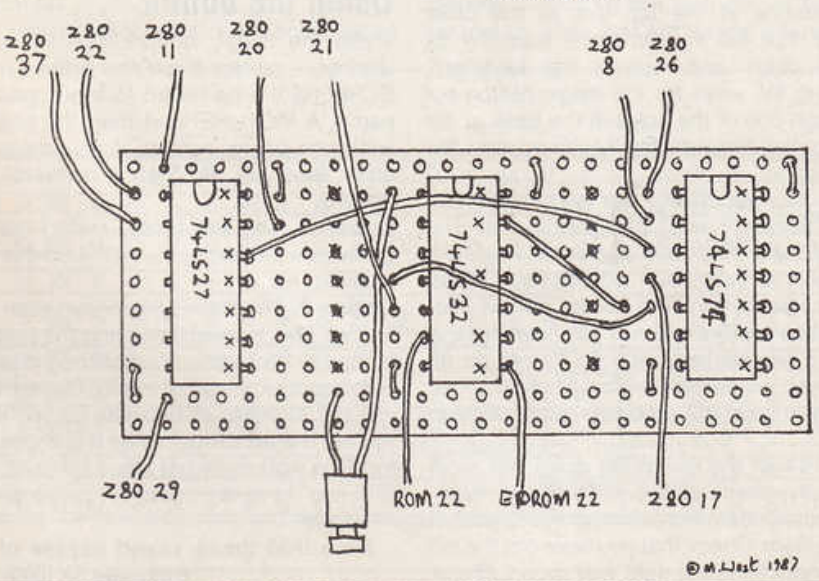
Fig. 2 shows how it all works. The main thing being the D-type latch which selects either the Rom or the Eprom by only allowing the RD signal through if it is selected. It will get through to the Rom if Q is low, ie, the latch is off.

The Eprom is similarly activated when Q-bar is low, ie, the latch is on. Initially the latch is reset by being connected to the Z80's RESET pin which is active when the computer is switched on. When you press the button then, as the other input is connected to Q-bar, the output from the first OR gate will go low.

When the computer is not accessing memory then IORQ will go low, thus allowing the output from the second OR gate to go low. This sets the latch on, paging in the Eprom, and activates NMI. This forces the computer to stop what it was doing and jump to address 102 in the Eprom. That is the entry point for the magic button software.

The EPROM is paged from software by OUT 127,n : where n is either 3 to page it out or 11 to page it in. This out is decoded by the three input NOR gate.

Fig. 3



Where to obtain the kit

The Eprom and components are available from me. There are two ways of doing this. Either you can get the Eprom from me and the bits yourself or you can get a full kit from me.

Prices

Fully programed Eprom	£5.00
Eprom and other bits	£7.00

The address is: Mick West, 27 Lynton Drive, Shipley, West Yorkshire BD18 3DJ, from August 28 onwards.

Please note, that if your Spectrum is still under guarantee, opening it up to begin this project and any alterations you make to the components will render your guarantee void.

THE ALLTIME GREATEST 10 Game COMPILATIONS

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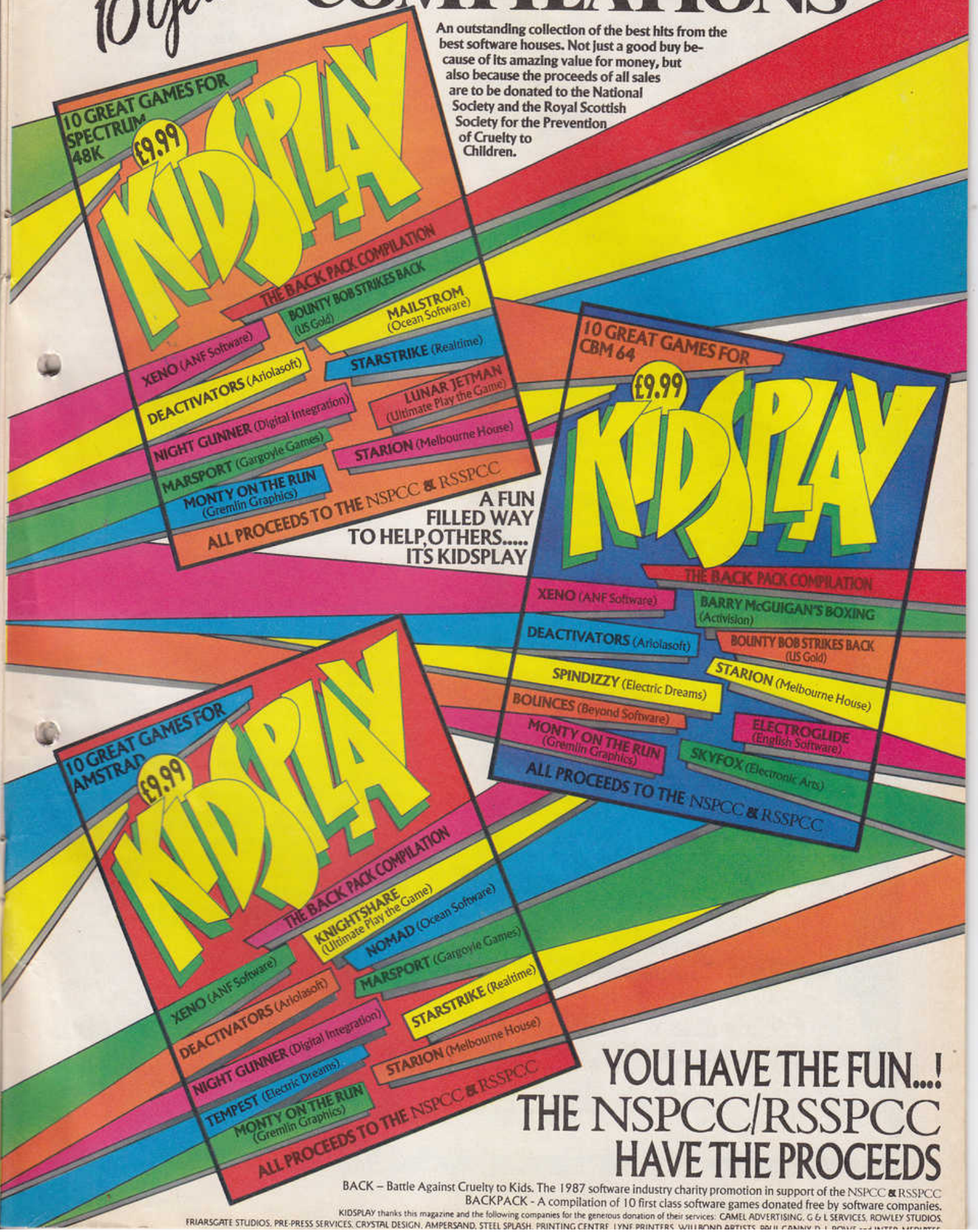

YOU HAVE THE FUN...! THE NSPCC/RSSPCC HAVE THE PROCEEDS

BACK – Battle Against Cruelty to Kids. The 1987 software industry charity promotion in support of the NSPCC & RSSPCC

BACKPACK - A compilation of 10 first class software games donated free by software companies.

KIDSPLAY thanks this magazine and the following companies for the generous donation of their services: CAMEL ADVERTISING, G & L SERVICES, ROWLEY STUDIOS, FRIARSGATE STUDIOS, PRE-PRESS SERVICES, CRYSTAL DESIGN, AMPERSAND, STEEL SPLASH, PRINTING CENTRE, LYNE PRINTERS, WILLBOND ARTISTS, PAUL GINNY, D. L. ROWE and INTER-MEDIATES.

LOOKING AT THE RISCS

lain Fenton discusses the whys and wherefores of RISC computers, and looks at how the concept evolved in the first place.

Many of you will have recently seen the launch of the Acorn ARM machine (ARM standing for Acorn RISC Machine), and wondered what all the fuss about Reduced Instruction Set Computers (or RISC for short) were, or why they are receiving so much attention in the computer press recently. In this article, I hope to show the advantages and ideas behind RISC computers as they are today.

As modern microprocessor-building techniques advanced, so it became possible to put more transistors (the building-blocks of all CPUs) onto each piece of silicon. The original Intel 8088/8086 CPU which is at the heart of the IBM PCs and the Amstrad PCs has about 80,000 transistors on it, while the next generation 80286 (in the IBM AT and compatibles) has around 150,000.

The Motorola 68000 (used in the Apple Mac, Commodore Amiga and Atari ST series) has over 190,000, and the current state-of-the-art CPU, the Intel 80386, has over a quarter of a million transistors.

As these chips increased in size and complexity, so did the instructions that they processed. The new Acorn RISC chip however, has only around 25,000 transistors on it, hence making it considerably cheaper to manufacture than the other more complex chips of its competitors.

Current complex computers

The most sophisticated of today's microcomputers, such as the Compaq 386, or the Apple Mac II have some very complex instructions for their CPUs to operate, such as segmenting memory for multi-tasking, and protecting memory from over-writing itself when two programs both ask for the screen at the same time, or for converting strings of text characters into decimal numbers.

The architecture of the current crop of CPUs reflects this attempt to build complexity in at the lowest level. It has been shown however, that these long instructions are not used as often as was thought, and the complexity in chip-design and space needed to accommodate these instructions has slowed CPUs down unnecessarily.

The operating systems on these computers spend about 90% of their time doing very simple instructions, such as loading a number into a memory location, branching on a result to another location, and adding two numbers in memory and storing the result somewhere. This is not very efficient on a chip expecting, and set up for, a large, complex instruction. Whilst a 32-bit chip may be waiting for a 32-bit instruction, it has to read in 4 bytes (ie, 32 bits) in order to process the data.

One British Risc chip implementation is the Inmos Transputer, and as it only has a very small number of instructions these can be fitted into only one byte, hence when running simple instructions the Inmos chip will be able to spend much less time waiting for instructions than a chip expecting longer instructions will have to.

Clock Cycles

All computers have a predefined 'clock cycle' (like the heart-beat in a human being), and the speed of the cycle regulates how fast the computer can work. There are a number of 32-bit microprocessors on the market – the Intel 80386 (as in the Compaq 386, and the new IBM PS/2 model 80) and Motorola 68020 (as in the Apple Mac II) are but two examples, and in general the complex instructions sent to these chips will take between three and ten clock cycles to complete.

As the CPU has to deal with varying length instructions, it becomes difficult to keep a smooth flow of data and instructions going through the chip without using sophisticated pipelining, and special low-level hardware to ensure the next instruction to be processed is in the pipeline waiting when needed.

One of the main design principles with a RISC chip is that each instruction that the CPU has to handle can be processed in a single clock-cycle. Hence in a RISC CPU there is less complexity on-chip, and so the design can be smaller, and therefore faster.

With the Acorn chip running single-cycle instructions, and with a clock cycle of 8 MHz (eight million cycles per second), this means that it has a full clock execution rate of 8 mips (million instructions per second). Because of its longer instruction cycle

times, a chip like the Intel 80386 even when running at its top speed of 20 MHz can only process instructions at around 4 to 5 mips.

Also, as these complex chips are optimised at current speeds, so as their clock speed increases through manufacturing improvements their overall throughput (ie total usable system speed) will not increase as much as with a simpler chip such as the Acorn or Inmos ones.

Rather than single-cycle instructions, most of the CISC (Complex Instruction Set Computer) CPUs – the opposite to RISC CPUs – have what is known as micro-code instructions. This is where a complex machine-language instruction has to be decoded into several smaller instructions in order to perform some long task, such as supporting complex addressing modes.

"As the chips increased in size and complexity, so did the instructions they processed. The new Acorn RISC chip has around, 25,000 transistors"

With Risc chips there is no need for this two-tier system of machine language instructions, and so instructions can be directly processed by hard-wired control logic, without micro-code.

One of the aims of RISC architecture is that the complex and difficult tasks are taken out of the hardware design of the chip, but put into software instead, and central to this idea is in the use of optimised compilers to use the full speed potential of RISC designs. With complex addressing modes that are used in current CISC chips, such as the Intel 80386, memory-mapping and keeping track of how to address such segment of memory is a very complex task, and this is shown in the delay in producing a multi-tasking operating system, such as Microsoft's new 'OS/2', for the 80286 and 80386 chips.

Acorn's Archimedes uses RISC technology, yet the price has been kept to around £1,000. The most immediate effect has been to the speed of its processing, and the graphics are pretty neat, too.

Better emulation

One of the fascinating possibilities for RISC architecture computers in the coming years is the one of getting away from hardware-dependent operating systems, and towards 'virtual' machine interfaces. With current chips having so much hard-wired micro-code, it is very difficult for a low-level program (such as an operating system) to be run on a different CPU design.

This is why MSDOS only runs on the Intel 80x86 family of chips, as it is written almost entirely in assembly language. If an operating system level program is not written for a particular chip's performance-enhancing peculiarities, then there will be less problems in converting that program to run on another chip.

Compiler writers could convert their products more easily with less sophisticated register sets to work with, and so again this would lead to software getting to the consumer faster than before.

Updating a program that is hard-wired (ie, one that is written in micro-code onto a chip) is very difficult and expensive for a designer, but if it is taken out of hardware and put into software control, then updating it, correcting bugs, and the like becomes much easier.

RISC for the average user

Whilst the average user will not be so concerned with the number of machine level instructions that his or her computer's chip can process, the power that RISC architecture gives will be of great benefit to users in a couple of years time.

More and more RISC-based computers are coming to the market, the first major one being the little-known IBM RT PC (RT standing for Risc Technology), which was targeted at the CAD/CAM market, which, with a price of upwards of £3,000 wasn't a big-seller.

Now that Acorn has released a £1,000 Risc machine, and other manufacturers produce their own machines, so many users will see the benefit of speed, power and flexibility that this new design architecture can bring.

See page 18 for our review of the Archimedes.

EUREKA! THE ARCHIMEDES

Kenn Garroch tells why he thinks the Archimedes is the most amazing micro yet to be produced, in this in-depth review of Acorn's newest machine.

Well, what can I say except that I am impressed. The Archimedes is the most amazing micro I have ever used as far as speed goes, and since I am a BBC micro user from olden times, it qualifies as a good machine on most other counts as well.

It is based around a Basic operating system very similar to the other Acorn machines. However, it is possible to QUIT from Basic into an operating system (Supervisor) called Arthur (?).

Arthur uses the * (asterisk) commands as on the original BBC, so . gives a directory, etc. These built-in commands fall into various categories: disc access which includes the ADFS and FileSwitch, MOS utilities such as loading modules, configuring the battery backed Ram which holds a set of system variables (including a clock/calendar) and other presets. Also available are the mouse, window manager, sprite utilities, and sound controls.

Further commands and utilities can be loaded in in module form, eg, sprite definitions, sound waveforms, other languages, a Basic editor, fonts, etc. It is basically the same idea as the sideways Rom/Ram idea on the old BBCs, only greatly extended.

