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POPULAR Computing WEEKLY

Only 50p.

11-17 December 1986

Vol 5 No 50

MikroGen sells out to Creative Sparks

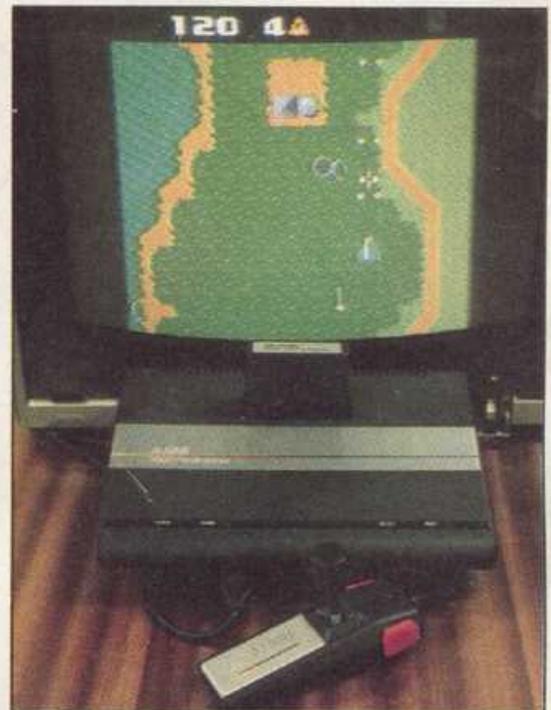
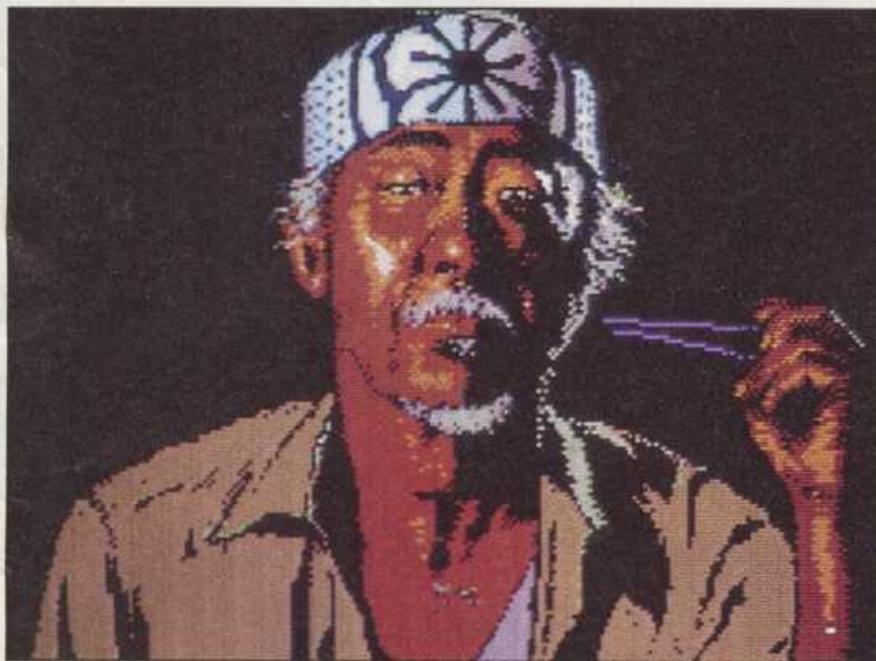
Full story - p4

NEWS DESK

Ocean in transatlantic link with Mindscape?

Atari beefs up software support service

Problems with Plus 2 screen editor



THIS WEEK'S REVIEWS

Microdeal's Karate Kid II (above)
- martial arts on the Atari ST

Star Glider on Amstrad CPCs

Gremlin's Footballer of the Year

Atari returns to its roots: the
7800 games console (right)



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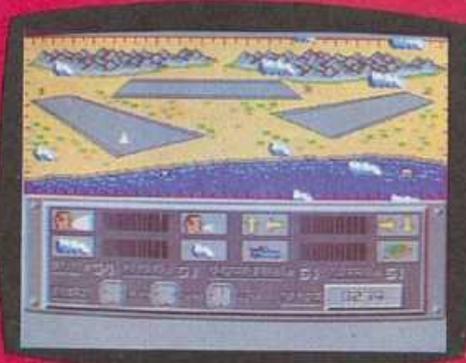
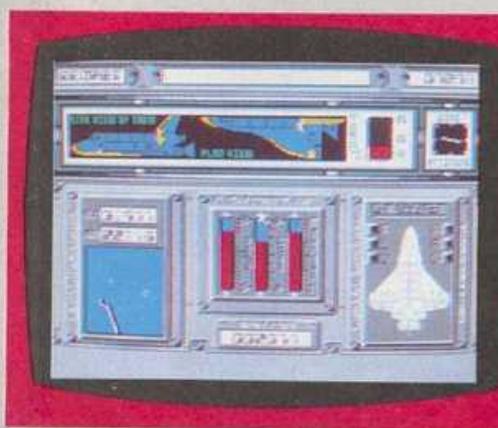
STIMULATION

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This is not just another Karate game. This is the game of the film. Guide Daniel through fight after fight against ever more powerful adversaries. Then face the evil Chozen himself in the Castle of King Shohashi, where you must discover the secret of the drum - or die! But the fighting isn't all. Catch flies with chopsticks and break ice with your bare hand in full-size, animated graphic screens. Daniel LaRusso faced the challenge. The boy became a man. The man became a hero. What will you do? AVAILABLE LATE NOVEMBER - £24.95* colour only.

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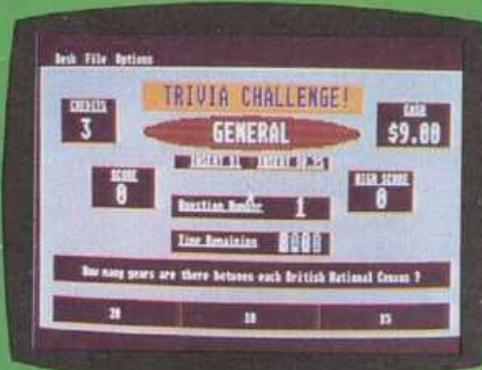
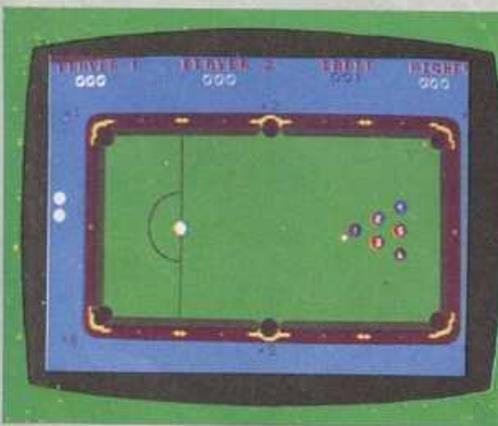
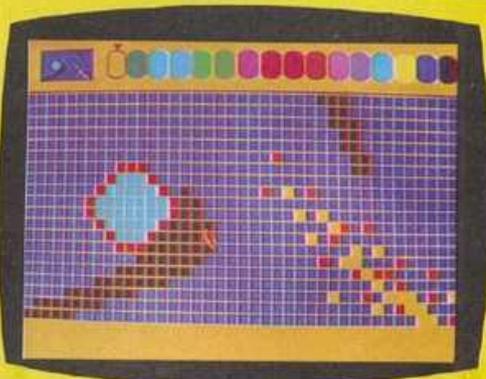
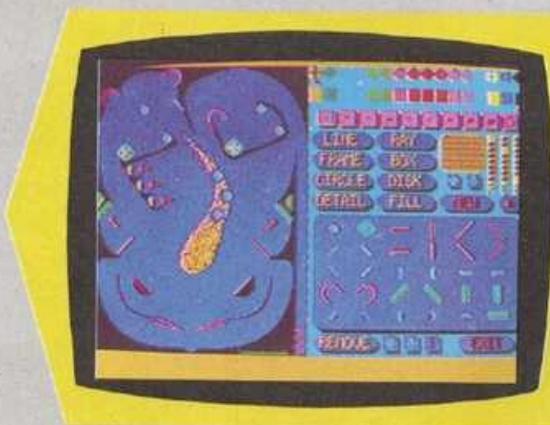
STAGGERING

PINBALL FACTORY

PINBALL comes to life with this new arcade game. PINBALL has never been so realistic or so creative. First join the staff of the Pinball Factory - take an empty play area and design the background graphics choosing colours that the ball won't bounce off - the art package will let you design each screen pixel if you want that sort of definition. Next design your own playing board with 30 different bumpers and ball traps to position it's no easy task. Now test the game and change the design to improve the play - are you satisfied with the play area? then switch to the Logo design department, here you can design your own logo with the full art package included in the program. All finished? not yet! set the scoring, gravity, ball speed and elasticity then play the best game of Pinball you've ever played! crisp graphics, sound and fast action. Mouse controls let you 'bump' the machine just like a real pinball machine and 'Flip' the flippers. Now remember to save your customized game to disk. You can decide what's more fun - designing or playing?