Switching the machine on with the Welcome disc in jumps the machine into Basic which promptly quits and loads a series of modules (sprites, fonts, sounds, etc). The Wimp (Windows, Icons, Menus, Pointer) desktop is then run. This is a Basic program that provides a full mouse driven desktop environment along with accessories such as a diary, calculator and notepad.

One would think that being written in Basic, this is going to be slow. Not a bit of it, however, it is faster than either the Mac or the ST and provides more windows and in colour.

The Basic on the Archimedes is the fastest I have ever seen. Writing games (simple ones such as *Meteors* or possibly *Elite*?) is quite straightforward, none of this messing around in machine code. However, if you want to get your hands dirty, as with all BBC Basics, there is an assembler built in, an ARM (Acorn RISC Machine) assembler at that.

I was unable to test this to any great extent since the ARM instruction set is a little strange. However, with the help of a good book, it should not prove too difficult to learn since the Archimedes is uncrashable (there and always break and reset to get out of the stickiest situations) and the results should be, to say the least, stunning, so it's well worth the effort.

There were three Basics available on the review machine, Rom Basic V, Ram_Basic V, and 65Arthur which is a 6502 emulator running a 6502 version of Basic along with its built in 6502 assembler. This appears to be completely compatible with the old BBC B. I'm not sure how it compares with the Master but I presume it is compatible with that as well. The Ram_ Basic is identical to the Rom Basic apart from the fact that it has a full help utility for Basic commands, ie, HELP . lists all of the commands, HELP LIST reveals all about the LIST command, etc.

BBC Basic V contains a large number of commands including support for the mouse, the structures IF..THEN..ELSE..ENDIF, WHILE..ENDWHILE, REPEAT..UNTIL, CASE..WHEN..OTHERWISE..ENDCASE and the usual BBC Basic procedures and functions. It appears to be fully upward compatible with earlier versions but with a plethora of new commands.

The graphics commands are exceptional because of their speed, the filled rectangles, triangles, and circles being astonishingly fast. Number crunching is also pretty nifty, although I won't give any benchmarks as I think they give a false impression.

A better idea is gained by using the machine and comparing its feel with others (not very scientific, I know). In this light, it is probably the fastest machine I've ever used (including minis and mainframes).

The Archimedes is capable of displaying 256 colours on a 640x256 pixel screen without any noticeable loss of speed on the graphics. The colours in these modes are chosen in a rather odd way since it is only possible to select between 64 and then give each a tint on a scale of 0-3.

In 256 colour modes (16, 4 or 2) pallette colours are selected from a total of 4096 with the colour command, giving a pretty wide range. The 256 colour modes make it a little difficult to obtain the correct colour but after a little experimentation, it can be done.

In line with the compatibility idea, modes 0 to 7 are the same as those on the other BBC machines (mode 7 is teletext but not using the standard chip) with another 10 to available on a standard monitor plus three more super high res modes (640×512) using a multi sync monitor (of the ST).

One of the built-in modules runs the sprites. There are a number of commands for accessing these and the Welcome disc comes with a sprite editor. In use, the sprites are pretty fast, and five or six big ones can be on screen before any slowing down occurs. The shadow screen comes in handy as does the WAIT command which waits for the next vertical sync before continuing (the same as *FX19 on BBC B etc). Good, fast, non-flickering graphics can easily be obtained in Basic without any great effort from a programming point of view.

The sound on the Archimedes is produced by a synthesis method using sampling. Each sound is stored as a waveform which can then be reproduced at any desired frequency. This gives the machine the ability to theoretically produce any sound, including speech. However, there

were no details on how this is done given in the manual.

When using all eight channels, the speed of the machine is reduced since there is so much processing going on, this is not too bad and using a couple of channels doesn't do any harm at all. The sound is produced in stereo, although the machine itself appears to have only a mono speaker. There is a 3·5mil stereo jack socket at the back which will take the standard 'Walkman' type headphones to give reasonable reproduction. I should think that the output impedence of this socket will match the input of most modern hi-fi amplifiers.

The manual supplied with the review machine was, putting it mildly, none too good, and only experience with other Acorn machines helped me find my way about. I do however, like to be able to get at all of the fiddly bits. The trouble is that there is so much stuff available on the machine, it would take a manual twice the size to cover it all in detail. Having said that, it gives a reasonable introduction but it could have been better. I hope that an improved version will be released soon.

As far as interfaces go, the Archimedes has the usual Centronics, RS232 (typical non-standard socket), RGB and composite video connectors (the latter is monochrome), and Econet. In addition there is room for some 'podules' – peripheral modules, another name for add-ons.

So far, all I have said is to the good of the Archimedes, however, there are a few naff bits about the machine as well; nothing is perfect.

The keyboard is terrible, and it needs to be bashed quite hard to get some of the keys to react. It could be that since it was a review machine, it had been through the wars, this, however, is not really any excuse. There is a cooling fan which I found gave out quite an annoying buzz – good design of the case should obviate the need for one.

On the whole, the operating system lacks cohesion. Although it has a desktop program, and very nice it is too, there is a kind of half hearted feel to software. It is neither a Wimp machine, nor a standard keyboard Basic machine, it splits itself between both these worlds.

Unlike the Mac or the ST, the user interface is not very complete, and since the price is quite high, I would have expected a lot more especially with all that processing power. Acorn really should bundle more software with it, a good word processor and a decent paint package (the one it comes with is not really up to much considering the capabilities of the machine) would be nice, and it would encourage the business aspect as well.

Above all, the thing that really shows what the Archimedes is capable of is the bundled game – *Lander*. This has a superb solid 3D moving landscape, and the effects of the jets and explosions, etc, are fantastic.

If Acorn were to drop the price to match the ST, Atari would get really worried (Commodore should already have started thinking). As it is, knowing Acorn's past performance, I will be surprised if the Archimedes does anywhere near as well as it deserves.

Overall, the only conclusion I can reach is: As soon as I can afford it, I will buy one (the computer nutter in me can't wait), having had a model A BBC micro as my first machine and then upgraded to STs and Macintoshes, the Archimedes is a dream come true.

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THE WAY THAT LISP GOES TOGETHER

Kenn Garroch continues his series on programming in Lisp: this week he finishes his analysis of recursion and takes a deeper look at the inside workings of the language.

Following on from last week's article, here is the conclusion of our look at recursion.

For example, the following function gives powers using recursion.

```
(de power (n m)
  (cond ((zerop m) 1)
    (t (times n (power (difference m 1))))))
```

It is used as *n* to the power of *m* (n^m) and works by subtracting 1 from *m* using *difference*, and setting this as the new argument for *power*. *Times* multiplies *n* by the result of *power*. First of all, the function winds itself up until *m* is zero [*zerop* gives true when its argument is zero] and gives 1 as the result. This is then multiplied by *n* to give *n* which is returned as the result of *power* this time. Since the top level has not yet been reached, power returns *n* to *times* to give $n \times n$ and next time to give $n \times n \times n$. The number of times *power* returns *n* depends on how many times the function recurred. Note that it also gives the correct results for n^0 and n^1 but not for n^{-1} or *m* being any negative number. In this case, since *zerop* never gets *m* to be zero the function just keeps on recurring until the memory is full.

As you can see, recursion can sometimes be difficult to follow even with the simple examples given here. A bit of thought, and a little practice makes it a little clearer, and since it is such a slick programming method, and the mainstay of Lisp, it is worth the effort.

Another example is *factorial* which is almost identical to *power:*

```
(de fact (x)
  (cond ((zerop x) 1)
    (t (times x (fact (difference x 1))))))
(fact 5)
```

gives 120, ie, $5 \times 4 \times 3 \times 2 \times 1$.

Now having looked at recursion, and defining functions, the next step is to have a look a little deeper inside the language, and see how things are put together.

Lisp is made up of lists of data, and internally, these lists are set up as cells, each being linked in such a way as to give a list. Take the list:

(setq letter '(a)) which gives the list (a)

This is a list containing one item and the letter is a pointer to its start. Internally, the list is a series of pointers arranged in the same way as the list (see examples). From a programming point of view, this is all transparent, however, there are a few points worth noticing. When taking the car (first in the list), the computer simply looks at the name of the list, and can immediately see the first entry. The cdr is then the rest. Getting at entries in between is a little more difficult. Although there are the commands cadr and caddr (take the car of the cdr and car of the cdr of the cdr), for long lists other methods have to be used. The two functions eq and equal work in different ways. Eq actually compares list pointers so, for two lists to be eq then they must be versions of the same list. For example:

```
(setq 1st1 '(a b c))
(setq 1st2 '(a b c))
(eq 1st1 1st2)
```

gives nil or not true.

This is because, although the lists have the same contents, they are not in the same places in memory ie, there are two lists 1st1 and 1st2. However, continuing the example:

(equal 1st1 1st2) gives true since the contents of each list are the same.

```
(setq 1st3 1st1)
```

(eq 1st3 1st1) gives true since 1st3 is a copy of 1st1 and therefore points to the same physical list.

The command cons can be used to add things to the front of the list, for example:

```
(cons 'head 1st1) gives the list
(head a b c)
```

Note that it does not actually add it to the list in memory, it simply produces the result of adding it to the list. To actually add to the list, (setq 1st1 (cons head 1st1)) must be used.

One of the clever things about Lisp is that defined functions are themselves lists, and as such can be accessed with all of the usual commands. The difference between a function and an ordinary list is the Lambda identifier. Try creating the following function: (de test (arg) (print arg) (print arg)). Now simply type in test without the brackets. You should get: (lambda (arg) (print arg) (print arg)).

This is a list with lambda at its head, arg (or list of args) in second place, and the rest of the function following as a series of lists. It follows that a function can be defined by attaching a lambda to the start of the list at the head of which are the arguments for the function. For example, (setq test '(lambda (arg) (print arg))) defines test as a function to be used as (test 'a) for example to print the letter a.

The function fun can be defined as: (de fun (nme 1st) (set nme (cons 'lambda 1st))). Fun now performs exactly the same function as de or defun ie, it defines functions. It has to be used in a slightly different way: (fun 'test '((arg) (print arg) (print arg))).

This is not really of much use since de already exists for just this purpose. However, it can be modified to check whether the definition already exists, tell the user if it does, and not do the definition. For this, the function find needs to be defined as: (de find (func 1st) (cond ((null 1st) nil) ((equal func (car 1st)) t) (t (find func (cdr 1st))))).

This is a recursive function that works its way down a lits until it either finds a name that matches func, or gets to the end of the list. In the first case, it returns t(true a match was found) and in the second, nil (false the end of the list was reached and a match not found). Try it out with (find 'a '(b c a d)) and (find 'a '(d c b s)).

The function fun can now be redefined using find to look in the oblist to see if the function exists. The oblist is a Lisp's record of all functions and objects that have been defined, try typing in (oblist) to see what is there. The new definition for fun is:

```
(de fun (nme 1st)
(cond ((find nme (bolist)) (print 'Exists))
(t (set nme (cons 'lambda 1st))))).
```

Now try: (fun 'test '((arg) (print arg) (print arg))) and you should see it in action.

Kenn Garroch continues this series next week.

Discmon

A Moulden

The last part of Discmon this week, and also the last of the instructions.

Discmon recognises 22 commands, some of which take parameters. Commands with a T after them must have the parameter entered in decimal.