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STUNNING



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STRIKING

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STUPEFYING

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HARDWARE ▶

15 Atari 7800

First of Atari's new launches to appear next year will be the re-

vamped games console, the 7800. In our preview, we look at its capabilities and some of the software available for it.

HELVETICA MEDIUM ITALIC
SANS SERIF SHADED
HELVETICA LIGHT ITALIC
MICROGRAMMA EXTENDED
HELVETICA (LARGE)
BODONI (LARGE)

17 PCW Fonts

Dissatisfied with the look of PCW printouts? David Wallin compares

◀ SOFTWARE

four font programs, each giving you a number of typefaces with which to print your documents.

GAMES ▶

18 Adventure Corner

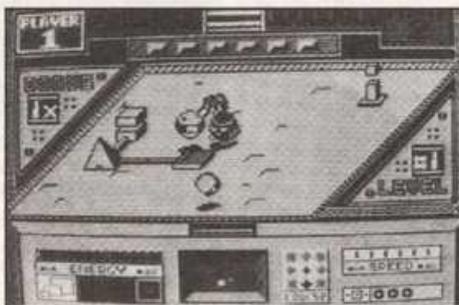
19 Adventure Help

20 Arcade Action

Lots of help with *Strike Force Cobra*, plus this week's Top Twenty.

23 Karate Kid II

Is this the game of the film or the film itself? Difficult to tell with the superb



graphics in Microdeal's new ST game. See for yourselves in full colour.

24 Reviews

Wargaming with Rainbird's *Tracker*, a game of two halves with Gremlin's *Footballer of the Year*, bouncing in space with *Orbix the Terrorball* from Domark - a varied selection to get your teeth into this week.

◀ PROGRAMMING

29 Spectrum

A neat error trapping routine brought to you by J Collins.

29 Amstrad CPC

The second and final part of *Sembler*.

30 QL

Format your printouts with the aid of this program.

30 BBC

Scroll through your memory, editing at will - from Mark Gidley.

31 Commodore

Fast loading with *Astro Load*.

36 Bytes and Pieces

39 Peek and Poke

REGULARS ▶

6 News Desk

Atari bids to expand software support.

12 Letters, Chess

40 Communications

David Wallin looks at the advantages

of electronic mail over the conventional post.

43 Chess

Martin Bryant's computer chess update discusses the advanced features of today's chess programs.

45 Soundcheck

More musical offerings for the ST, plus EMS from Gremlin Graphics for the Amstrad.

51 New Releases

54 Ziggurat, Hackers

Editor Christina Erskine News editor John Lettice Features editor John Cook Technical editor Duncan Evans Production editor Michelle Beauchamp Supplements editor Christopher Jenkins Supplements designer Barbora Hajek Advertisement and Promotions manager Simon Langston Assistant advertisement manager David Osen Advertisement executives Jon Beales, Rodney Woodley Classified executive Susannah King Editorial secretary Annmarie O'Dwyer Administration Geraldine Smyth 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. © Sunshine Publications Ltd 1986. ISSN 0265-0509

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ABC

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MikroGen is sold to distributor

MIKROGEN has been bought out by Creative Sparks Distribution for a sum which, although undisclosed, is substantial enough to make MikroGen managing director Mike Meek "very happy".

The Bracknell-based software house was one of the longest serving independent labels in the business, but is known to have been looking at ways to expand for the past year or so. The first option floated was a budget label, which didn't get off the ground, but Meek reveals that he's more recently been looking at tie-ins with other companies.

"We've got an operation that'll be very much better if we go with other people in the market." He claims that neither company made the first move, but that the deal arose from "various discus-

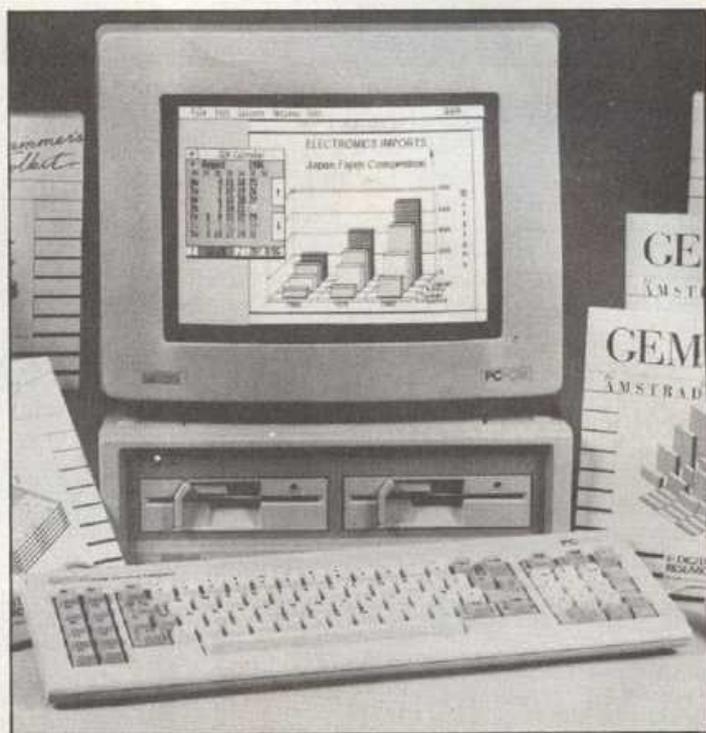
sions" about other matters he'd held with CSD managing director Henry Kitchen.

Meek also concedes that he'd been talking to other companies "although they weren't in this country," and he says that there was no urgency in the company getting more backing.

MikroGen will continue under the same management, the main change, according to Meek, being that it should be able to produce more products.

The takeover of MikroGen is just the latest in a series of expansion moves CSD has made since it was the subject of a management buyout last year.

The company now has a presence in book publishing, serious software, training and support, distribution and games software.



PC: Passed its exams

PC passes Poly test

AMSTRAD is claiming further evidence of its PC's reliability after 16 of the machines survived a month at Leicester Poly in what Amstrad describes as one of the PC's "toughest assignments yet".

The machines are claimed to have been running 12

hours a day, five days a week, both individually and networked, with no serious problems.

"If they continue to be so reliable and the price remains roughly the same, we'll certainly be buying more," said a Polytechnic spokesman.

Fraud over games

SOFTWARE buyers have been victims of another bogus mail order company.

Johnson Enterprises, operating from an address in Stoke-on-Trent, is now the subject of a fraud inquiry by Stoke CID.

A CID spokesman said that it appeared that there had been no software for sale. The company had simply taken customers' money with no intention of fulfilling the orders.

The premises in Stoke were an accommodation address, and the person responsible could be from anywhere in the country, the spokesman said.

Anyone who has lost money through dealing with Johnson Enterprises should report the matter to their local police station and ask them to contact the investigating officer at the County Police Office,

Sutherland Road, Longton, Stoke-on-Trent.

● *Popular Computing Weekly* would like to point out that there is no connection between Johnson Enterprises and Maros Computers Ltd of Market Street, Longton, Stoke-on-Trent.

Maros Computers has been very helpful in bringing to light the true state of affairs at Johnson Enterprises.

Atari bids for business

ATARI is aiming to break into the business market with its ST range, and has just signed up Merseyside IBM dealer Data Exchange as part of its campaign for next year.

The systems Atari plans to sell into business are the two and four megabyte STs, hard disc and the IBM co-processor which, according to Atari general manager Bob Gleadow, require "a new breed of

dealer," and it appears that Atari will be trying to differentiate between this hardware (which will now be available "early next year") and the current ST range.

"We plan to market them very aggressively and consequently need strong dealer support from companies like Data Exchange who are used to dealing with large corporations," says Gleadow.

Ocean in US tie-up?

THE success of British companies like Mastertronic and Firebird in selling budget software in the US has prompted US publisher Mindscape to join them with its Thunder Mountain range. The range will consist mainly of programs that have previously been published in the US and

Europe, with the first release being Ocean's Rambo.