DRV *x* selects drive number *x* (0–3).
TRK *x* (T) moves to selected track.
SCT *x* moves to sector *x* (0–9).
ABS *x* (T) moves to absolute sector.
REL +/– *x* (T) moves relative to current sector.
FILE *x* moves to beginning of file *x*.
DH *x* converts decimal *x* to hex.
HD *x* converts hex *x* to decimal.
ASC *x* resets byte changed with *F2* key.
CHR *x* resets *F2* byte but select *x* rather than Ascii.
NEW restarts the program.
SAVE saves a sector to disc.
HELP displays brief instructions.
QUIT exits *Discmon*.

```
 3970LDA#9:JSR&FFE3:JSR&FFE3
 3980JSR&FFE3:JSR&FFE3:JSR&FFE3:JSR&FFE3
:TXA:AND#&7F:BNEouterloop:RTS
 3990JSR&FFE3:JSR&FFE3:TXA:AND#&7F
 4000.printspace LDA#32:JMPback
 4010.printhex PHA:CLC:AND#&F0:RORA:RORA
:RORA:RORA:JSRnyb:PLA:AND#&F
 4020.nyb CLC:ADC#48:CMP#58:BCC number:A
DC#6
 4030.number JMP&FFE3
 4040.star LDX#5:LDA#31:JSR&FFE3:LDA#37:
JSR&FFE3:LDA#5:JSR&FFE3
 4050.starloop LDA#32:JSR&FFE3:LDA#10:JS
R&FFE3:LDA#8:JSR&FFE3:INX:CPX#21:BNEstar
loop:RTS
 4060.bin STA&8F:LDA#31:JSR&FFE3:LDA#29:
JSR&FFE3:LDA#2:JSR&FFE3
 4070LDY#7:.binloop
 4080LDA&8F
 4090LDX#0
 4100.bininner:STY&8E
 4110RORA:INX:CPX&8E:BNE bininner
 4120DEY:AND#1:CLC:ADC#48:JSR&FFE3
 4130CPY#0:BNE binloop:LDA&8F:AND#1:CLC:
ADC#48:JSR&FFE3:RTS
 4140]NEXT:ENDPROC
 4150:
 4160DEFPROCwipe:VDU26
 4170PRINTTAB(E%*3+3,F%+5)c$
 4180PRINTTAB(E%*3+6,F%+5)c$
 4190ENDPROC
 4200:
 4210IFERR=206GOTO70
 4220*FX4
 4230IFERR=17VDU28,0,23,39,22,12:IFFNupd
ateyn:PROCsave:GOTO5020:ELSEIFERR=176GOTO
5020
 4240REPORT:PRINT;" at ";ERL:END
 4250:
 4260DEFPROCchange(N%,o%)
 4270mem%?o%=N%
 4280N$=STR$~N%:IFLENN$=1N$="0"+N$
 4290PRINTTAB(E%*3+4,F%+5);
 4300PRINTLEFT$(N$,1)RIGHT$(N$,1)
 4310PRINTTAB(E%+29,F%+5);
 4320IFN%>31ANDN%<127VDUN%ELSEPRINT" ";
 4330IFO%=&7F ORO%=&FF ENDPROC
 4340PROCwipe:E%=E%+1:O%=O%+1
 4350IFE%=8:E%=0:F%=F%+1
 4360ENDPROC
 4370:
 4380DEFFNvalidhex(Q$,L%):LOCAL
 4390FL%=-1:FORP%=1TOL%
 4400G$=MID$(Q$,P%,1)
 44106%=ASCG$
 4420IF(G%>57ANDG%<65)OR(G%<48ORG%>70)FL
%=0
 4430NEXT:=FL%
 4440:
 4450DEFPROCinst:VDU28,0,20,39,3,12
 4460PRINT'r$"Keys are..."
 4470PRINTg$"CURSOR KEYS"w$" move cursor
"
 4480PRINTg$"SHIFT + CURSOR KEYS"w$" mov
e cursor to     extremes of motion"
 4490PRINTg$"CTRL + CURSOR KEYS"w$" move
 around disc"
 4500PRINTg$"CTRL + SHIFT + CURSOR KEYS"
w$" move        around disc in steps of
five"
 4510PRINTg$"TAB"w$" toggle between firs
t and second    half of sector"
 4520PRINTg$"COPY or CTRL_I"w$" display
instuctions"
 4530PRINTg$"FUNCTION KEY f0"w$" display
 disc info"
 4540PRINTg$"FUNCTION KEY f1"w$" change
case"
 4550PRINTg$"FUNCTION KEY f2"w$" insert
set character"
 4560PRINTg$"ESCAPE"w$" leave Discmon"
 4570PRINT'CHR$133"Press COPY...";:REPEA
TUNTILGET=135:CLS
 4580PRINT'r$"Language..."
 4590PRINTg$"DRV drvno"w$" select drive
number"
 4600PRINTg$"SCT sctno"w$" move to secto
r specified"
 4610PRINTg$"TRK trkno (T)"w$" move to t
rack trkno"
 4620PRINTg$"ABS absol (T)"w$" move to a
bsolute"SPC9"sector specified"
 4630PRINTg$"REL <(+)/-> offset (T)"w$"
move sector     relative to current posi
tion"
 4640PRINTg$"FILE fsp"w$" move to file s
pecified"
 4650PRINTg$"DH/HD number"w$" hex/dec /
dec/hex"
 4660PRINTg$"ASC hexno"w$" set ascii for
 f2"
 4670PRINTg$"CHR chr"w$" set character f
or f2"
 4680PRINTg$"NEW"w$" new disc"
 4690PRINT'm$"Press COPY...";
 4700REPEATUNTILGET=135:CLS
 4710PRINT'r$"Language (...cont'd)..."
 4720PRINTg$"Single chr string"w$" Inser
t character"
 4730PRINTg$"Double chr string"w$" Inser
t ascii code"
 4740PRINTg$"+/- hexno"w$" Cbyte=Cbyte +
/- hexno"
 4750PRINTg$"OR byte"w$" Cbyte = Cbyte O
R byte"
 4760PRINTg$"AND byte"w$" Cbyte = Cbyte
AND byte"
 4770PRINTg$"XOR byte"w$" Cbyte = Cbyte
XOR byte"
 4780PRINTg$"NOR byte"w$" Cbyte = NOT (C
byte OR byte)"
 4790PRINTg$"NAND byte"w$" Cbyte = NOT (
Cbyte ANDbyte)"
 4800PRINTg$"XNOR byte"w$" Cbyte = NOT (
Cbyte XORbyte)"
 4810PRINTg$"NOT"w$" Cbyte = NOT Cbyte"
 4820PRINTg$"NEG"w$" Cbyte = NEG Cbyte"
 4830PRINTg$"SAVE"w$" save sector to dis
c"
 4840PRINTg$"HELP"w$" display brief inst
ructions"
 4850PRINTg$"QUIT"w$" leave program"
 4860PRINT'CHR$133"Press COPY...";:REPEA
TUNTILGET=135:CLS:ENDPROC
 4870:
 4880DEFFNupdateyn:IFeditf=0:=FALSE
 4890VDU28,0,23,39,22,12
 4900PRINT;y$"Update disc? (y/n)";
 49106=GET
 4920IFG=78ORG=110CLS:C=0:S$="":=FALSE
 4930IFG<>89ANDG<>121GOTO4910
 4940CLS:C=0:S$="":=TRUE
 4950:
 4960DEFFNupper(Z$)
 4970Y$="":FORP%=1TOLENZ$
 4980A%=ASCMID$(Z$,P%,1)
 4990IFA%>96ANDA%<123Y$=Y$+CHR$(A%-32)EL
SEY$=Y$+CHR$A%
 5000NEXT:=Y$
 5010:
 5020CALL(!&FFFC AND&FFFF)
 5030:
 5040DEFPROCmove(N%):A=G:*FX15
 5050IFFNupdateyn=TRUE:PROCsave
 5060G=A:IFG=136PROCB:PROCloadsave(DR%,T
R%,SC%,1):PROCshow
 5070IFG=137PROCF:PROCloadsave(DR%,TR%,S
```

```
C%,1):PROCshow
 5080IFG=139ANDN%=5:PROCfiveon:ENDPROC
 5090IFG=138ANDN%=5PROCfiveback:ENDPROC
 5100IFG=139ANDTR%=TRK%-1 TR%=0:PROCload
save(DR%,TR%,SC%,1):PROCshow:ENDPROC
 5110IFG=139ANDTR%<>(TRK%-1)TR%=TR%+1:PR
OCloadsave(DR%,TR%,SC%,1):PROCshow
 5120IFG=138ANDTR%=0TR%=TRK%-1:PROCloads
ave(DR%,TR%,SC%,1):PROCshow:ENDPROC
 5130IFG=138ANDTR%<>0TR%=TR%-1:PROCloads
ave(DR%,TR%,SC%,1):PROCshow
 5140ENDPROC
 5150:
 5160DEFPROCB
 5170SC%=SC%-N%:IFSC%<0ANDTR%<>0:SC%=SC%
+10:TR%=TR%-1
 5180IFSC%<0ANDTR%=0:SC%=SC%+10:TR%=TRK%
-1
 5190ENDPROC
 5200:
 5210DEFPROCF
 5220SC%=SC%+N%:IFSC%>9ANDTR%<>TRK%-1:SC
%=SC%-10:TR%=TR%+1
 5230IFSC%>9ANDTR%=TRK%-1:SC%=SC%-10:TR%
=0
 5240ENDPROC
```

```
 5250:
 5260DEFPROCinfo:VDU28,0,20,39,3,12
 5270PRINT'r$"Program    Start sector"TA
B(27,1)"End sector"
 5280PRINTTAB(12,2)r$"(absolute)"TAB(27,
2)"(absolute)"
 5290VDU28,0,20,39,5,12,14
 5300FORP%=1TONUM%
 5310PRINTTAB(0)g$nm$(P%);
 5320PRINTTAB(11)c$"D:"FNPAD(STR$(st%(P%
)));
 5330PRINT" H:"FNPAD(STR$~(st%(P%)));
 5340PRINTTAB(26)"D:"FNPAD(STR$(en%(P%))
);
 5350PRINT" H:"FNPAD(STR$~(en%(P%)))
 5360NEXT
 5370PRINT'm$"Press SPACE...";
 5380REPEATUNTILGET=32:VDU12,15
 5390ENDPROC
 5400:
 5410DEFFNmem(Z%,V%)
 5420W$="":FORH%=Z%TOZ%+V%-1
 5430I%=?H%:IFI%>31ANDI%<>127ANDI%<129W$
=W$+CHR$I%ELSEW$=W$+"@"
 5440NEXT:=W$
 5450:
```

```
 5460DEFFNPAD(V$):IFLENV$=1V$="00"+V$
 5470IFLENV$=2V$="0"+V$
 5480=V$
 5490:
 5500DEFFNfile:AB%=TR%*10+SC%
 5510FG%=0:C%=0:REPEAT:C%=C%+1
 5520IFAB%>=st%(C%)ANDAB%<=en%(C%)FG%=C%
 5530UNTILFG%<>0ORC%=NUM%+1
 5540IFC%=NUM%+1="None"
 5550=nm$(C%)
 5560:
 5570DEFPROCcase:B%=0%?mem%
 5580IFB%>64ANDB%<91B%=B%+32:GOTO5600
 5590IFB%>96ANDB%<123B%=B%-32
 5600PROCchange(B%,0%):editf=1
 5610ENDPROC
 5620:
 5630DEFPROCfiveon
 5640TR%=TR%+5:IFTR%>TRK%-1TR%=TR%-TRK%
 5650PROCloadsave(DR%,TR%,SC%,1)
 5660PROCshow:ENDPROC
 5670:
 5680DEFPROCfiveback
 5690TR%=TR%-5:IFTR%<0TR%=TR%+TRK%
 5700PROCloadsave(DR%,TR%,SC%,1)
 5710PROCshow:ENDPROC
```


Logo-R

Robert Glavas

This program is a Spectrum version of the language *LOGO*. It involves the use of a turtle and pen to draw pictures or patterns on the screen. The basic *LOGO* instruction set is used here, and includes, UP, PEN, DOWN, PEN, LEFT, RIGHT, FORWARD and BACK.

There are two modes of operation, the direct mode and the programming mode. In direct mode any instruction entered will be executed immediately. In the programming mode every instruction will be stored until you revert back to direct mode, where you can run the listing.

The instructions are as follows.

UP PEN stops the drawing although the turtle will still move.

DOWN PEN starts drawing.

CENTRE positions the turtle in the centre of the screen.

FORWARD N moves the turtle forwards N units.

BACK N moves the turtle back N units.

LEFT N rotates the turtle anti-clockwise N units.

RIGHT N rotates the turtle clockwise N units.

NORTH makes the turtle look towards the top of the screen.

CLS clears the screen.

COPY produces a hardcopy of the screen.

FRESH does a CLS, CENTRE, NORTH, UP PEN.

V(N)=X is how you can store variables and do calculations. You can incorporate variables in other commands, such as FORWARD V(3)*V(2)+7.

NEW deletes a program.

SAVE and LOAD are obvious.

HELP renders assistance.

VALUES displays all the variables.

EXIT returns to Basic.

REPEAT N . . . AGAIN is a loop structure which repeats the lines between the REPEAT and AGAIN, N times.

There are two commands which can only be used in direct mode, and they are RUN, which executes your program, and PROG which enters programming mode.

The following commands can only be used in programming mode.

LIST lists the current program.

LLIST produces a hardcopy.

DEL deletes the last line entered.

PUT lets you insert a line into the program.

EDIT lets you edit a line.

END switches you to direct mode.

```
  1 GO TO 900
  5 INPUT "": PRINT #0;"ERROR": BEEP .1
,30.7: PAUSE 50: LET EXR=TRUE: RETURN
 10 DATA "UP PEN": LET PEN=UP: RETURN
 20 DATA "DOWN PEN": LET PEN=DOWN: RETU
RN
 30 DATA "CENTRE": LET X=128: LET Y=88:
RETURN
 40 DATA "FORWARD": LET D=VAL J$(9 TO )
```

```
: LET A=PI/(180/(ANG+.00001)): LET BX=(C
OS A)*D: LET DY=(SIN A)*D: IF PEN=DOWN T
HEN  GO SUB 150
 41 LET X=X+DX: LET Y=Y+DY: RETURN
 50 DATA "BACK": LET D=VAL J$(6 TO ): L
ET A=PI/(180/(ANG+.00001)): LET DX=(COS
A)*-D: LET DY=(SIN A)*-D: IF PEN=DOWN TH
EN  GO SUB 150
 51 LET X=X+DX: LET Y=Y+DY: RETURN
```

```
 60 DATA "LEFT": LET D=VAL J$(6 TO ): L
ET ANG=ANG+D: RETURN
 70 DATA "RIGHT": LET D=VAL J$(7 TO ):
LET ANG=ANG-D: RETURN
 80 DATA "NORTH": LET ANG=90: RETURN
 90 DATA "CLS": CLS : RETURN
100 DATA "COPY": COPY : RETURN
```

continued on page 24 ▶

◀ continued from page 23

```
 110 DATA "V(": LET N$="(": FOR F=3 TO 1
5: IF J$(F)<>"=" THEN  LET N$=N$+J$(F):
NEXT F
 112 IF N$="(" OR N$(1)<>"(" OR N$(LEN N
$)<>")" THEN  GO SUB ERROR: RETURN
 113 LET N=VAL N$: IF N>VARS OR N<1 THEN
  GO SUB ERROR: RETURN
 114 LET V(N)=VAL J$(F+1 TO ): RETURN
 120 DATA "FRESH": LET X=128: LET Y=88:
LET ANG=90: LET PEN=UP: CLS : RETURN
 130 DATA "REPEAT": RANDOMIZE VAL (J$(8
TO )): LET L$=L$+CHR$ (PEEK 23670)+CHR$
(PEEK 23671): RANDOMIZE C: LET L$=L$+CHR
$ (PEEK 23670)+CHR$ (PEEK 23671): RETURN

 140 DATA "AGAIN": IF L$="" THEN  GO SUB
 ERROR: RETURN
 141 LET Z=CODE (L$(LEN L$-3))+(256*CODE
 (L$(LEN L$-2))): LET Z=Z-1: RANDOMIZE Z
: LET L$(LEN L$-3)=CHR$ (PEEK 23670): LE
T L$(LEN L$-2)=CHR$ (PEEK 23671): IF Z=0
 THEN  LET L$=L$( TO LEN L$-4): RETURN
 142 LET C=CODE (L$(LEN L$-1))+(256*CODE
 (L$(LEN L$))): RETURN
 149 REM %%%% LINES %%%%
 150 IF X>=0 AND X<=255 AND Y>=0 AND Y<=
175 AND X+DX>=0 AND X+DX<=255 AND Y+DY>=
0 AND Y+DY<=175 THEN  PLOT X,Y: DRAW DX,
DY: RETURN
 155 IF X>=0 AND X<=255 AND Y>=0 AND Y<=
175 THEN  PLOT X,Y: DRAW DX,DY: RETURN
 160 IF X+DX>=0 AND X+DX<=255 AND Y+DY>=
0 AND Y+DY<=175 THEN  PLOT X+DX,Y+DY: DR
AW -DX,-DY: RETURN
 170 RETURN
 200 REM %%%% ARROW %%%%
 210 IF X<6 OR X>248 OR Y>169 OR Y<7 THE
N  RETURN
 220 LET Z=ANG-135: LET A=PI/(180/(Z+.00
01)): PLOT X,Y: DRAW 7*(COS A),7*(SIN A)
: LET Z=Z-135: LET A=PI/(180/(Z+.0001)):
 DRAW 10*(COS A),10*(SIN A): LET Z=Z-135
: LET A=PI/(180/(Z+.0001)): DRAW 6*(COS
A),6*(SIN A): RETURN
 300 REM %%%% SAVE %%%%
 310 IF P$="" THEN  GO TO 1000
 320 LET LN=LEN P$/32: LET T(1)=LN: DIM
T$(LN,32): IF LN>100 THEN  INPUT "": PRI
NT #0;"SORTING. PLEASE WAIT."
 330 FOR F=1 TO LN: LET T$(F)=P$(((F-1)*
32)+1 TO )
 340 NEXT F: INPUT "": SAVE "I" DATA T()
: POKE 23736,181: SAVE "II" DATA T$(): D
IM T$(1): GO TO 1000
 400 REM %%%% LOAD %%%%
 410 CLS : PRINT AT 5,0;"_____"''"LOAD
ING"'"_____": LOAD "I" DATA T(): DIM T
$(T(1),32): LOAD "II" DATA T$()
 420 LET P$="": IF T(1)>100 THEN  INPUT
"": PRINT #0;"SORTING. PLEASE WAIT."
 430 FOR F=1 TO T(1): LET P$=P$+T$(F): N
EXT F: CLS : GO TO 1000
 899 REM %%%% VARS %%%%
 900 LET P$="": LET ANG=90: LET X=128: L
ET Y=88: LET DOWN=1: LET UP=0: LET PEN=U
P: DIM T(1): LET ARROW=200: LET ERROR=5
 910 LET STORE=60064: LET GET=60076: LET
 FALSE=0: LET TRUE=1: LET SCROLL=3280: L
ET DIRECT=1: LET PROG=2: LET MODE=DIRECT
: LET L$="": LET VARS=20: DIM V(VARS)
 920 POKE 23658,8: POKE 23609,3: POKE 23
561,20: POKE 23562,2: POKE 23624,69: POK
E 23693,71: CLS : BEEP .0001,69
 930 GO SUB 6000: PAUSE 50
 940 GO SUB 5000
 950 CLS : LET L=USR STORE
 999 REM %%%% ENTRY %%%%
1000 LET L=USR 60000: LET EXR=FALSE: LET
 A$="PROG:": IF MODE=DIRECT THEN  LET A$
="DIRECT:": LET L=USR GET: GO SUB ARROW
1010 INPUT (A$); LINE J$: LET J$=J$+"
                                ": LET J$=J
$( TO 32): IF J$(1)=" " THEN  GO TO 1010
1020 IF MODE=DIRECT THEN  LET L=USR GET
1030 IF J$( TO 3)="NEW" THEN  LET P$="":
 GO TO 1000
1040 IF J$( TO 4)="SAVE" THEN  GO TO 300
1050 IF J$( TO 4)="LOAD" THEN  GO TO 400
1060 IF J$( TO 4)="HELP" THEN  GO SUB 50
00: GO TO 1000
1070 IF J$( TO 6)="VALUES" THEN  GO TO 4
500
1080 IF J$( TO 4)="EXIT" THEN  STOP
1090 IF MODE=DIRECT THEN  GO TO 2000
1099 REM %%%% PROG ENTRY %%%%
1100 IF J$( TO 3)="END" THEN  LET MODE=D
IRECT: CLS : GO TO 1000
1110 IF J$( TO 5)="LLIST" THEN  LPRINT '
 INVERSE 1;"START", INVERSE 0;P$; INVERS
E 1;"END",': GO TO 1000
1120 IF J$( TO 4)="LIST" THEN  GO SUB 12
00: GO TO 1000
1130 IF J$( TO 4)="EDIT" THEN  GO TO 300
0
1140 IF J$( TO 3)="PUT" THEN  GO TO 3500
1145 IF J$( TO 3)="DEL" AND P$<>"" THEN
 LET P$=P$( TO LEN P$-32): INPUT "": PRI
NT AT 21,0;"DELETED": LET L=USR SCROLL:
GO TO 1000
1150 RESTORE : FOR Q=1 TO 14: READ A$: I
F A$=J$( TO LEN A$) THEN  PRINT AT 21,0;
J$: LET L=USR SCROLL: LET P$=P$+J$: GO T
O 1000
1155 IF J$(3)=" " AND A$( TO 2)=J$( TO 2
) THEN  LET J$=A$+J$(3 TO ): LET J$=J$(
TO 32): PRINT AT 21,0;J$: LET L=USR SCRO
LL: LET P$=P$+J$: GO TO 1000
1160 NEXT Q: GO SUB ERROR: GO TO 1000
1200 CLS : POKE 23692,-1: PRINT AT 21,0;
 INVERSE 1;"START", INVERSE 0;P$'': RETU
RN
1999 REM %%%% DIRECT ENTRY %%%%
2000 IF J$( TO 4)="PROG" THEN  LET MODE=
PROG: CLS : GO SUB 1200: GO TO 1000
2010 IF J$( TO 3)="RUN" THEN  GO TO 4000
2020 RESTORE : FOR F=10 TO 120 STEP 10:
READ A$: IF A$=J$( TO LEN A$) THEN  GO S
UB F: INPUT "": LET L=USR STORE: GO TO 1
000
2025 IF J$(3)=" " AND A$( TO 2)=J$( TO 2
) THEN  LET J$=A$+J$(3 TO ): GO SUB F: I
NPUT "": LET L=USR STORE: GO TO 1000
2030 NEXT F: GO SUB ERROR: GO TO 1000: R
EM ! HELLO MUM !
2999 REM %%%% EDIT PROG %%%%
3000 IF P$="" THEN  GO TO 1000
3010 CLS
3020 PRINT AT 21,0; INVERSE 1;"START",:
LET L=USR SCROLL
3030 FOR F=1 TO LEN P$ STEP 32
3040 PRINT AT 0,23; INVERSE 1;"1 - ALTER
";AT 1,23;"0 - DEL  "
3050 PRINT AT 21,0; INVERSE 1;P$(F TO F+
31)
3060 FOR Z=-4E10 TO 4E10: PAUSE 0: LET A
$=INKEY$
3070 PRINT AT 21,0;P$(F TO F+31)
3080 IF A$="1" THEN  GO TO 3200
3090 IF A$="0" THEN  LET A$="": GO TO 32
10
3100 LET L=USR SCROLL
3110 NEXT F: PRINT AT 21,0; INVERSE 1;"E
ND",: LET L=USR SCROLL: GO TO 1000
3200 GO SUB 3300
3210 LET Q$=P$( TO F-1)
3220 LET W$=P$(F+32 TO )
3230 LET P$=Q$+A$+W$
3240 IF A$<>"" THEN  PRINT AT 21,0;A$: G
O TO 3100
3250 GO SUB 1200: GO TO 1000
3300 LET X$=P$(F TO F+31)
3310 LET A$="": FOR G=32 TO 1 STEP -1: I
F X$(G)=" " THEN  NEXT G
3320 LET A$=X$( TO G)
3330 PRINT AT 21,0;A$;
3399 REM %%%% AMEND %%%%
3400 FOR Z=-4E10 TO 4E10: PRINT  FLASH 1
;" ";: PAUSE 0: LET I$=INKEY$: IF I$=""
THEN  PRINT CHR$ 8;: NEXT Z
3410 PRINT CHR$ 8;: IF I$=CHR$ 13 AND A$
="" THEN  RETURN
3420 IF I$=CHR$ 13 THEN  LET A$=A$+"
                                ": LET A$=A$
( TO 32): RETURN
3430 IF I$=CHR$ 12 AND A$<>"" THEN  LET
A$=A$( TO LEN A$-1): PRINT " ";CHR$ 8;CH
R$ 8;
3440 IF I$=CHR$ 12 THEN  NEXT Z
3450 IF LEN A$=31 THEN  NEXT Z
3460 IF I$>=" " AND I$<="^" THEN  LET A$
=A$+I$: PRINT I$;
3470 NEXT Z
```

PROGRAMMING: SPECTRUM

```
3499 REM %%%% INSERT %%%%
3500 IF P$="" THEN  GO TO 1000
3510 CLS
3520 PRINT AT 21,0; INVERSE 1;"START",:
LET L=USR SCROLL+USR SCROLL
3530 FOR F=1 TO LEN P$ STEP 32
3540 PRINT AT 21,0;P$(F TO F+31)
3550 LET L=USR SCROLL: PRINT AT 19,0; FL
ASH 1;" "
3560 FOR Z=-4E10 TO 4E10: PAUSE 0: LET A
$=INKEY$
3570 IF A$>="A" AND A$<="Z" THEN  PRINT
AT 19,0;: GO TO 3700
3580 IF A$<>" " THEN  NEXT Z
3590 PRINT AT 19,0,,: LET L=USR SCROLL
3600 NEXT F: PRINT AT 21,0; INVERSE 1;"E
ND",: LET L=USR SCROLL: GO TO 1000
3700 PRINT A$;
3710 FOR Z=-4E10 TO 4E10: PRINT  FLASH 1
;" ";: PAUSE 0: LET I$=INKEY$: IF I$=""
THEN  PRINT CHR$ 8;: NEXT Z
3720 PRINT CHR$ 8;: IF I$=CHR$ 13 THEN
GO TO 3800
3730 IF I$=CHR$ 12 AND A$<>"" THEN  LET
A$=A$( TO LEN A$-1): PRINT " ";CHR$ 8;CH
R$ 8;
3740 IF I$=CHR$ 12 THEN  NEXT Z
3750 IF LEN A$=30 THEN  NEXT Z
3760 IF I$>=" " AND I$<="^" THEN  LET A$
=A$+I$: PRINT I$;
3770 NEXT Z
3800 IF A$="" THEN  GO TO 3590
3810 LET A$=A$+"
        ": LET A$=A$( TO 32)
3820 LET Q$=P$( TO F-1)
3830 LET W$=P$(F TO )
3840 LET P$=Q$+A$+W$
3850 GO SUB 1200: GO TO 1000
3999 REM %%%% RUN PROG %%%%
4000 IF P$="" THEN  GO TO 1000
4010 LET EXR=FALSE: LET L$="": FOR C=1 T
O LEN P$ STEP 32
4020 IF INKEY$=" " THEN  INPUT "": LET L
=USR STORE: GO TO 1000
4030 LET J$=P$(C TO C+31)
4040 INPUT "": PRINT #0;J$
4050 RESTORE : FOR Q=10 TO 140 STEP 10:
READ A$: IF A$=J$( TO LEN A$) THEN  GO S
UB Q: IF EXR=TRUE THEN  INPUT "": LET L=
USR STORE: GO TO 1000
4055 IF A$=J$( TO LEN A$) THEN  NEXT C:
INPUT "": LET L=USR STORE: GO TO 1000
4060 NEXT Q: GO SUB ERROR: GO TO 1000
4499 REM %%%% VALUES %%%%
4500 CLS : FOR F=1 TO VARS: PRINT "V(";F
;")=";V(F): NEXT F
4510 INPUT "": PRINT #0;"PRESS ANY KEY T
O CONTINUE": PAUSE 0: CLS
4520 GO TO 1000
4999 REM %%%% HELP %%%%
5000 CLS
5010 LET Z$="
____"+CHR$ 13+CHR$ 13
5020 PRINT "LOGO INSTRUCTIONS"'Z$
5030 RESTORE : FOR F=1 TO 14: READ A$: P
RINT A$: NEXT F
5035 PRINT '"SHORTHAND:"'"FIRST TWO LETT
ERS OF INSTRUCTIONPLUS OPERAND, EG. FD 3
5, BA V(1)"
5040 INPUT "": PRINT #0;"PRESS ANY KEY T
O CONTINUE": PAUSE 0: CLS
5100 PRINT "STANDARD COMMANDS"'Z$
5110 PRINT "NEW"'"SAVE"'"LOAD"'"HELP"'"V
ALUES"'"EXIT"
5120 INPUT "": PRINT #0;"PRESS ANY KEY T
O CONTINUE": PAUSE 0: CLS
5200 PRINT "DIRECT ENTRY COMMANDS"'Z$
5210 PRINT "RUN - RUN STORED PROGRAM"'"P
ROG - ENTER PROGRAMMING MODE"'"ALL LOGO
INSTRUCTIONS"'"EXCEPT REPEAT & AGAIN"
5220 INPUT "": PRINT #0;"PRESS ANY KEY T
O CONTINUE": PAUSE 0: CLS
5300 PRINT "PROGRAM ENTRY COMMANDS"'Z$
5310 PRINT "LIST"'"LLIST"'"DEL - OMIT LA
ST LINE"'"PUT - INSERT AN INSTRUCTION"'"
EDIT - AMEND THE PROGRAM"'"END - ENTER D
IRECT ENTRY"
5320 INPUT "": PRINT #0;"PRESS ANY KEY T
O CONTINUE": PAUSE 0: CLS : RETURN
5999 REM %%%% MCODE %%%%
6000 PRINT AT 1,1;"LOGO-R"''" ROBERT GLA
VAS"'" COPYRIGHT 1987 A.D": PLOT 0,0: DR
AW 255,0: DRAW 0,175: DRAW -255,0: DRAW
0,-175: RESTORE 6000: FOR F=60000 TO 600
87: READ A: POKE F,A: NEXT F: RETURN
6010 DATA 59,A,225,17,15,0,25,235,42,61,
92,115,35,114,201,59,A,33,58,92,126,254,
1,40,17,254,5,40,13,254,11,40,9,254,10,4
0,19,51,A,195,3,19,229,245,33,5,0,175,34
,66,92,50,68,92,241,225,54,255,35,203,25
4,195,125,27
6020 DATA 33,0,64,17,80,195,1,255,23,237
,176,201
6030 DATA 33,80,195,17,0,64,1,255,23,237
,176,201
7000 REM ONCE PROGRAM HAS BEEN
 COMPLETED IT CAN BE              SAVED T
O AUTO-RUN WITH          SAVE "LOGO-R" L
INE 0
```

PROGRAMMING: AMSTRAD CPC

String Finder

Alastair Scott

You can find the location of any hex or Ascii string in memory with this fast machine code routine. All the addresses are printed in hex.