Jon Woods of Ocean describes this as a "one-off deal," concedes that Ocean is talking to Mindscape, but won't say what these talks are about. "I don't talk until the ink is dry," he says.

Ocean is however well

placed for a tie-up with Mindscape. The British company has a substantial backlist of products that haven't so far been released in the US, and Mindscape intends to feature "strong character licences", something of a speciality of Ocean's in the new range.

Plus 2 hits problems with screen editor

PROBLEMS with the screen editor on Amstrad's new Spectrum Plus 2 are becoming apparent. The editor works fine with most listings, but the longer the listing in the computer's memory the more the editor slows down.

Effectively this means that Basic listings over around 300 lines are difficult to alter, as the editor appears to have to refer to the entire listing each time you enter a character.

So unless you wait two or three seconds between each

character you type in you'll find the machine loses most of your input.

The editor is basically a patch added on to Spectrum Basic when Sinclair launched the 128K Spectrum, so it's still possible to edit 48K listings by using the Plus 2 in 48K mode (although you'll have to remember where the keywords are).

As *Popular* went to press Amstrad said it was unaware of the problem, but said it would look at it if notified of it.

DR predicts Gem on a chip

DIGITAL Research is hailing the arrival of the Intel 82786 chip next spring as the saving of the PC standard. The IBM machine has traditionally fared badly against the likes of the Apple Macintosh because of its poor graphics handling, but the new chip, which DR says will initially be available as an upgrade card for PCs and compatibles, is set to change that.

The 82786 contains an internal graphic processor subsystem and a display proces-

sor as well as a dynamic video Ram memory controller. DR is launching Gem 786 to take partial advantage of the new chip by running Gem faster, but the company predicts that graphic systems like Gem will be built into the new chip in the near future.

This plus the new chip will allow PCs to run graphics systems faster, and to use far higher resolution monitors for the likes of design and desktop publishing applications.



Genlock now showing

Video on Amiga

COMMODORE is now selling its Amiga Pal Genlock system, which allows the Amiga's graphics to be mixed with external Pal video sources.

This allows subtitles to be added to videos, or computer graphics to be used against a background of a video image. The device retails for £430.

Software Hotlines

Do you remember that digitised dalliance *Samantha Fox's Strip Poker*? Silly, wasn't it – but strange enough, there are still people out there who think there is money to be made out of pouting pixels. It is only to point out the absurdity of the thing that we feel forced to mention a couple of programs by **Brilliant Software** which bring an entirely new meaning to the category utility. One is a selection of digitised pictures named *Miss All Nude America*, the other a similar classic named *Girls They Want To Have Fun*.

Any argument about the ethics of such software is largely irrelevant here, but as a consumer magazine we feel obliged to point out that if anyone wants to look at pictures of naked women or men, full colour, high resolution photographic images can be easily obtained from any newsagent at considerably less cost than the £9.50 the tape will set you back. Sex and computing do not mix – be warned – many have the scars to prove it.

I think I feel an apology coming on – attention please. Last week I exclusively revealed the existence of *L'Affaire Simon* from **Info-games**, the first computer game ever to open with a man getting his head shot off. Now we can exclusively reveal... that it isn't called *L'Affaire Simon* at all, rather *L'Affaire*

Sidney. So if you see anyone, tell them, will you?

News from the **Argus** stable. Firstly, **Bug Byte** will soon be re-releasing two old **Virgin** classics, *Falcon Patrol II* and *Strangeloop* – both great value at £2.99 on Spectrum and Commodore. Also, **Quicksilver** has made a late entry in the coin-op conversion stakes with *Elevator Action*. Licensed from **Taito**, it involves guiding Agent Otto all the way from the top of an apartment building to his waiting getaway car – all a flimsy excuse for plenty of gratuitous violence. Vastly popular in the arcades, surprisingly there has only been one true home computer clone – *Mission Elevator* on Amstrad CPC – so it's something to look forward to in January.

In fact, the New Year is going to be busy – the list of post-Christmas releases ever grows; *Shockway Rider* and *Heroquest* to name but two. You can also add *Indoor Sports* from **Advance** to the deluge – licensed from **Mindscape** in the US (in turn programmed by **DesignStar** people – who are **ex-GameStar** personnel). This compilation will be selling for £8.95 on Spectrum and Commodore 64, £9.95 on Amstrad CPC. Spectrum and Amstrad versions will have four sports; 10-pin bowling, darts, air hockey and table tennis – alas Commodore owners will have to be content without the latter, as it's already been released full-price on its own by **US Gold**. Funny old world, isn't it?

John Cook



Indoor Sports

Discovery rights on sale

THE Opus Discovery, *de facto* disc standard for the Spectrum, appears to be up for sale, with at least two companies bidding to buy it. No-one at Opus was available for comment as *Popular* went to press, but the company is now putting a great deal of weight behind its PC compatible, and the opportunities there are likely to be greater than in the home market.

Colin Hughes of Sinclair software and add-on supplier Transform has been trying to buy the rights to the Discovery, but last week the deal seemed to have fallen through, with Opus reported-

ly more interested in selling to an overseas company.

Hughes sells a considerable amount of software for the Discovery, so, failing actually buying the rights to the device, he's interested in making sure that the drives are still available from someone. The original deal involved Opus selling Transform a supply of $\frac{1}{2}$ inch drives along with the rights to the product, but, failing this, Hughes says he can get drives of his own, and doesn't rule out producing his own drive if he can't get the Discovery.

He still, however, has hopes that Opus will do busi-

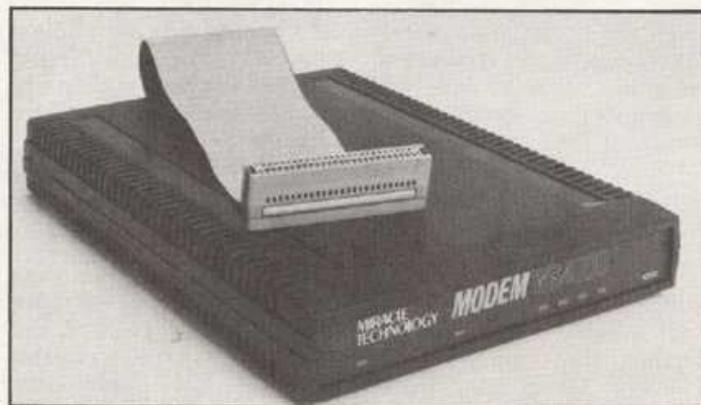


Discovery: The bidding opens

ness with him, and feels there aren't too many other serious contenders in the frame. "They offered it to a couple of people, but I heard that nobody was interested. As far

as I know I'm the only one with money on the table."

Transform specialises in serious uses for Sinclair machines, and sees the Discovery as an industry standard.



Miracle's WS4000

Miracle launches modem for the PCW

MIRACLE Technology has produced a version of its WS4000 modem for the Amstrad PCW. The WS4000 is Hayes compatible and features V21/V23 and speeds from 300 to 1200/75 baud as standard. It can be upgraded to V22/V22 bis and 1200 and 2400 baud full duplex.

The modem comes with a serial interface for the PCW built in, so you don't need to buy Amstrad's and according to Miracle can be operated with the Amstrad's built in Mail 232 software, which provides basic comms

facilities. Miracle can also supply it with bundled *ChitChat* communications software for £298.

The WS4000 is Miracle's top-of-the-range modem, is totally software controlled and features auto-dial and auto-answer.

Sage's *ChitChat* is a sophisticated communications package supporting a wide range of baud rates and including a phone directory facility.

Details from Miracle Technology, St Peters Street, Ipswich IP1 1XB (0473 216141).

Lifeline thrown to Apricot users Cheetah claims the credit

APRICOT users beached by the company's abandonment of its low-end machines are now being offered a cheap support service.

On-Line Support has been formed as a partnership between add-on board manufacturer Insoft Systems and software consultancy Viking Information, and offers a range of services. Bulletin board-based support (£29.95 a year) is cheapest, and various permutations of telephone support are offered.

Details from Simon Tea (0905 778871) or Alan Flower (0272 858189).

CHEETAH has pointed out that the joystick interface bundled with the Spectrum Plus 2 by Boots (see last week's issue) is a Kempston-compatible Cheetah interface, and not a Kempston as published. The Cheetah pack also includes the Cheetah 125+ joystick, which can plug into the interface or into the Plus 2 itself, allowing both Sinclair and Kempston protocols to be used.

In the same issue the price of Cheetah's Mk5 Midi keyboard was also inadvertently left out of the review - it is in fact £99.95.