To use the machine code on its own the syntax is, *C$="string to be found": :FIND,@C$.*

```
100 'String Finder
110 'by Alastair Scott  July 1987
120 MODE 2:INK 0,0:INK 1,26:BORDER 0
130 DEFINTa-z:WINDOW#1,1,80,5,5:k$=CHR$(24)
140 IF PEEK(&BE80)<>1 THEN GOSUB 310
150 PRINT k$" STRING FINDER "k$
160 LOCATE 1,3:PRINT"Find hex or ASCII string? (H/A) ";
170 f$="":WHILE f$<>"H"AND f$<>"A":f$=UPPER$(INKEY$):WEND
180 PRINT f$
190 IF f$="H"THEN GOSUB 240 ELSE GOSUB 290
200 LOCATE 1,7:PRINT"String found at locations ... "
210 LOCATE 1,9:!FIND,@c$:PRINT:PRINT
220 PRINT k$" Press any key to run again "k$
230 CALL &BB18:RUN
240 INPUT#1,"Enter hex string ",h$
250 IF LEN(h$)MOD 2=1 THEN 240
260 c$="":FOR a=1 TO LEN(h$)\2
270 c$=c$+CHR$(VAL("&"+MID$(h$,a*2-1,2)))
280 NEXT:RETURN
290 INPUT#1,"Enter ASCII string ",c$
300 RETURN
310 FOR a=&BE80 TO &BEFB
320 READ b$:POKE a,VAL("&"+b$)
330 NEXT:CALL &BE80:RETURN
340 DATA01,89,BE,21,FB,BE,C3,D1,BC,BE,BE,C3
350 DATA93,BE,46,49,4E,C4,00,DD,6E,00,DD,66
360 DATA01,7E,32,CE,BE,32,DB,BE,23,5E,23,56
370 DATAED,53,BF,BE,1A,32,B1,BE,21,01,00,7E
380 DATAFE,00,CC,B8,BE,23,7D,B4,20,F5,C9,0E
390 DATA00,DD,21,00,00,7E,DD,46,00,B8,20,11
400 DATA23,DD,23,0C,79,FE,00,20,F0,CD,DA,BE
410 DATA3E,20,CD,5A,BB,C9,06,00,2B,10,FD,7C
420 DATACD,E4,BE,7D,F5,0F,0F,0F,0F,CD,ED,BE
430 DATAF1,E6,0F,C6,90,27,CE,40,27,C3,5A,BB
440 DATA00,00,00,00
```

Space Blaster

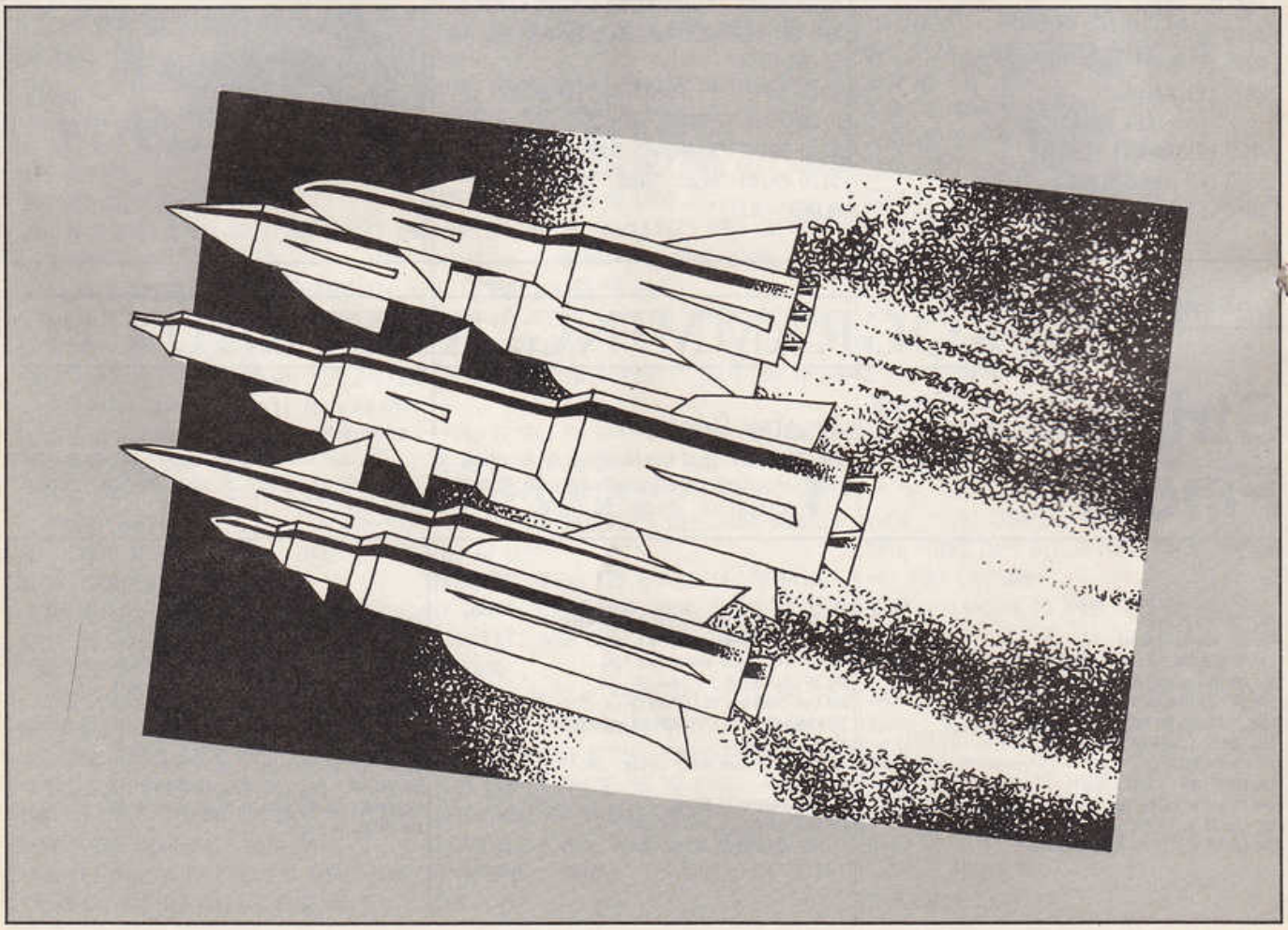
John Taylor

Part three of the machine code blasting game is presented this week. And that's it. Go to it.

```
2950 DATA 25,82,58,2A,62,A8,FF,00,08,00,00,2A,00,00,08,00,00,2A,00,00,  950
2960 DATA 08,00,00,08,00,8A,AA,A0,2A,AA,A8,A5,55,5A,63,33,32,63,33,32,  1636
2970 DATA A5,55,5A,2A,AA,A8,0A,AA,A0,02,2Z,20,00,00,00,00,00,00,00,00,  1128
2980 DATA 00,00,00,00,00,00,00,00,00,00,FF,02,00,80,02,AA,80,02,28,80,  855
2990 DATA 02,3C,00,02,8E,80,02,28,80,02,82,80,00,AA,00,0A,AA,A0,2A,AA,  1662
3000 DATA A8,AA,AA,AA,A0,8E,0A,A2,FF,8A,A2,D7,8A,A2,D7,8A,AA,FF,AA,2A,  3268
3010 DATA BE,A8,02,AA,00,0A,82,A0,2A,C3,A8,3F,00,FC,00,00,28,00,00,E9,  1951
3020 DATA 00,00,E9,00,02,E9,80,0A,E9,A0,0B,E9,20,0A,E9,A0,02,E9,80,00,  2038
3030 DATA E9,00,00,E9,00,00,E9,00,00,E9,00,00,E9,00,00,E9,00,00,E9,00,  1631
3040 DATA 00,E9,00,00,E9,00,00,E9,00,00,28,00,00,28,00,00,28,00,00,00,  819
3050 DATA E4,00,03,E5,00,23,E5,20,E3,E5,24,EB,E5,A4,EB,E5,A4,EB,E5,A4,  3132
3060 DATA E3,E5,24,E3,E5,24,E3,E5,24,E3,C5,24,E3,01,24,E3,31,24,E3,21,  2772
3070 DATA 24,23,01,20,03,C5,00,03,E5,00,03,E5,00,00,E4,00,00,00,00,00,  996
3080 DATA 00,00,00,0A,AA,30,2A,AA,A0,AA,AA,A8,95,A9,56,95,A9,56,91,A9,  2314
3090 DATA 18,91,A9,18,26,9A,60,2A,76,A0,0A,76,80,0A,76,60,09,FD,60,05,  1881
3100 DATA FD,80,2A,76,A0,2A,9A,A0,AA,AA,A8,AA,AA,A8,A0,A8,28,A8,00,A8,  2777
3110 DATA AA,AA,A8,2A,AA,A0,0A,00,00,00,00,00,00,00,34,00,03,F5,40,0F,  1269
3120 DATA F5,50,0F,F5,50,3F,AA,54,3E,82,94,3E,80,94,3E,00,94,3E,00,94,  1952
3130 DATA 3E,82,94,3F,AA,54,0F,F5,50,0F,F5,50,03,F5,40,00,34,00,00,00,  1701
3140 DATA 00,00,00,00,00,00,00,00,00,00,00,20,00,00,A8,00,20,A8,20,A8,  432
3150 DATA 20,A8,20,2A,AA,A0,02,AA,00,02,AA,00,0A,AA,80,0A,AA,80,0A,AA,  1604
3160 DATA 80,2B,EF,A0,2F,67,E0,2F,67,E0,AA,AA,A8,AA,9A,A8,AA,9A,A8,AA,  2980
3170 DATA 9A,A6,A2,AA,25,25,00,A0,0A,AA,80,02,AA,00,FF,00,30,00,00,30,  1725
3180 DATA 00,00,DC,00,00,DC,00,03,67,00,03,A6,00,0E,AA,C0,0E,BA,C0,3A,  1546
3190 DATA CE,B0,EB,03,AC,EA,CE,AC,3A,BA,B0,36,AA,70,0D,A9,C0,0D,65,C0,  2640
3200 DATA 03,57,00,03,57,00,00,DC,00,00,DC,00,00,30,00,00,30,00,FF,00,  971
3210 DATA 00,00,00,00,00,82,02,00,0A,8A,80,0B,8B,80,0B,8B,80,0B,8B,80,  1114
3220 DATA 0B,8B,80,0B,A6,80,0A,AA,80,28,20,A0,2B,EF,A0,2B,67,A0,2A,AA,  2088
3230 DATA A0,2A,8A,A0,2A,8A,A0,0A,22,80,02,AA,00,00,A8,00,00,00,00,00,  1352
3240 DATA 00,00,00,AA,AA,AA,95,55,56,9A,AA,A6,9B,FF,E6,9B,AA,E6,9B,96,  2820
3250 DATA E6,9B,96,E6,9B,96,E6,9B,96,E6,9B,96,E6,9B,96,E6,9B,96,E6,9B,  3595
3260 DATA 96,E6,9B,96,E6,9B,96,E6,9B,96,E6,9B,AA,E6,9B,FF,E6,9A,AA,A6,  3670
3270 DATA 95,55,56,AA,AA,AA,FF,00,00,00,00,00,00,00,00,00,00,00,1B,00,00,  1120
3280 DATA 6A,F0,00,6A,BC,01,5A,BF,15,5A,BF,15,5A,AF,15,5A,AF,15,6A,AF,  2096
3290 DATA 15,6A,AF,05,6A,AF,05,6A,BF,05,6A,BF,05,6A,BC,01,6A,BC,01,AA,  1957
3300 DATA FC,00,AA,FC,00,2A,F0,00,00,00,00,0F,FF,C0,05,55,40,03,FF,00,  1838
3310 DATA 00,DC,00,00,DC,00,00,54,00,00,54,00,01,55,00,01,11,00,01,55,  798
3320 DATA 00,01,55,00,01,65,00,01,65,00,01,65,00,01,55,00,01,01,00,01,  481
3330 DATA 45,00,00,54,00,00,54,00,00,54,00,00,10,00,00,00,00,00,00,00,  337
3340 DATA 00,00,00,00,00,00,00,00,00,00,34,00,00,E9,00,00,E9,00,03,  521
```

```
3350 DATA AA,40,03,B6,40,03,B6,40,03,B6,40,03,AA,40,00,E9,00,00,E9,00,  1684
3360 DATA 00,E9,00,00,34,00,00,34,00,00,00,00,00,00,00,00,00,00,40,00,  401
3370 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,10,00,02,00,00,  18
3380 DATA 00,00,00,00,40,00,04,03,00,00,20,00,02,04,00,00,00,00,0C,0C,  141
3390 DATA 00,00,40,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,  64
3400 DATA 00,00,FF,00,00,00,00,00,00,00,00,00,00,00,00,02,03,00,00,10,  284
3410 DATA 10,00,40,00,00,32,00,00,00,00,00,20,30,31,00,40,00,04,00,00,  335
3420 DATA 00,00,20,32,10,01,00,00,00,10,00,00,00,00,03,04,00,00,00,00,  386
3430 DATA 00,43,00,00,00,00,00,00,04,00,20,00,00,03,02,00,00,00,00,00,  244
3440 DATA 33,00,13,00,00,00,04,C3,0C,30,00,00,03,10,C0,20,00,03,03,03,  597
3450 DATA 00,00,00,10,30,11,04,00,00,03,33,02,00,00,00,22,20,00,00,00,  207
3460 DATA 20,10,43,00,00,00,00,10,00,FF,00,00,00,00,00,00,00,00,00,00,  394
3470 DATA 00,00,00,AA,80,A8,95,82,56,80,82,02,80,82,02,80,82,02,80,02,  1613
3480 DATA 02,80,02,AA,8A,82,56,80,02,02,80,82,02,80,82,02,AA,82,02,55,  1823
3490 DATA 41,01,00,00,00,00,00,00,00,00,00,00,00,00,FF,00,00,00,00,00,  321
3500 DATA 00,00,00,00,00,00,00,AA,82,AA,99,82,55,86,82,00,88,82,00,88,  1506
3510 DATA 82,00,88,82,AA,86,82,55,85,82,00,86,82,00,86,82,00,84,82,00,  1377
3520 DATA 80,82,AA,40,41,55,00,00,00,00,00,00,00,00,00,00,00,00,00,00,  642
3530 DATA 00,00,00,00,00,00,00,00,00,00,00,2A,02,02,95,82,02,80,82,02,  987
3540 DATA 80,82,02,80,82,02,80,82,02,80,82,02,80,82,02,80,81,89,80,81,  1951
3550 DATA 81,80,80,64,2A,80,64,15,00,10,00,00,00,00,00,00,00,00,00,00,  800
3560 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,AA,82,A6,95,42,  683
3570 DATA 56,80,02,02,80,02,02,80,02,02,AA,82,02,95,42,A8,80,02,58,80,  1513
3580 DATA 02,00,80,02,06,80,02,02,AA,82,02,85,41,01,00,00,00,00,00,00,  731
3590 DATA 00,00,00,00,00,00,00,9C,00,00,00,00,00,00,00,00,00,00,00,AA,  326
3600 DATA 02,02,95,82,02,80,82,02,80,82,02,80,82,02,AA,02,02,95,82,02,  1392
3610 DATA 80,02,02,80,02,02,80,02,02,80,02,02,80,00,A6,40,00,54,00,00,  972
3620 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,  0
3630 DATA 00,00,00,2A,82,02,95,42,02,80,02,02,80,02,02,80,02,02,6A,02,  895
3640 DATA AA,15,82,56,00,82,02,00,82,02,00,82,02,00,82,02,AA,42,02,55,  1258
3650 DATA 01,01,00,00,00,00,00,00,00,00,00,00,00,00,63,00,00,00,00,00,  101
3660 DATA 00,00,00,00,00,00,00,AA,82,AA,95,41,65,80,00,20,80,00,20,80,  1233
3670 DATA 00,20,A0,00,20,94,00,20,80,00,20,80,00,20,80,00,20,80,00,20,  1052
3680 DATA 80,02,AA,40,01,55,00,00,00,00,00,00,00,00,00,00,00,FF,00,  705
3690 DATA 00,00,00,00,00,00,00,00,00,00,AA,02,AA,95,82,55,80,82,00,  964
3700 DATA 80,82,00,80,82,00,80,82,AA,AA,02,55,96,02,00,82,02,00,81,82,  1744
3710 DATA 00,80,82,00,80,82,AA,40,41,55,00,00,00,00,00,00,00,00,00,00,  900

READY.
```