Across-the-board aid

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Five Star Games	9.95	6.95	Tommahawk	9.95	6.95
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Spitfire Ace	9.95	3.50	Ghostbusters	9.95	5.50	Football Manager	9.95	5.95
Goonies	9.95	3.50	Football Manager	9.95	5.95			
Super Huey	9.95	4.50	Spy Hunter	8.95	3.50	MSX		
Elite (disc)	14.95	6.50	The Artist	9.95	3.50	Gun Fight	9.95	1.99
Theatre Europe (disc)	14.95	5.95	Arcade Hall of Fame	9.95	5.50	All MSX cartridges	15.95	10.99
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CREDIT CARD PHONE ORDERS WELCOME



Atari plans a push on software

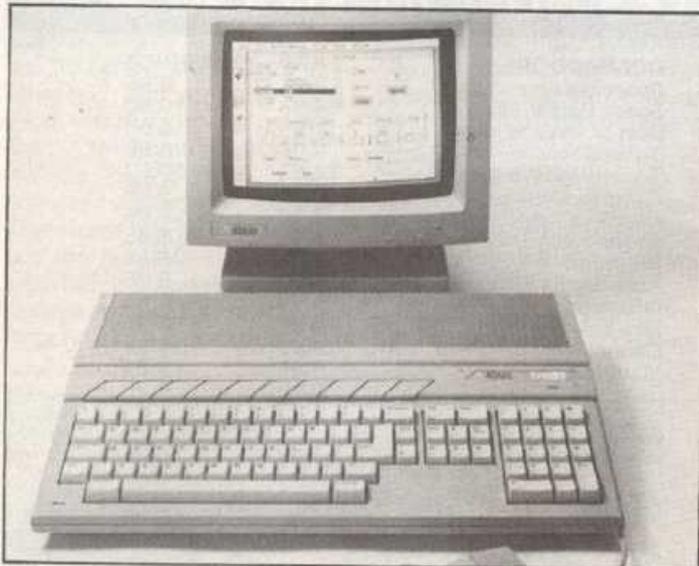
ATARI is planning a major push to increase the amount of software available for its machines in the New Year. According to Roland Whitehouse, recently appointed marketing support manager (software), at Atari, much

ing titles, "if we feel there's a gap in the market."

As far as the ST is concerned the bandwagon is already rolling, but the 8-bit machines and the new 7800 are still at the discussion phase. "What we've got to

development on the 7800 than its rivals. Sega is maintaining strict control on who gets a licence to produce for its console and, through Ariolasoft, on what gets published. Atari, on the other hand, will be allowing software houses to develop and market cartridges in the same way as standard computer software is produced - no licence and no publisher to veto product.

This should allow software houses to sell Atari cartridges cheaper, and should speed development of software for the machine.



ST: Bandwagon rolling

of the task will involve "seeing how we can stimulate (development) activity."

This will mean liaising with developers and publicising their products, but Whitehouse doesn't rule out Atari itself developing and publish-

ing titles, "if we feel there's a gap in the market."

He claims that software houses are currently showing interest in both these, and reveals that Atari will be taking a more liberal approach

Printer shows more Star quality

STAR has launched the NX-15, a wide carriage replacement for its SG-15. It includes tractor and friction feed as standard along with an automatic single sheet feeder. It runs at 120cps in draft mode and 30cps in NLQ.

The new machine has a full-featured front control panel that allows typestyle, draft or NLQ, print pitch, form length and paper control to be altered without recourse to the dip switches. It uses cartridge interfaces, so can be reconfigured to work with different computers. It costs £389.

Details from Star Micronics, Craven House, 40 Uxbridge Road, Ealing, London W5 2BS (01-840 1800).

Mirage bites back

MIRAGE Microcomputers, which was barred from the last Amstrad Computer Show because its Imager could be used for piracy, has reached an "amicable arrangement" with Amstrad and the show organiser Database Exhibitions.

The new Mirage Imager III will transfer tape software to disc but serialises the result, so copied software can only be run if the original imager is present.

Rival company Romantic Robot modified its copier in

the same way in order to gain admission to the previous Amstrad show.

According to Mirage director Derek Robinson the company's intention to sue Database over its banning from that show was expressed in "a heated moment", and the two have now resolved their differences.

Mirage's Imager III now has the approval of both Amstrad and the Amstrad User Club, and Robinson describes this as "part of the amicable arrangement."

Footnotes

TEN days after everyone in the world knows already, Commodore announces that the price of the Amiga is to be kept under £1,000 (£1,170 for those foolish people who have to pay Vat) for December. But what does it say here? The price is being kept down "to satisfy the insatiable demand shown over the last four weeks."

Normally you satisfy insatiable demand for a machine by building more of them rather than cutting the price. It could of course be that the people have been insatiably demanding that

Commodore cut the price to a level they can afford...

Meanwhile in the 'Oh what a Whopper' department, Commodore UK managing director, Chris Kaday, says: "One of the secrets to continued success (sic) is don't change the formula, so my advice is to buy now, as there are no guarantees as to what will happen with the offer in January." So the big price cut's not till February, Chris?

Over at Moss Bros, Domark is busily perpetuating an everyday story of sexual stereotypes. "If Dad has to be at work early and has to leave the game you can cut him out with this choice," says the *Trivial Pursuit* manual, while you can "use this if Mum

wants to make a cup of tea." And if the Dom Dom brothers want to dress up as Palmerston and Disraeli you can just reset the machine...

They're so much more liberated about clothing in the Netherlands. Aackosoft's latest catalogue includes such gems as "Sexy Sue" dodging the flashers and Red Lights of Amsterdam.

But the really risqué title is *Star Wars*, the entry for which begins "Long ago, in a galaxy far, far away..." No, Aackosoft doesn't have a licence for *Star Wars* and yes, Lucasfilm (which owns it) and Activision (which wants to buy it) are waxing exceeding interested in the Dutch outfit's affairs...



Return of Victorian valets

Spectravideo's joystick bundle

SPECTRAVIDEO intends to corrupt hard-working PCW owners with a bundle of Quickshot 2 joystick, interface and *Tomahawk* helicopter simulator for £29.95. As *Tomahawk* on its own costs £19.95 this represents something of a bargain, although very little PCW software uses a joystick.

Details from Spectravideo, 165 Garth Road, Morden, Surrey SM4 4LH (01-330 0101).

Arnor launches BCPL for Amstrad

ARNOR has released a version of its implementation of BCPL for the Amstrad CPC and PCW machines. The language, which was used to write Arnor's *Protext*, comes on 3 inch disc in both CP/M and AMSDOS formats, and is also available for the 464/664 in Rom form.

It compiles to Z80 machine code and programs produced with it will therefore run independently of the language. Arnor's BCPL is a full implementation with comprehensive I/O libraries, including sound and graphics, and includes examples such as a space invaders game and a full-screen text editor. It costs £39.95.

Drawing Board enhancements

CULTON Sales and Services has added pattern fill and area

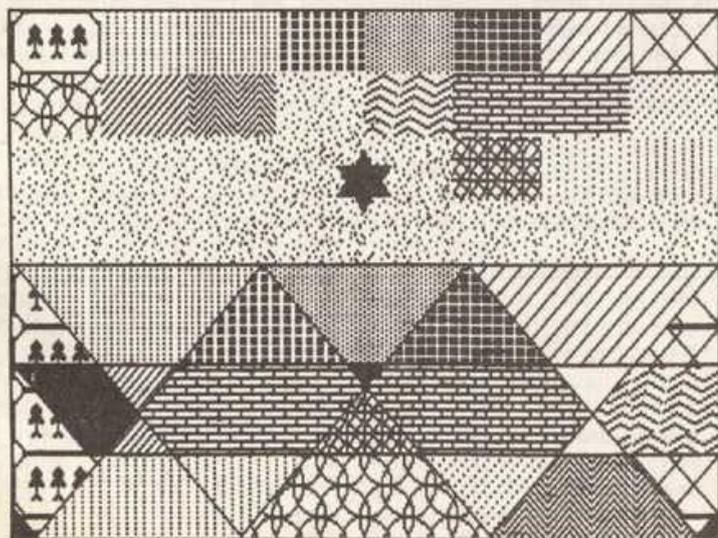


measuring routines to its *Drawing Board* program. The fill routine allows hatching, shading, gridding and tiling of selected areas of a drawing, with the pattern being selected from a suite of over 30 held in memory at any one time.

Patterns can be created in sizes from 8 x 1 to 40 x 24 pixels, the area measuring facility can be used to count the number of elements in a pattern used to fill an area. Bricks used to fill a wall can be estimated, for example.