Newpause

D Nash

The problem with the Spectrum's PAUSE command is that if you press a key while it is pausing, then it ends immediately. This routine acts like the normal PAUSE except that it is unaffected by any key presses. To use the command run the listing then enter *RANDOMIZE N* and *LET L=USR 65500*, where N is the time in 50ths of a second.

```
100 REM PAUSE II BY D.NASH 1987
110 REM
120 LET START=65500
130 FOR I=START TO START+16
140 READ A
150 POKE I,A
160 NEXT I
200 DATA 237,75,118,92,118,11,120,254,0
,32,249,121,254,0,32,244,201
```

Angle

Christopher Harbron

Print text at any angle in graphics mode with this BBC procedure. The best results are achieved in modes 0, 1 and 4. The syntax is *PROC ANGLE(A$, W, X, Y)* where A$ is the string to be printed, W is the angle of elevation, and X and Y are the co-ordinates.

```
>LIST
10000 DEFPROCANGLE(A$,E%,XC%,YC%)
10010 A%=10:X%=0:Y%=12
10020 C=COSRADE%:S=SINRADE%
10030 FORB%=1TOLENA$
10040 ?&COO=ASCMID$(A$,B%,1)
10050 CALL&FFF1
10060 FORR%=1TO8
10070 FORP%=0TO7
10080 IF((2^P%)AND?(&COO+R%))>1 PLOT69,XC%+
      (32*(B%-1)+4.5*(7-P%))*C-(4.5*(8-R%))
*S,YC%+(32*(B%-1)+4.5*(7-P%))*S+(4.5*(8-R%)
      )*C
10090 NEXT,,
10100 ENDPROC
```

Audio Warning

Christopher Guest

This small program for the C16/+4, will makes your keys squeal in agony when you beat them. To turn the bleeping on enter, *SYS 1552* and to turn it off hit *Run-Stop/Return*.

```
5 T=0
10 C=DEC("610")
20 FOR1=1TO8
30 READA$
40 FORP=1TOLEN(A$)STEP2
50 B$=MID$(A$,P,2):A=DEC(B$):T=T+A
60 POKEC,A
70 C=C+1
80 NEXT:NEXT
90 IFT<>9808 THENPRINT"ERROR":STOP
100 DATA"78A9208D1203A9068D1303"
110 DATA"5860EAEAEAA5C6EAC940D0"
120 DATA"09A9008D0F06EA4C42CE20"
130 DATA"36064C42CEAD0F06C5C6D0"
140 DATA"0160A5C68D0F06A9FF8D0F"
150 DATA"FFA93F8D11FFA200A000E8"
160 DATA"E0FFD001C8C004D0F6A900"
170 DATA"8D11FF60"
```

Attention!

Unfortunately due to the sheer volume of submissions our returns department has been unable to cope satisfactorily. So, from now on we are requesting that you include a suitable stamped addressed envelope for return of your submission. Not enclosing a suitable SAE will mean that your program will not be returned. You have been warned.

The beneficial side of this system is that 90% of submissions will be returned within one week. A small price to pay for such a service I'm sure you'll agree.

With regards to future submissions we are looking for articles on programming in general, utility programs and applications software and lastly, good games. Here are a few types of program we don't want: Educational, hangman, pools predictors, mastermind, flashing borders, bank accounts, disc catalogues and clocks.

If you can't get a program listing in the magazine to work ring in to see whether it was faulty rather than writing. If there were problems then we'd let you know. Corrections normally appear a couple of weeks later. Thanks.

Duncan Evans
Technical Editor

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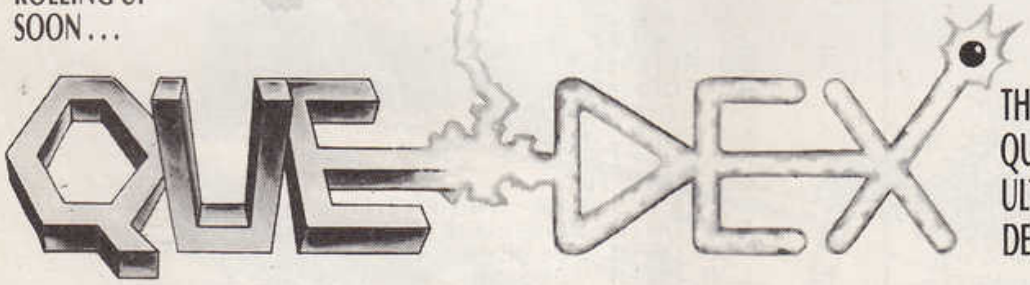

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POPULAR COMPUTING WEEKLY

with Kenn Garroch

Cumana/QL pin layout

W Hayes of Tividale, W Midlands, writes:

Q I have a QL and a Cumana 3½ inch 1 megabyte disc drive and I have just bought an Atari STFM. I would like to use the Cumana as a second drive for the ST but I don't know the pin configuration for the 34 pin plug on the drive to allow me to connect to the St disc port.

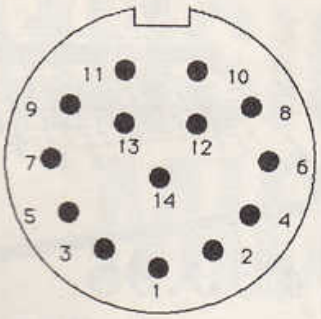
I wrote to Cumana about a month ago but it looks like being the old deaf ear treatment I've been getting from these companies for the past five years or so. Is it possible to show the pin layout in your column as there must be other readers out there with a similar problem?

A As far as I know, the 34 pin connection on the disc drive is a standard format, as used on the BBC, Amstrad, QL, etc. The trouble is that I am not totally sure of four of the functions, namely, load head, and write enable on the drive side, and write gate and motor on on the ST.

However, perhaps the following will be of some help, and if anyone knows the details, perhaps they could let me know.

Drive	ST
32 Side select	Select side 0
30 Read data	Read data
28 Write protect	Write protect
26 Track 0	Track 0
24 Write enable	?Write gate?
22 Write data	Write data
20 Seek step	Step
18 Direction	Direction in
16 Load head	?motor on?
12 Drive sel 1	Select drive 1
10 Drive sel 0	Select drive 0
8 Index	Index pulse

All odd numbers on drive side are ground.



1 Read data
2 Select side 0
3 Ground
4 Index pulse
5 Select drive 0
6 Select drive 1
7 Ground
8 Motor on
9 Direction in
10 Step
11 Write data
12 Write gate
13 Track 0
14 Write protect
Do not connect sheild on ST side

ST disk socket

Caught in a Triangle

Kerry Blake of Polebrooke, Peterborough, writes:

Q Having recently bought a 520 STFM, I decided that I should upgrade to a 1 megabyte disc drive, namely the Triangle. With these two excellent products, I had no problems until I tried to boot a protected disc in drive B. As the ST always boots any disc in drive A after power up, I would like to know if there is any way to boot the disc in drive B on power up, without going through Gem. Is it possible to instal a suitable program to make the ST boot on drive B, or make the Triangle drive A. Have you any ideas on the subject, is there a product available which would solve the problem, or have any readers got any ideas on how to do it?

A The ST always boots to dive A because the operating system Rom tells it to. This would seem to preclude any possibility of using a program to change them over since, after power down, all programs in ram are lost. However, it may be possible to use an auto program on the disc in drive A to run the auto program in drive B. This would involve the use of Gem's *Exec* call. You might try a machine code auto program (in the auto folder) that, from drive A, executes the file in drive B's auto folder. I'm not too sure how this would affect the protection on disc B. It shouldn't make any difference but some protections are strange (to say the least) so it might.

From a hardware point of view, swapping over the drive select lines should do the trick but it would invalidate your warranty since drive A is internal as is its select line. It is unusual for software to be distributed in double density since all ST drives read single density discs. I don't know of any available hardware to solve the problem so it looks like, unless the first suggestion works, you're stuck.

Memotech: a letter missing

M J Burrows of Warrington, Cheshire, writes:

Q I have read letters in your magazine, from various people praising the Memotech MTX 512 computer and so, when the price of these machines recently fell to £40.00, I decided to order one.

The machine duly arrived and on unpacking, I was very impressed by the appearance, the keyboard, and the plethora of sockets on the back.

After a quick flick through the manual, I powered up the machine to see what it could do. I was a bit perturbed to see that the 'R' of the ready was missing and after entering on of the short demo programs in the manual, was even more perturbed to see that the first character of every line number was missing. Also, when printing to the screen, the first character on every line was lost.

At this stage I rang the supplier thinking that there was something radically wrong, only to be told that 'it was a quirk of the machine' and that most software has been 'designed to overcome this problem'. A chess program was included in which the first character of every line of every instruction screen was lost. Obviously not designed to overcome this 'quirk'.

Can you tell me if this is a problem experienced by all Memotech owners, or is mine a very early issue machine, hence the low price, while later models having been corrected. Can any adjustment be made?

I would be very disappointed had I paid the full price asked when these computers were first introduced.

Having said all that, it still seems an impressive machine, especially for the current price, despite the 'quirk' (I own a Spectrum as well). Could you please print the address of the MTX users group?

A I am no expert on MTX machines so, I can't be of much help. However, it may sound silly, but have you tried adjusting the horizontal screen position of the picture? On a TV, this is usually a control at the back somewhere, and most monitors also have a similar adjustment. If this is not the fault then could any MTX user who knows a fix, let me know?

An MTX user group can be reached by sending an SAE to: Phil Eyres, 23 Denmead Road, Harefield, Southampton SO23 5GS.

Double density on Amstrad

D J Parry, of Norwich, Norfolk, writes:

Q I have an Amstrad 8512. Is it all right to use ordinary CF2 discs in the bottom drive of my computer? Previously I have used CF2 DD discs, but these are expensive and if it is OK to use the others it would be cheaper. Are CF2 discs more likely to get corrupted than CF2 DD discs?

A The only real difference between single and double density discs is that the latter are tested and certified to be double density. However, both types have similar disc material, and since you have to make back up copies, using single density discs in a double density drive should not cause too many problems.

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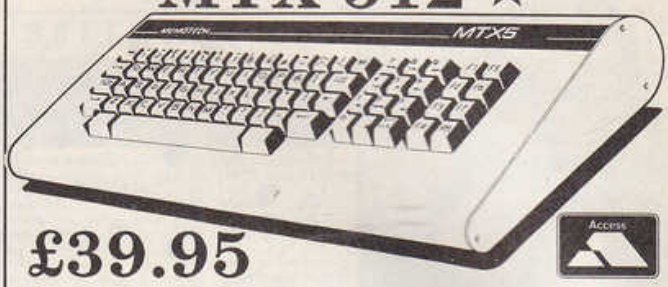

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THE MUSIC OF MANY MICROS

Mark Jenkins reviews packages from the American company Sonus, for the Commodore and Apple ranges, IBM PC and compatibles, and the Atari ST.

This week we're looking at a whole new range of software which is being imported into the UK for the first time.

The packages all come from Sonus, an American company which has been working in the music software field for a couple of years now. At first concentrating on the Commodore 64 and Commodore 128, they've now branched out with packages for the Apple (IIe, II+, MacIntosh and GS versions), Atari ST and IBM PC compatibles. The range covers everything from sequencers to Midi event editors, sound editors and more exotic applications such as drum pattern librarians, and is backed up with an extensive selection of hardware which should allow anyone's micro to go Midi.

Sonus' pride and joy is the *Super Sequencer*, available for the C64/128 and Apple IIe/GS. The Commodore versions both use all the available memory on their respective micros, which should give pretty impressive note capacity, particularly in the case of the C128 version.

Super Sequencer includes a storage routine for MIDI System Exclusive data, so it can also be used for saving, for instance, entire banks of DX sounds. The basic screen layout resembles a multitrack tape recorder and mixer; fast forward and reverse, mute and unmute and punch in/out, with assignable velocity, channel and name for each track are all there.

Editing routines allow individual sequences to be time-shifted and you can delete pitch wheel, modulation or patch change information. The software's also capable of treating movements of a synth's modulation wheel as volume data, so on a suitably equipped selection of synths you could create an automated mixdown.

Individual sequencers can be arranged into a song, with short sections or the whole song capable of being transposed to a different key. 24 sections can be used and each of these can contain a sequence repeated up to nine times (not a very meaningful figure musically, but there you are). Four complete songs can be held in memory at any one time, and a Captive Play Thru function allows you to control any

connected Midi synth while you're programming via the sequencer package.

Glass Tracks is a budget sequencer for the C64/128 and Apple IIe/II+/GS which will allow you to record, erase and transpose sequences, set Midi channel assignment and velocity, auto correct and store eight sequences on eight tracks. Demo songs from classical, rock and other styles are included.

Midi Processor is an editing package which allows you to alter individual Midi events stored in Super Sequencer files. It will allow you to de-merge information which has been combined onto a single track, and should be useful for tidying up your more spontaneous performances.

MidiTech 64 is a "Universal System Exclusive Librarian" which will store patches from any synth capable of dumping them – dump requests for the CZ101, RX11, DX/TX, FB01, Korg Poly 600 and LinnDrum are included, but you can create any dump request needed as long as the necessary codes are included in your instrument's handbook.

The DX/TX Double Banked Librarian/Programmer will edit sounds for two DX synths simultaneously and will store them on disc for fast recall. Performance memories are saved too, and 320 new sounds are included on the disc. The package will allow you to program and play a TX7 without a DX7 being present, but is not as yet compatible with the DX7MkII. Again, it's available for the C64/128 and Applelle/GS. A similar RX Librarian exists for the RX11 and RX21 drum machines, while the FB01 Design package will allow you to create and store new sounds for the FB01 FM synth module.

Sonic Editor is a sound creation and editing package for the Ensoniq Mirage and the Sequential Prophet 2000, which gives graphic waveform displays and allows you to create loops and trim samples for the best possible results. You can set all available parameters including filter and detune levels, and a joystick or paddles can be used to edit sounds. A library of useful basic waveforms is provided and these can be added together to create octaves and fifths. Sets of 78 sounds can be saved to disc, and waveform displays can be printed out.