The *64 Drawing Board* is £34 on disc, and will shortly be available in cartridge version for the 128 at £57.60.

Details from Culton Sales and Services, 34 Mount Street, Dorking, Surrey (0306 885138).



BBC utility Rom revised

BBC Telesoftware has added a keyword search facility to the Ceefax teletext service. The program, which is available free, will be broadcast for downloading over the Christmas period.

Details from BBC Enterprises, Woodlands, 80 Wood Lane, London W12 0TT (01-743 5588).

Word search for Ceefax

WORD Processing, the user group/newsletter for the serious user, has launched *Pen-Friend 2*, a follow-up to its *Pen-Friend* utility Rom for *Wordwise Plus*.

The new version allows all routines to be terminated with *Escape*, which returns you to the text area, and includes an address finder. The format page option now allows headers and footers to be centred or left or right justified, and an extra star command allows you to go straight to the disc directory ready to edit a file. It costs £18.95, and older versions can be upgraded for £6.

Details from Word Processing, PO Box 67, Wolverhampton, West Midlands (0902 788207).

DIARY DATES

DECEMBER

13 December

21st ZX Microfair

Royal Horticultural hall, London SW1

Details: Premier show for the Sinclair community. Add-ons, software, bric a brac stalls

Price: £2

Organiser: Mike Johnston, 01-801 9172

JANUARY

9-11 January

6th Official Amstrad Computer Show

Novotel, Hammersmith, London W6

Details: The year kicks off with the first of an ever increasing wave of Amstrad shows. Hardware, software, the works for CPCs and PCWs, with early support for the PC to be expected

Price: £3 adult, £2 children, £1 discount for advance booking

Organiser: Database Exhibitions,

061-456 8835

FEBRUARY

17-20 February

Which Computer? Show

NEC, Birmingham

Details: Mainly business exhibitors; includes Commodore, and low-cost PC clones

Price: £5

Organiser: Cahners Exhibitions, 01-891 5051

26-28 February

The Atari Computer Show

Novotel, London W6

Details: First chance for Atari to show off the exciting new strategy it's allegedly working on.

Price: £3 adult, £2 children, £1 discount for advance booking

Organiser: Database Exhibitions, 061-456 8835

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

Thanks to readers

You could have knocked me down with a feather! In fact, you can knock me down with a pile of letters: 176, would you believe? All these are replies to my request for help in comprehending the workings of my new

QL generously presented to me by my son. (See Any helpful QL readers? in *Popular*, 13 November a couple of issues ago). Hang on! I promise to write to every one of you, but it'll take me some weeks, so don't go away.

Edward G Ogilvie
Bristol

Vexed by hex

On page 42 of *Popular*, October 16, Dr Paul Mooney's Renumbr program claims to "correctly reassign all *Goto*, *GoSub*, *Restore* and *List* statements, even when reference is made to lines which do not exist or are beyond the end of the

program".

However, a bug in the Basic listing for the hex loader is caused by not resetting CS to 0 (should an error be made whilst typing in the hex codes), ie, whatever value CS has when it reached line 130, it remains in CS when returned to line 50, causing a continuous loop.

Uncharted waters

Colossus has now entered unknown territory in the Readers vs *Colossus* tournament, according to *Colossus* author Martin Bryant.

In Game Two, Martin says that *Colossus* played the first five moves from book openings but it has not taken a non-recognised line of move. He thinks that this game is now into a new area and that the Readers' team will no longer be able to research the moves in chess literature.

The latest moves in Game Two are as follows: the Readers opted for 8 d6-d1, while *Colossus's* 'non-recognised line' in response was K g8-e7.

Game One is proceeding along more straightforward

lines. The Readers, playing Black, voted 8... h7-h6 as the best move. *Colossus* has followed with 9 K g5-f3. Full details below.

Your next move

Over to you again. Send in your suggested next moves (one for each game) to either Inter Mediates (*Popular* Chess), Freepost, Sawbridgeworth, Herts CM21 9YA (no stamp needed), or *Popular* Chess, Unit 2, The Maltings, Sawbridgeworth, Herts CM21 OPG (with a stamp). The move getting the most votes will be entered into the game. Closing date for entries is Wednesday, January 7 - later than usual, but due to *Popular* publishing a double issue next week, and the vagaries of the Christmas post, the next moves in the tournament will be published

in the January 15 issue. Bear with us!

Prizes

A British Museum reproduction chess set will go to the person suggesting the most

selected moves in each game.

Five copies of CDS's *Colossus Chess* will be awarded as runners-up prizes. It's not too late to start now, so why not send in your suggestions.

Game one

- 1 Pe2-e4 Pe7-e5
- 2 Ng1-f3 Nb8-c6
- 3 Bf1-c4 Ng8-f6
- 4 Nf3-g5 Pd7-d5
- 5 Pe4xd5 Nc6-a5
- 6 Bc4-b5+ Pc7-c6
- 7 Pd5xc6 Pb7xc6
- 8 Bb5-e2 H7-h7
- 9 Ng5-f3 ?

Game two

- 1 Pe2-e4 Pc7-5
- 2 Ng1-f3 Nb8-c6
- 3 Pd2-d4 Pc5xd4
- 4 Nf3cd4 Pe7-e5
- 5 Nd4-b5 Pa7-a6
- 6 Nb5-d6+ Bf8xd6
- 7 Qd1xd6 Qd8-f6
- 8 D6-d1 Ng8-e7
- 9 ?



Puzzle

Puzzle No. 237

My friend Arnold has just acquired a rather unusual striking clock. I noticed it the other day during a visit to his house. Let me describe it to you. At a quarter past the hour it goes 'ping'; at half past the hour it goes 'ping, ping'; while at a quarter to the hour it goes 'ping, ping, ping'. On the hour itself it doesn't 'ping' at all but 'bongs' from one to twelve times depending on the time.

During this visit the clock was striking just as I arrived, as indeed it was as I was leaving. In fact, during my stay it chimed a combined total of 86 'pings' and 'bongs'. If you knew the length of my visit you could work out my times of arrival and departure, but can you do it without this information?

Solution to Puzzle No. 232

Answer: Arnold's number was 4718. My first guess, 6015, had only one digit in common, the 1, and this was correctly placed. My second guess was 8174, which was 3456 too high.

Solution: The first problem is to find pairs of numbers comprising of the same four digits differently arranged, having a difference of

3456. This is done in the first FOR/NEXT loop. The subroutine at line 130 checks that the number consists of four different digits. The difference of 3456 is then added to this number, and the result is checked firstly to ensure that this number contains four different digits, and secondly that they are the same four digits as those in the original number. This is done in the subroutine at line 200.

Pairs of digits that satisfy these conditions are then printed out. This results in 37 pairs of numbers being displayed. However, from this list can be crossed off any numbers which

contain more than one digit in common with the first guess (6015), or do not have any digit in common. This leaves a short list of just seven pairs of numbers, but only one of them (4718) contains the matching digit in its correct place.

Winner of Puzzle No. 232

The winner this week is J R Hall of Farnborough, Hants who will be receiving £10.

Rules

The closing date for Puzzle 237 is December 29th. Answers on a postcard please.

```

10 DIFF=2456
20 CLS
30 FOR N=1023 TO 9876-DIFF
40 X$=STR$(N):GOSUB 130
50 IF T=1 THEN 110
60 D=N+DIFF
70 X$=STR$(D):GOSUB 130
80 IF T=1 THEN 110
90 GOSUB 200
100 IF T=0 THEN PRINT:N;"/";D;" "
110 NEXT N
120 END
130 REM Digit check
140 T=0
150 FOR F=1 TO 3
160 FOR G=F+1 TO 4
170 IF MID$(X$,F,1)=MID$(X$,G,1) THEN T=1
180 NEXT NEXT
190 RETURN
200 REM Match digits
210 N$=STR$(N):D$=STR$(D)
220 C=0:T=1
230 FOR F=1 TO 4
240 FOR G=1 TO 4
250 IF MID$(N$,F,1)=MID$(D$,G,1) THEN C=C+1
260 NEXT NEXT
270 IF C=4 THEN T=0
280 RETURN
    
```

The problem was solved by inserting in line 30, (after line a\$:) *Let CS = 0: Go to 50.*

Having succeeded in loading the hex program, I tested its use. While the bulk of it worked correctly, the program failed to deal fully with *GoSub* and *Restore* statements.

I have no doubt there is a simple solution somewhere, but as my knowledge of machine code is very limited, I have little chance of solving it!

I would welcome any advice.