Sonic Editor is available on the 520ST/1040ST, whereas the Casio CZ Programmer/Librarian and Design *Sound Disc* are only available for the C64/128. To make things even more confusing, the Masterpiece sequencer is available only on the ST and the MacIntosh; this is a pro-level package with 32 channels, event editing, Song Pointers and, on the ST's, an optional "Super Score" package for music transcription.

The ST packages, of course, require no interface card, but Sonus manufacture hardware Midi interfaces for the C64/128 and for the PC, which runs its Personal Musician, DX Editor and DX Design programs. The Commodore/Apple interface has one In and Two Outs with or without tape sync, while the Mac interface has 2 Ins and six Out/Thrus, and the more professional user may want a SMPTE/MIDI Time Code interface or even an MM90 Intelligent Midi Router as well.

Over the coming weeks we'll be reviewing some of these products in more detail. In the meantime, you can contact Sonus for a catalogue and price list at PO Box 18, Wokingham, Berkshire RG11 4BP (0734 792699).

IT'S BIGGER AND IT'S BETTER IN THE USA

Paul Fletcher takes a look at the differences between British and American bulletin boards and tells you how to get in touch with some of the more interesting competitors on the other side of the ocean.

Going back to the roots of computer communications, this week we'll take a look at the US communications world.

The most noticeable difference between US and UK bulletin boards is, as usual, size. There are over 200 bulletin boards that have in excess of 250Mb on line, while a typical large UK equivalent comprises about 70Mb, most of the boards offer an off line library as well. Another major difference is in the speed of the modems used, there are a large number of boards running at speeds of up to 9600 baud, and quite a few running at 19·2K baud.

To my knowledge, the largest board in the US is Nautilus (0101 316 365 7631). Having two laser discs on line, it offers the complete 17,000 program PD Sig library online, together with a host of other information, in total a massive 1·6 gigabytes of downloadable data. The whole of the Nautilus program database can be searched keywords, and you can locate a particular type of program within seconds. This is in my opinion the ultimate software distribution system.

Nautilus has multiple lines, it is also completely free, you only pay the cost of the phone call between the hours of 8 pm and 8 am it costs around £32.00 per hour to dial the US direct, at current British Telecom and Mercury charges.

There are several other interesting developments in the US Bulletin Board world, one of the amusing being Ansi Music. This uses a series of codes to transmit tone commands to your computer. However, your software must be capable of handling these commands.

Ansi Music can be found on several boards, including Paul Waldinger's Sound of Music board (0101 516 536 8723), which has over a dozen file areas, six conferences, and three lines.

The Sound of Music Bulletin Board has a musical introduction, and a musical exit. There are also a lot of very good graphics programs, many of which are not in the UK yet. Paul Waldinger is one of the friendliest sysops I have ever come across, and grants special access to international callers on receipt of a postcard.

Sound of Music uses PC Board as its host software, this being arguably the most flexible bulletin board software available for the PC. A full list of BBs using PC Board is available on the Brown Bag board (0279 74855/6), which is, I think, the only PC Board BB running in the UK at present.

Running under Double DOS, PC Board can cope with two users on a single PC, it also supports multiple conferences, each of which can be set to operate as a mini-board in its own right. In addition to these features it also offers DOORS, this allows a caller to access DOS applications. This is an ideal way for non-PC users to access and run PC board software.

"The largest board in the US is Nautilus. Having two laser discs on line, it offers the complete 17,000 PD Sig library on line"

Another interesting feature of most US boards, is their support of the EGA card. Most of them have a file area for EGA programs, until the launch of the Amstrad 1640 PC, this has not been important for most UK PC users, but with the availability of low-cost EGA systems, this could change soon.

One thing that rapidly becomes apparent is that the UK user groups, and PD 'distributors' are really out of touch with latest software. There are new developments daily, and to keep on top of things you really do need to keep in touch.

Below, I've listed 10 US bulletin boards which I've particularly liked and think are worth trying out.

1 Sound of Music (0101 516 536 8723) Graphics, sound
2 Nautilus (0101 316 365 7631) Sheer size of system
3 Token Ring (0101 201 546 1468) Range of software
4 Fountain Head (0101 801 261 8974) Range of software
5 Hi Res BBs (0101 312 279 1053) Graphics
6 Computer Playroom (0101 312 279 1053) Games
7 Sparta (0101 201 729 7056) Hard disk utilities
8 Players Network (0101 205 854 4694) Games doors
9 Trolls Cave (0101 615 242 7909) Atari ST
10 River City (0101 219 287 3358) Amiga

On a slightly more commercial scale there are several boards operated by companies as support lines for their products, even those whose products are not shareware. Also there are some people who charge a subscription fee for a years use of service, there are a few people in the UK who also operate this type of system.

In the real commercial world, there are several major services including Compuserve, The Source, BIX and MCI. In brief, Compuserve is similar to Prestel and Telecom Gold, but far more varied and advanced. The range of services and information available is far superior to any UK based service, and with a London dial access mode it is well worth subscribing to.

The Source is another information service, which although not as powerful as Compuserve, is still fascinating to look through. BIX is the Byte Information Exchange, a multi-conferencing system run by the American magazine *Byte*. It is quite expensive to use, but you can get a great deal of good quality advice from it. MCI is a mail service, pure and simple, and in my opinion one of the best electronic mail services world wide.

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Program *Athena* **Type** Arcade **Price** £8.95 tape, £14.95 disc **Supplier** Imagine, 6 Central Street, Manchester M2 5NS.

Program *Joe Blade* **Type** Arcade **Price** £1.99 **Supplier** Players, Callera Park, Aldermaston, Berks RG7 4QW.

Program *Lucasfilm 4* **Type** Arcade compilation **Price** £9.99 tape, £14.99 disc **Supplier** Activision, 23 Pond Street, Hampstead, London NW3 2PN.

Collection of Lucasfilm's four games using fractal graphics, which, if I remember correctly, were supposed to make the industry gasp in awe.

The pack comprises *Rescue on Fractalus, Ballblazer, Koronis Rift* and *The Eidolon*, all pretty good games in their own right. A welcome addition to the compilation field.

Atari ST

Program *Cyber Studio* **Type** Graphics system **Price** £89.95 **Supplier** Electric Distribution, 8 Green Street, Willingham, Cambridge CB4 5JA.

Package licensed from US company Antic, comprising *CAD 3D 2* and *Cybermate*.

CAD 3D is a graphics system, *Cybermate* an animation program which will move, rotate and view from any perspective images created with *CAD 3D*.

Intended for use in product design and scientific models rather than as an alternative to *Degas*.

Program *Autoduel* **Type** Arcade/racing **Price** £24.95 **Supplier** Origins, 2 Market Place, Tetbury, Gloucs.

Program *Championship Baseball* **Type** Simulation **Price** £24.95 **Supplier** Activision, 23 Pond Street, Hampstead, London NW3 2PN.

Program *TNT* **Type** Arcade **Price** £24.95 **Supplier** Infogrames, Mitre House, Abbey Road, Enfield, Middlesex.

Version of *Commando* on the ST with full screen scrolling. Excellent graphics in pretty pastels and subtle shades.

Commodore 64

Program *Death Wish 3* **Type** Arcade **Price** £9.99 tape, £14.99 disc **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

See panel for comment.

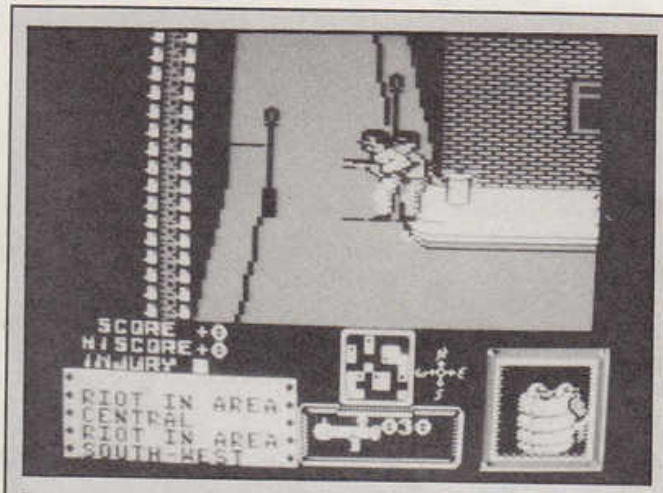
Program *Athena* **Type** Arcade **Price** £8.95 tape, £12.95 disc **Supplier** Imagine, 6 Central Street, Manchester M2 5NS.

Program *Last Mission* **Type** Arcade **Price** £9.99 tape, £14.99 disc **Supplier** US Gold, Units 2 and 3, Holford Way, Holford, Birmingham B6 7AX.

Program *Centurions* **Type** Arcade **Price** £8.99 tape, £14.99 disc **Supplier** Reaktor, 68 Long Acre, London WC2E 9JH.

Program *Lucasfilm 4* **Type** Arcade compilation **Price** £9.99 tape, £14.99 disc **Supplier** Activision, 23 Pond Street, Hampstead, London NW3 2PN.

See Amstrad CPCs for comment.



Law and order has collapsed, vicious gangs roam the streets terrorising the populace. There's only one man who can rid New York of the scum, Paul Kersey, the ageing vigilante, played so listlessly by Charles Bronson in the film *Death Wish 3*.

This time you play the role of Kersey in Gremlin's computer version of the film, and are charged with gunning down all the worthless trash on the streets. The main target for your magnum, pump action shotgun, machine gun or rocket launcher though, are the gang leaders who lounge inside the buildings.

The action is presented sideways on, with gun fodder running on from either side, which presents problems when moving around in a three dimensional environment. Instead of having roads that lead straight up the screen you change your orientation so that even if you are now facing north you still run from side to side in an east-west direction. Not a good system, compounded by the squidgy little map and compass.

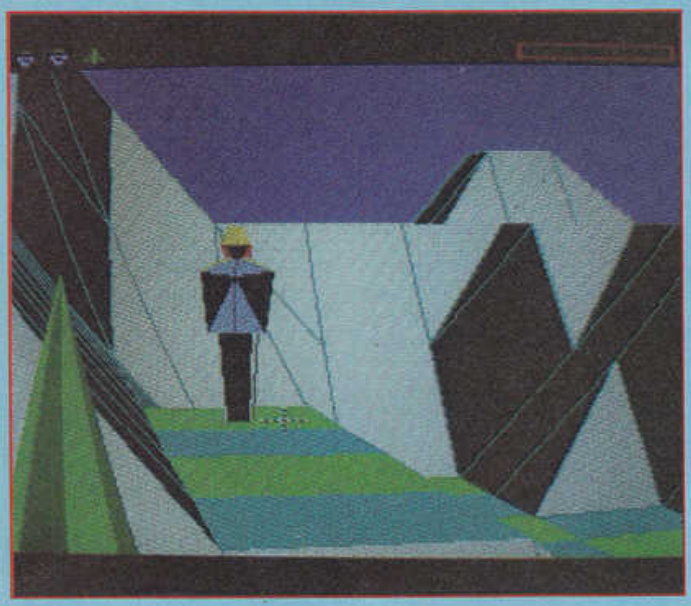
The main thrill in this game is, of course, the mindless violence. The rocket launcher, which blows people up and leaves a pool of their bits on the floor, is particularly impressive, the sound effects don't match the action. There's nothing that sounds remotely like a gun and there isn't even any squealing from the victims when they're being blown away.

Possibly the most tasteless aspect of this very tasteless game, are the hookers who wander on screen, pause, then lift their skirts and scratch their bottoms.

It's true to say that the game is a faithful interpretation of the film. After 15 minutes the gratuitous cartoon violence rapidly pales leaving only a weak and plotless excuse for entertainment.

Duncan Evans

Program *Death Wish 3* **Type** Arcade **Price** £7.99 Spectrum, MSX £9.99 tape, £14.99 disc Commodore and Amstrad CPC **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.



The watcher on the shore

Sentinel is one of the few games out this year which can make some sort of claim to originality. Like many games that offer something different and don't fall into a recognised category, it has attracted fanatical devotees and those utterly immune to its appeal in about equal quantities.

Released on the Firebird Gold label, it's due out on the Atari ST in October.

Sentinel is based on a set of landscapes over which the sentinel itself is constantly watching. The sentinel rotates and when its beam catches you it will begin absorbing your energy, until you have none left and you die.

That energy is created by absorbing trees (if this sounds surreal, I make no apologies, it is surreal) synthoids and boulders.

Your task is primarily to stay alive, escaping from the sentinel's beam and creating as much energy for yourself as you can. Ultimately, the idea is to absorb the sentinel itself and any of the sentinel's sentries you come across.

The game has nothing to do with fast all-out action, and much to do with tactics, and logical thinking.

As you can see from the screen shot, the Atari ST *Sentinel* uses near identical graphics to the 8-bit versions. Sound effects, too, remain much the same. This is a straight conversion, rather than a souped-up enhancement designed to stretch the ST to its technical limits.

However, there is one major difference which helps considerably once you've got going. Pressing the Help key while your cursor points at the sky will give you a bird's eye view of the current landscape.

Sentinel may well be a slow starter, even an acquired taste, but it provides a refreshing change form all those Rambo playalikes and pixies.

Christina Erskine

Program *Sentinel* **Micro** Atari ST, available October **Price** £19.95 **Supplier** Firebird, 74 New Oxford Street, London WC1.

Reaching for the skies

Odd company, Cascade. Their original *ACE* was one of the best combat flight simulators for the Commodore 64, and was followed by the unusual *Skyrunner*, which I liked but apparently no-one else did.

Now comes *ACE 2* and, unfortunately, I'm the "no-one else" this time. I don't like it.

The game is set up as a two-player air-to-air combat game – simulator seems like too strong a word for it – but it includes the essential option of playing against the computer.

And here lies the first and most irritating problem. *ACE 2* supposedly allows you to set any of 20 skill levels for the computer but I found this ranged from dying immediately, to dying almost immediately.

Most of this difficulty arises from the crude simulation and lack of controls. For example, although my computers were telling me that the enemy aircraft was out of range, I was being peppered by its heat-seeking missiles.

If our boys are facing the enemy in planes like this a) they're not being paid enough, and b) we're in big trouble if the Luxembourg airforce decides to take us on.

There are no landings or take-offs, no flap control, no undercarriage to worry about, which makes for a lousy flight sim but actually makes little difference since you have no time to worry about anything except the missiles screaming at you.

There are two scenarios in which you either take on another plane, or try the longer mission which involves killing the other plane then knocking out a ground installation. I can't tell you what the ground installation is like because I never lived long enough.

The graphics are poor; a plain slab of dark blue for the sea, a plain slab of light blue for the sky, and a plain slab of yellow for the land.

The game plays reasonably well as a two-player game, and to give a little credit where it's due, it is a much better game than the appalling *Top Gun* licence.

However, it suffers the usual fault of two-player games in that single-player versions rarely work well.