Graham Hitchcock
Richmond
N Yorks

Sounding off on Soundcheck

I would like to complain about a comment made in *Soundcheck*, November 6.

In his first paragraph, Mark Jenkins said, "It's good to see some of the simpler micros being supported by powerful music software".

"Simpler micros" refers to the Atari 8-bit machines, and it totally disgusts me that these computers can be called "simple", when you consider the Spectrum, which has only one sound channel, merging colours and a very limited resource of colours. Tons of people know this, but they still buy them. Why?

Many a C64 owner has been taken aback by the Atari games I have shown them, but I, however, have not been impressed by any C64 games. I was expecting to see something brilliant from the so-called superb C64, but no.

I have owned an Atari for three years and during that time, I have been persecuted and teased no end of times by my friends for the machine I bought.

Not all times were bad though. Recently I showed a Spectrum owner *International Karate*. When he heard the four channel sound music, the brilliant colour usage and multicolour non-merging graphics he was amazed. This friend now owns an Atari and has sold his Spectrum for buttons, as that's all it is worth.

Keith Starr
Luton

Revival of The Living Dead

I take exception to your article *The Living Dead* in the supplement dated November 20, in which you referred to the MSX as dead.

The MSX system was the best-selling system last Christmas. It is one of the top-selling systems in Europe and Japan, and it is the first system to interface with a camera, the Canon T90.

It has been bought by the Russians for use in their schools, even after comparing and considering many of the so-called 'living' micros.

You say the disc drive is expensive, and the true ones are (Toshiba, JVC and Sony).

However, Knights does a disc drive for £89 and the only thing it does not offer is random access filing.

MSX 2 is now available in the UK, and it offers graphics and sound that a lot of home computers can't match; I would say that MSX is far from dead.

David Haslett
Preston

We did not mean to imply that MSX - the concept - was dead. The article was a guide to buying discontinued micros at a bargain price. The original MSX specification machines are no longer manufactured for sale in the UK (dead in that sense) and can be bought very cheaply; hence their inclusion in the article.

The misery of the warranty

Regarding your news item (November 13) that Amstrad is axing one of its warranties; I don't regard this as a bad thing. In fact, I rather wish that I had had no warranty for my Amstrad.

When it broke down in January I took it back to the dealer who accepted it quite happily, as it was still under warranty. I still haven't got it back! For the first six months or so I called in about once a month, but I have now given up, as I am resigned to never seeing my machine again (un-

less I take legal action to retrieve it, which is obviously not worthwhile).

If there had been no warranty on the machine, I would have taken it to one of the repair firms which advertise in *Popular*, and would no doubt have had it back many months ago.

So I must commend Amstrad for axing one of its warranties.

Bill Frankland
London NW2



"Hello Amstrad? We've got a tough new test for your PC"

Xen tape offer

Thank you for publishing my *Xen Plus* program for Amstrad CPC micros. I would like to point out a few mistakes in the printed article: the commands are *:HELP* not *:HELP1* and *:EMPHASIZE* not *:EMPHASISE*.

I will supply the program on tape or disc for £3.00 and £6.50 respectively. The price includes comprehensive documentation and example programs. The disc version contains separate versions of *Xen* and *Xen Plus* and also a combined version of the two which can be loaded in one go.

Simon T Goodwin

From Spectrum to QL

One of the facilities that those who graduated from Spectrum to QL find is the lack of a *SGN* function. It is an odd omission on a machine which includes so many other functions, including the *ABS* function; admittedly *SGN* can be emulated - but so can many other functions. Here is an extremely economical User Defined Function which tests the sign

of any variable passed to it and returns the appropriate value.

```
100 DEF FuNction sgn(variable)
110 RETURN (variable>0)-
(variable<0)
120 END DEFine
```

M J Edwards
Gwent

Said it with flowers

Re *Audiogenic in Software Hotlines*, page 5, 20-26 November 1986.

I did say it with flowers, but it was too much too late...

Gary Partis
Bedlington
Northumberland

PC-Write set right

In Marcus Rowland's otherwise excellent review of public domain software for IBM-PC compatibles (November 6) there were a couple of points which weren't really fair to *PC-Write*.

Although it isn't exactly "what you see is what you get", it's pretty close.

The review said there is no on-screen display of fonts, only a marker for each control code indicating font change. In fact, fonts are normally set to be displayed in different colours (user customisable), so it's easy to see on the screen which fonts your final printed text will be in.

Also, although page breaks are not shown on screen, normally, hitting *Shift-F1* displays the prompt *F2:repage*, and hitting *F2* then has the effect of highlighting each line which will be on a page break when the file is printed.

This takes into account any page-formatting "dot" commands in the file. Sure, headers and footers aren't actually displayed on screen, but they are taken into account.

All the above comments apply to *PC-Write* version 2.4, the last version to be officially distributable in the UK as "freeware", and the last to come with a full (over 100-page) manual on disc. I thought I'd better write and put the record straight, just in case anyone was put off by these little "deficiencies" noted in Marcus's review.

John Rice
Manchester

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Atari returns to its roots

John Cook zaps away on the forthcoming Atari 7800 and reports on its performance

Atari made its name in the home market place with games consoles of one sort or another – did you know, for example, that according to its own figures, an amazing 25 million 2600s (the old VCS that has been kicking around since the mid-seventies) has been sold to date – one million alone in 1985, 100,000 of which came into the UK? Considering 1985 was well into the 'computer revolution', that's a lot of consoles.

Now Atari has come up with a follow-up machine to the long serving 2600 VCS; the imaginatively named 7800 ProSystem – because it's three times better? The *Popular* games droids were powered up and led to the console to find out.

Hardware

What you get for your £69.99 is the console itself – an imposing black box slightly smaller than its predecessor – two controllers (joysticks to you), transformer, TV lead and *Pole Position II* on cartridge. The external controls are limited to a power on/off, reset game, a select option (to control difficulty levels) and a pause button. These are all situated along the top front of the machine, with the two joystick ports tucked underneath its projecting lip. Two 'difficulty switches' (a hand-me-down from the 2600 to ensure full compatibility) are also to be found here.

Opening up the box shows a relatively uncluttered circuit board with 4K of Ram, another 4K of Rom, a 6502 CPU running at 1.79Hz (the 2600 had a cut-down version of the same chip, the 6507) and two major graphics chips. Tia (again, as found in the 2600) and Maria (groan) which gives the 7800 more colours and higher screen resolution.

The cartridges themselves are Rom only and at the moment are planned to come in predominantly 64K and 128K sizes which should retail at around £10 and £20 respectively, although no firm prices have been fixed as yet.

The design of the cartridge slot and the supporting hardware has ensured compatibility with 2600 cartridges – Atari claims that if it plays on the VCS, the ProSystem can handle it.

The Rom supports a total of 64 sprites (with a maximum of eight per line) but the Player-Missile graphics collision detection of the XL/XE is not included. Instead, the machine uses what is described as a 'coin-op' approach, with each line of the raster display being thought of as a bit-map, held as line-Ram in memory.

The controllers supplied with the machine are simple Atari-style joysticks with an oblong base that fits neatly into the hand and two independent fire buttons, one on each side. They worked well enough, but had a suspect feel – certainly not robust enough for extended use. The good news here is that your existing Atari-style joysticks (and that's almost every single one on the market right now) will work well for most games – a significant advantage over the competition.

Software

Like most machines, ultimately the ProSystem is going to be judged by the quality, quantity and price of the soft-

ware produced for it. Sure, it can run all that 2600 stuff – but who wants to play two year old games?