Real fans of flight simulation will scorn it.

Peter Worlock

Program *ACE 2* **Type** Arcade **Price** £14.95 disc, £9.95 cassette **Supplier** Cascade, 1–3 Haywra Crescent, Harrogate HG1 5BG.

Program *ACE 2* **Type** Flight simulation **Price** £9.95 tape, £14.95 disc **Supplier** Cascade Games, Harrogate, N Yorks

See page 42 for comment.

Program *Implosion* **Type** Arcade **Price** £9.95 tape, £14.95 disc **Supplier** Cascade Games, Harrogate, N Yorks

Implosion has been produced by Cascade in association with US company Mindscape, which has been bringing out some pretty nifty titles over the last six months or so.

This is a multi-screen, multi-colour, multi-sound, multi-scrolling shoot 'em up.

Program *Classix 1* **Type** Compilation **Price** £9.99 tape, £14.99 disc **Supplier** The Edge, 36–38 Southampton Street, London WC2E 7HE.

Latest in the currently fashionable compilation stakes is The Edge's *Classix*, featuring *Bobby Bearing, Brian Bloodaxe, Quo Vadis, Wizardry* and *Firequest*.

Commodore Amiga

Program *Super Huey* **Type** Arcade **Price** £19.99 **Supplier** US Gold, Units 2 and 3, Holford Way, Holford, Birmingham B6 7AX.

Super Huey is now available on the widest range of machines possible, from the forthcoming games consoles up to the Amiga. It sits most happily at the gamesy end of the market.

Program *Hardball* **Type** Simulation **Price** £24.95 **Supplier** US Gold, Units 2 and 3, Holford Way, Holford, Birmingham B6 7AX.

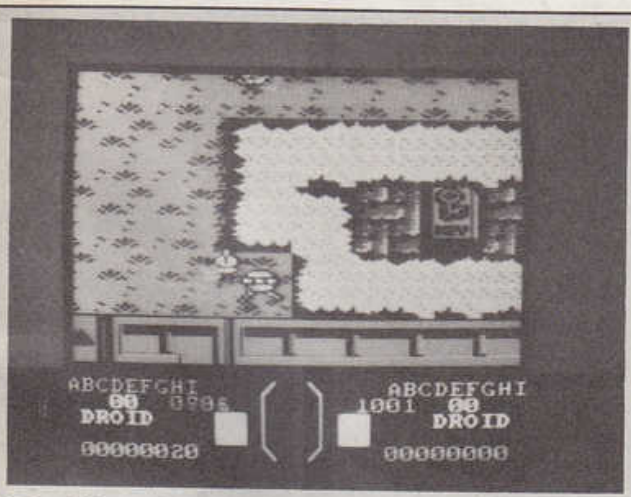
IBM PCs and compatibles

Programs *Shogun* **Type** Arcade adventure **Price** £19.95 **Supplier** Virgin Games, 2 Vernon Yard, Portobello Road, London W11.

Game based on James Clavell's book of the same name, based in the Japan of 1600, and already available on CPCs and Commodore 64.

Shogun is a neat example of what might be termed the old fashioned arcade adventure.

Choose a character to play from a cast of aristocrats, peasants, samurai warriors, priests, bandits, or Blackthorne, hero of the book. Re-



Combine a Saturday morning cartoon, *Druid* and the extra weapon aspect of *Nemesis* and what is the result? *Centurions*, the latest Ariolasoft offering on the Reaktor label.

The game plan, for what it's worth, let's you assume the role of any of the three centurions, which you must guide through land, air and sea in a bid to stop Doc Terror from stealing cases of some nasty chemical. To do this you must find the various block keys that let you into certain regions of the complex.

Once in you are supposed to hunt down the six pieces of the master key that will let you exit to the next building, of which there are three.

Additional interest is supplied by the extra weapons you can gain by blasting lots of the monsters (?!) that are suddenly running around, and the provision for having an extra player on screen simultaneously.

So far so bad. In play the sprite detection is laughable, the sound effects could have been done on a Peruvian nose flute, the scrolling on a reduced screen is jerky and uneven and the whole affair is unoriginal and uninteresting.

Duncan Evans

Program *Centurions* **Type** Arcade **Price** £8.99 (tape), £14.99 (disc) **Micro** Amstrad CPC (reviewed) **Supplier** Reaktor, 68 Long Acre, London WC2E.

'Whaddya mean, you sold the last copy?'

No doubt about it . . . bulging eyes, flaring nostrils, face contorted in rage, literally smouldering with frustration.

Another ordinary ST user has missed out on *ST Update*.

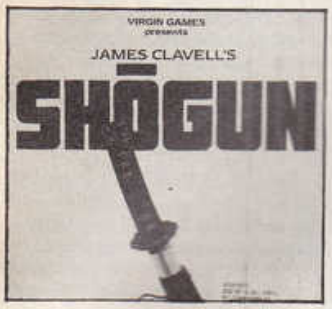
Trouble is, in its first few months *ST Update* has been a monstrous success. There's simply no way you can be sure that there'll be a copy for you, unless you order one today.

It's too late after the event. Tearing your newsagent's arm off and beating him to death isn't going to help.

Save yourself the anguish. Just ask him nicely to keep your copy safe each month.

cruit followers, collect objects, get instructions from Buddha regarding your quest.

It's all very competently done, and you never know, PC owners may be crying out for this sort of thing.



MSX

Program *Death Wish 3* **Type** Arcade **Price** £7.99 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

See panel for comment.

Program *Ace of Aces* **Type** Arcade/simulation **Price** £8.95 **Supplier** US Gold, Units 2 and 3, Holford Way, Holford, Birmingham B6 7AX.

Spectrum

Program *Mask* **Type** Arcade **Price** £7.99 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

Program *Death Wish 3* **Type** Arcade **Price** £7.99 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

See panel for comment.

Progam *Centurions* **Type** Arcade **Price** £8.99 **Supplier** Reaktor, 68 Long Acre, London WC2E 9JH.

Program *Lucasfilm 4* **Type** Arcade compilation **Price** £9.99 **Supplier** Activision, 23 Pond Street, Hampstead, London NW3 2PN.

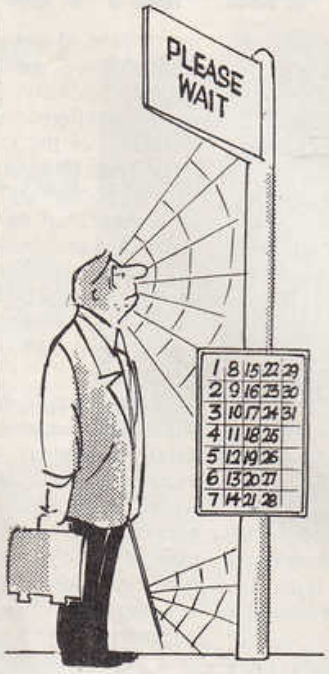
See Amstrad CPCs for comment.

CHARTS

Top Twenty

1	(5)	Milk Race	Mastertronic
2	(2)	BMX Simulator	Code Masters
3	(1)	Paperboy	Elite
4	(15)	Road Runner	US Gold
5	(-)	Exolon	Hewson
6	(7)	Barbarian	Palace
7	(3)	Run for Gold	Alternative
8	(20)	Destructo	Bulldog
9	(-)	Cricket International	Alternative
10	(10)	The Last Ninja	System 3
11	(4)	World Class Leaderboard	Access/US Gold
12	(11)	I Ball	Firebird
13	(19)	Living Daylights	Domark
14	(6)	Gauntlet	US Gold
15	(8)	Four Great Games	Microvalue
16	(-)	Ninja Master	Firebird
17	(-)	Eddie Kidd's Jump Challenge	Ricochet
18	(-)	Nick Faldo's Open Golf	Bug Byte
19	(-)	Tournament Leaderboard	Access/US Gold
20	(9)	Game Over	Imagine

All figures compiled by Gallup/Computer Trade Weekly



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COMING SOON

MANUAL LABOUR

"People", observes a user manual in its introduction, "use words and expressions to convey meaning. Computers, however, convey meaning through an ordinary television set or special printer."

Leaving aside the thought that computers also use words (ie 16 bits) and expressions, this obvious nonsense is at once both patronising and confusing. Could it be that these sentences are really almost meaningless, or are we meant to divine some deep philosophical symbolism? Those who think they understand them must possess such dangerously illogical minds that even modest computer literacy is likely to be utterly beyone them. Nevertheless, they may well be able to help me to understand the following vital information concerning the QL's *Keyrow* command; "There can be two keys in any row or there can be two keys in any column but there must not be two keys which share neither a row nor a column".

Now, computers are in fact relatively easy to understand; they have a limited vocabulary of around 200 words, they become petulant when the words are not used in accordance with strict rules of grammar, and they always do exactly what they are told even though it might not be quite what was intended. The role of a computer manual is to make all this clear to the user and to explain the vocabulary and the grammar.

The standard of computer instruction manuals is, apart from a very few honourable exceptions, disgraceful. The first bar to computer literacy is supposed to be the archaic QWERTY keyboard. But even before that bridge is crossed many otherwise enthusiastic and intelligent people throw themselves into the river convinced that computers are beyond them because they opening sentences of the manual were incomprehensible.

Software instructions are little better. A well-known sprite utility gives programmers the options of freezing, killing or dumping sprites without explaining what these powerful (and possibly fatal) activities are and what the differences between them might be. Some of the best manuals are those which have totally abandoned any link with reality. "Some murky distant planet orbiting an ancient sun had given birth to a supremely malevolent and extremely intelligent Cyborg: the Chessplayer" reveals the inlay of a perfectly humdrum chess program. Given its intelligence, it is a shame the Cyborg didn't offer to write the instructions.

All this leads to one conclusion: writing a computer manual is not easy. On the one hand, all relevant information has to be included for the benefit of the novitiate whilst on the other hand competent users should not be patronised. In addition, the manual must be both textbook and reference book: anyone who has tried to learn a language by reading a dictionary or checked a word's spelling by looking for it in a novel will appreciate the problems. Some people learn by example, others learn by practice, yet others learn just by reading descriptions, and all must be catered for by the same few thousand words of text.

Unfortunately, however, manuals are rarely written by journalists or teachers who might have some insight into these matters. They are written by programmers or firmware designers whose levels of English literacy are usually somewhat short of their computing skills. As a result, the excellence of their primary work is impaired by the shoddy quality of the guide which is meant to encourage and instruct (and entertain) the user. Meanwhile, authors continue to sell books which merely translate manuals into readable English.

Having had my grouse, I shall return to the instructions accompanying my new peripheral. In particular, I am advised that I must be cautious to the printer during its operation . . .

Mike Lloyd

Puzzle No 271

One of the Labours of Hercules that has not been so far documented is as follows:

On a circular track, 1,000 metres in circumference, were placed 1,000 small stones equally spaced along the track at one metre intervals. Starting at one of these stones, Hercules was required to collect up all of the stones in the following manner. He was to pass over nine stones and then pick up the tenth, continuing in this way until he had picked all of them.

He would, of course, circle the track many times, and as the stones were collected he would find that he would need to run further to pass over the nine stones as required.

For example, the first stone that he collected would require him to travel just ten metres, but before being able to pick up the final stone at the end of his task, he would need to circle the track many times in order to pass over this stone the required nine times before being allowed to pick it up.

Can you determine the total distance that he must run in order to complete his task?

Solution to Puzzle No 266

Of the 999 tickets in the lucky dip, 73 of them would result in a win. This is approximately equ to one chance in 13.685. Had the total been 13 14, the number of winning chances would have increased to 75 out of 999.

By taking each of the 999 values in turn, the program converts each number to a string variable and then sums the digits together (lines 140 to 170). Two variables are used to keep the score, WIN or LOSE. If the digital total is equal to 15 the variable WIN is incremented by one, otherwise LOSE is incremented. An array Z( ) is also used to keep a check on the frequency with which each of the digital sums occurs (line 190). By listing out this array, the most favourable winning scores can be determined.

Winner of Puzzle No 266

This week's winner is M A Hall, of Mitcham, Surrey, who will receive £10.

Rules

The closing date for Puzzle 271 is September 9.

```
100 DIM Z(27)
110 WIN=0:LOSE=0
120 FOR N=1 TO 999
130 N$=STR$(N)
140 T=0
150 FOR F=1 TO LEN(N$)
160 T=T+VAL(MID$(N$,F,1))
170 NEXT
180 PRINT N,T
190 Z(T)=Z(T)+1
200 IF T=15 THEN WIN=WIN+1 ELSE LOSE=LOSE+1
210 NEXT
220 PRINT WIN,LOSE
230 FOR F=1 TO 27:PRINT F,Z(F):NEXT
```

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1 SPREADSHEET

VIP Professional was modelled after the powerful, best selling Lotus 1-2-3™ program. It has every feature, every command of that program. In fact, the experienced 1-2-3™ user will feel right at home using the same keystrokes. But this version is made even easier to use by adding the user friendly face of GEM, so the beginner can use it right away. If you want to do your home budgets, financial planning, or sophisticated business inventory control or budget modelling, VIP Professional will fit the bill. And you can freely use 1-2-3™ or VIP Professional files created on other computers in VIP Professional on your Atari ST. And Professional is not only flexible, it's powerful too, with a full 8,192 row by 256 column worksheet to use with up to a massive 4Mb of memory. (Note: Lotus 1-2-3™ has only 2,048 rows).

2 DATABASE

VIP Professional includes a powerful data manager to arrange, store and analyse your important information. It can be used to store your home or business records and do extensive searches, sorts and comparisons. It allows up to 8192 records, with up to 256 fields and queries and 256 search criteria. The database manager can be used in conjunction with the spreadsheet commands to add greater power to the database facilities including sorting specific ranges of the database. You can also specify how you sort files, from the highest value to the lowest value (or from the lowest to the highest), or alphabetically (forwards or backwards). The graphics part of VIP Professional can be used to show trends in the database or other information. With its powerful statistical functions, it has almost limitless power.

3 GRAPHICS

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- VIP supports greater memory and larger spreadsheets than Lotus 1-2-3™.
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- VIP can accept any .WKS files from Lotus 1-2-3™ without modification.
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The official UK version of VIP Professional has a pound (£) sign as a standard part of its character set. Other versions have also been imported unofficially from the USA and have a dollar ($) sign instead of a £ sign. These versions will not be supported by the UK distributors or their dealers. Ensure that the VIP you buy is the official UK version, not an unofficial import with incorrect characters.

Professional is available from Atari ST Dealers throughout the UK. If your local dealer not have VIP in stock, it can be obtained by mail order (P&P free) from:

ICA SHOP Ltd, 1-4 The Mews, Hatherley Road, cup, Kent, DA14 4DX **Tel: 01-309 1111**

parisons made to Lotus 1-2-3™ are to version 1A. E&OE

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