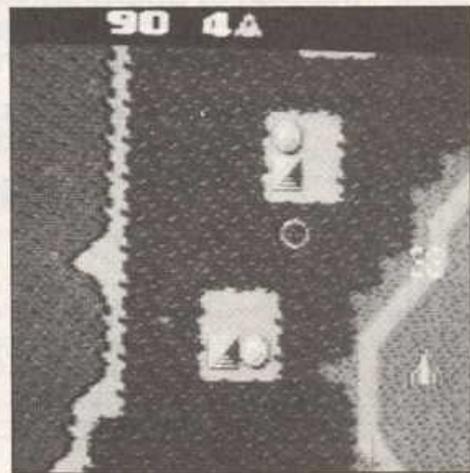
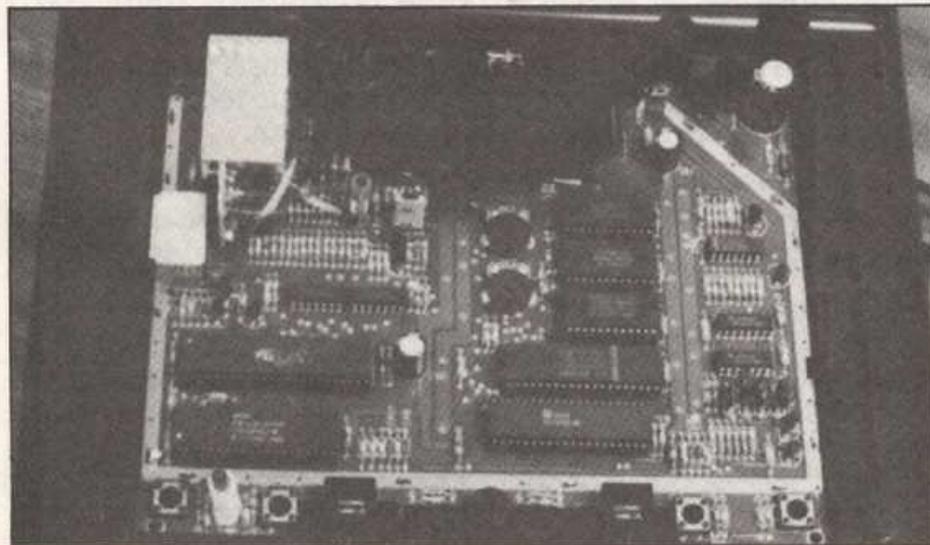
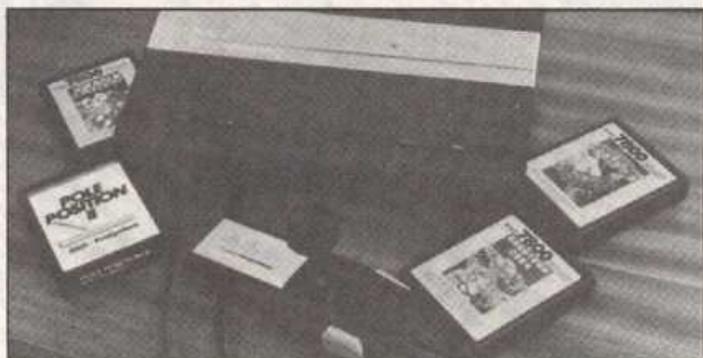
What the 7800 has got going for it is that Atari are making available a development system which runs on the ST and it looks like third party authors will not have to pay any premium to produce games – unlike proposals for the other competing systems. This should ensure a flood of software, if the thing sells.

The software cartridges we had available for test were three Namco licensed titles: *Pole Position II* (bundled with the machine), *Galaga*, and that old favourite *Xevious*, with that Williams' oldie *Robotron 2084* completing the set. All played well, with graphics and speed up to a very good Commodore 64 standard – sometimes beyond, certainly a significant improvement on the 2600.

Conclusion

At £70 (release date around March/April), the ProSystem undercuts the competition by £30 at least (Sega comes in at around £100, the basic Nintendo, £120) and its cartridges may also be cheaper. However, the software presently available compares less favourably with that for the other two.

At the moment it looks like a classic case of paying the money and taking the choice – but for quality blasting on the cheap, the 7800 may well have the edge.



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Giving some style to your Amstrad

The print of the Amstrad PCW8256 is a very good quality, but it is limited to one style (though not one size). There are currently four packages available for the 8256 to give it a greater range of typefaces. All four – *FontGem*, *PolyPrint*, *Tasword* and *Tasprint* – have different pluses and minuses and work in different ways.

FontGem is unique among the three packages in that it works with *Locoscript* automatically – files don't have to be converted to Ascii before they can be printed out. It works by patching on a typeface to the CP/M or *Locoscript* .EMS file on a disc. This sounds complicated but is in fact very simple to do and works very well. In plain English, what it does is to add a typefont to a .EMS file on a disc (the .CMS file is either J20LOCO.EMS or J13CPM3.EMS/J14CPM3.EMS – the file that makes the disc boot up). Once this is

PolyPrint will print out an Ascii file in any of a massive 25 different typefaces. Nine typefaces come with the program and the other two sets of eight typefaces cost about £20 a set. *PolyPrint* comes with *PolyWord*, a simple Ascii word processor to create files to print with *PolyPrint*. Control characters can be put in a file in the format of *(character) at the start of a line to give control over double/normal width, underlining, centring, changing of the typeface, setting the left margin and turning automatic justification on or off.

Locoscript control characters in an Ascii document do not exist, so you have to put these control characters in yourself. *PolyPrint* is not as easy to use as it might be, but with a little practice you can soon be printing out good quality leaflets on your humble Amstrad.

One big problem with *PolyPrint* is that each new type-

(normal width – double width can be too large to use at times!).

Tasman Software has two packages containing different fonts: *Tasword 8000* is a word processor that prints in three faces and *Tasprint 8000*, which gives you five typefaces for *Tasword* and also a program to print out text in a 'direct print mode' to the printer in the selected typeface. This mode lets you select a typeface and type a line of text which is then dumped to the printer. It is useful for adding one or two lines of text to a piece of paper at the last minute, but that's about as far as it goes. *Tasprint* has eight typefaces in total: Compacta, Data-Run ('digital'), Lectura Light, Median, Palace Script, Ranchero, Breaker and Outline. All these typefaces can be added to *Tasword* or used in direct print.

Tasword comes with Lectura Light and Median typefaces, but can also print in the normal *Locoscript* style. A document created on *Tasword 8000* can contain special printer control codes to change the typeface, put the text in a box, etc. The typeface may be changed many times on the one line. Being a full word processor, with printing in different styles an added extra, the editing facilities are very powerful.

simply have to put the paper in again with the new typeface selected, which is obvious once you use the program.

For the business user who just wants a different print style, possibly changing it occasionally, then *FontGem* is easily the best. *Tasword 8000* needs the other typefaces really to be any use (for the purposes of this article), and with them, it is a powerful, all round package, with the power of a full WP that can print in different styles. *Tasword* is a very good package, but you will have to learn the new word processor as well. *PolyPrint* from New Star Soft-

FontGem - 'Business 1' (Pitch: PS)

FontGem - 'Business 2' (Pitch: 10)

FontGem - 'Business 3' (Pitch: 12)

FontGem - 'Business 4' (Pitch: 10)

FontGem - 'Outline' (Pitch: PS)

FontGem - 'Vaudeville' (Pitch: 12)

FontGem - 'Olde English' (Pitch: PS)

FontGem - 'Stencil 1' (Pitch: 10)

done, whenever the disc is booted up, the new typeface will be in use rather than the old one. The program is menu-driven and very easy to use. There are eight typefaces available; four business typefaces and Old English, Vaudeville, Outline and Stencil. One point about *FontGem* is that as you can only patch on one typeface at a time, documents may only be printed in one style. One advantage given by working in *Locoscript* is that all *Locoscript* control characters (bold, underline etc.) work properly. Any text to be printed in draft quality uses the standard typeface.

face is loaded off the disc and so printing a file that regularly changes typeface takes a very long time. *PolyPrint* does have the greatest selection of typefaces, though.

The eight typefaces supplied with *PolyPrint* are Bodoni, Flash Bold, Commercial Script, Helvetica Light, Broadway, Helvetica Medium, Bodoni Italic, Minuscule Print and Cooper Black (large). With the two widths available, this is a good selection of typefaces, with Minuscule being very small (smaller than Pitch 17 on *Locoscript*) and Cooper Black fitting only two characters to one centimetre

HELVETICA MEDIUM ITALIC
SANS SERIF SHADED
HELVETICA LIGHT ITALIC
MICROGRAMMA EXTENDED
HELVETICA (LARGE)

The programs fall into two categories: those for serious use in documents and letters and one for small businesses, clubs, and so on, to use in preference to having a typesetter design a newsletter or an attractive sheet for advertising, etc.

PolyPrint fulfils the latter category very well. It can be used to design good textual artwork easily, though a problem occurs if the changing of the print style in use on one line is required. To do this you

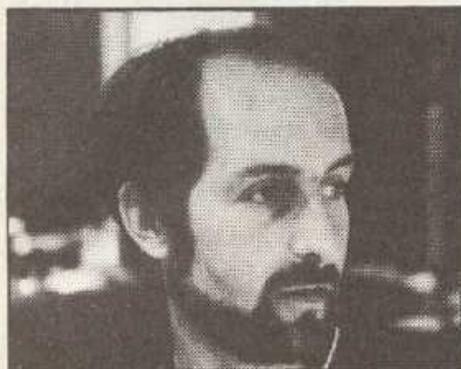
ware, 200 North Service Road, Brentwood, Essex. £29.90 (extra typefaces: £19.90 for 8).

FontGem from Gemini Marketing, Gemini House, Dinnan Way, Exmouth EX8 4RS. £19.95 with 8 typefaces.

Tasword from Tasman Software, Springfield House, Hyde Terrace, Leeds LS2 9LN. £24.95 with 2 typefaces.

Tasprint from Tasman, address as above. £14.90 with 8 typefaces.

David Wallin



Demos and monsters from Compass

Tony Bridge reviews the newest from the creators of *Project X Micro Man*

Compass Software has been a favourite software house of mine for some time now – producer of *Project X Micro Man*, its adventures are written with *The Quill*, but manage to convey a good atmosphere along with some interesting problems and unusual storylines. Much of the appeal of John Lemmon's stories lies in the presentation, with a neat screen display of well-matched colours and carefully-crafted character set.

Those pictures that are present are simple but to the point, and Lemmon makes a special point of an ancient but favourite device of mine, the little character-sized graphics to denote objects present and those held in the players inventory.

These were once a well-used feature, being common some years ago before the advent of *The Illustrator* and the attendant crop of pictures to accompany the scene. In *Demon*, they are unnecessary but welcome nevertheless.

But what of the story? Well, it concerns the exploits of one Morrack (whose part you play in the adventure) and his wanderings through a mystic fantasy land – not only will you meet Giant Green Trolls, Sid the Rat and Herne, the Hunter of Hell, but also Drakon the Evil Lord and none other than Charon the Ferryman himself, who will gladly take your coin in exchange for a trip across the River Styx to Hades. The 70 text-only locations (and 20 more with graphics) describe a very atmospheric landscape in which all manner of interesting things are going to happen. The text is colourful with a good character set and the pictures, too, are particularly well-drawn. All in all, well-presented, even though the obligatory spelling mistakes are present: Ram save and load are supported along with all the usual *Patch'd* effects.

The puzzles aren't particularly hard, especially if you remember one of the golden rules of adventuring; *Examine everything*. Most objects under such examination will yield up some interesting information and you'll find that you won't finish the story without checking everything you come across.

Similarly, the descriptions of many locations hold their own clues, so read these thoroughly. If you follow this course of action progress should be

"The puzzles aren't particularly hard, especially if you remember one of the golden rules of adventuring; examine everything"

steady. John Lemmon tells me that he has used every flag in *The Quill* to bring the characters to pseudo-life; some of these characters are good, others not so good. In keeping with the sense of magic about the proceedings, spells are waiting for you to pick up and use – you'll find one near the beginning, but you must decide how best to use it.

To start off the game, make sure that you examine the status in the opening location and read the inscription thereon; close by you will find Ashmeard's body, and you must pay particular attention to what lies within!

The adventure is very good value at just £2.50 for the Spectrum now, with Amstrad and Commodore versions to follow "soon". Oh, and check out the logo, a wizened old wizard, by design or accident reminiscent of someone not entirely unadjacent to a certain elfish person! Particularly interesting (and a first?) are the painted lead miniatures of the characters within the adventure. Compass Software is at 36 Globe Place, Norwich NR2 2SQ.

Elf Towers is undergoing major reconstruction and so for a few weeks the old fellow is perching on the dining-room table – the resultant upheaval has buried some tapes (though not, I trust forever) and brought others to light. One such is *The Hammer of Grimold* from River Software of Canterbury. Again, the story, which concerns your efforts to recover the Hammer (an ancient dwarfish treasure) is *Quill'd* and *Patch'd*, though not *Illustrated*.

The adventure has the look of a 1982 program, with no re-designed character set and fairly sparse location descriptions. Nevertheless, suspense is well maintained with hooded strangers glowering menacingly towards you in the opening Inn and so on.

Like *Demon from the Darkside*, River's

story repays examining with dividends. Try moving dead bodies – the trap thus revealed may actually be of some help!

This brings me to the Help facility; in most adventures, type *Help* and all you're likely to get is some smart comment or a suggestion to write off for a hint sheet. Some time ago, I mentioned *Monsters of Murdac*, a disc based story from Global Software. This featured a dynamic Help which pulled in specific answers from a database held on disc. Obviously this is difficult for a cassette based game, but River makes a brave stab at it, and give the player several coded clues for difficult situations. This is the first time that I have seen this particular aid in a *Quill'd* adventure, and it is a welcome addition.

As I said, the location descriptions are sparse; no pretence, for example, at disguising the necessary maze (how I hate them!) – it's simply "Forest Maze", which I suppose has a certain simplicity and directness. At least you know what you're supposed to be doing! The commands required can be very finicky; at the start, for example, you must *Sit Down* in the inn before the necessary subsequent action takes place (and of course, *Stand Up* before you can progress).

At least you are given some clue about this ("Here's a nice seat for you, sir", says the Landlord), but later a piece of food may be *Tasted* to reveal a valuable clue, although *Eating* it will prove fatal. As one more example, to reveal the flint in the stones, you must *Kick Stones* – moving, searching or examining them reveal nothing.

I'm sure that the author has good reasons for this sort of word-matching game, but to me it just means frustration and annoyance. Some situations are a trifle belaboured; the gigantic orc just happens to give the master key to you for safe keeping.

Still, the game, although not as polished as *Demon*, has a number of good points – I especially like the concept of a backpack which can hold more items than could otherwise be carried. It's a detail that is often seen, though not for some reason in *Quill'd* adventures. And the magic figure of £2.50 makes it reasonable value. Contact River Software at 44 Hyde Place, Aylesham, Canterbury, Kent CT3 3AL.

Terrors of Trantoss on Spectrum. How do I open the gates of Garnath? What do the runes say on the staff? Mark, 3 Rawcliffe Landing, Shipton Road, York YO3 6XL.

Spellbound on C64. Fourth floor: can't get through the wall. Ground floor: can't get over the pit to Gimbal. Debbie Hunt, 28 Walters Road, Hoo, near Rochester, Kent ME3 9SR.

Terrors of Trantoss on Spectrum. How do you pass the lizard inside the gates of Garnath? Keith W Adam, 19 Navarre Street, Dundee DD5 2TW.

Deadline on C64. Any help appreciated. David Oates, Station House, Station Road, Queensbury, Bradford, W Yorks BD13 1HR.

Dungeon Adventure on C64. What is the packing case for? Can objects be carried in it? If so, how do I get them in? David Oates, Station House, Station Road, Queensbury, Bradford, W Yorks BD13 1HR.

Borrowed Time on C64. What is the statue for? What use is Doris? David Oates, Station House, Station Road, Queensbury, Bradford, W Yorks BD13 1HR.

Zork I on C64. What is the pile of plastic for? David Oates, Station House, Station Road, Queensbury, Bradford, W Yorks BD13 1HR.

The Boggit on C64. How do I get into the small booth in part 1, and past the web in part 3? David Oates, Station House, Station Road, Queensbury, Bradford, W Yorks BD13 1HR.

Hitchhikers Guide to the Galaxy on Atari 800XL. How do you get past the screening doors, how do you get some tea, how do you open the glass case, and how do you charm the vogons? In *The Payoff*, once you're in the vault, must you find the vault number? Jasper Doviatt, 4 Eaton Crescent, Uplands, Swansea, West Glamorgan, SA1 4QJ.

Heroes of Karn on Spectrum. I can't get past the serpent. Helen Norton, 34 Main Street, Branston, Burton on Trent, Staffs DE14 3EY.

Seabase Delta on Spectrum. I have made the seesaw, but where do I go with it? Also, I can't find the egg and what do I do when I have it? Helen Norton, 34 Main Street, Branston, Burton on Trent, Staffs DE14 3EY.

Sinbad and the Golden Ship on Spectrum. How do you control the genie when out of the lamp, and how do you get past the oak door in the mountain in part 2? Peter Georgiou, 3 Shap Drive, Warndon, Worcester, WR4 9NY.

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For shorter comments, general observations or queries, there is of course the **Letters page**, with the tempting offer of a year's supply of *Popular* binders for the Star Letter each week.

For more specific points, our team of columnists are always willing to answer questions, and keen to hear the latest information. Drop your lines to **Tony Bridge** (adventure hints always gratefully received); **Tony Kendle** (who wants as many Arcade pokes, maps, solutions, etc, as possible); **David Wallin** (communications); **Kenn Garroch** (programming problems); **Mark Jenkins** (music queries and sample tapes) and **Martin Bryant** (computer chess comments).

All letters should be addressed to *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP. If you mark your letters with the department you want, things get processed much more quickly.



Left: the adventurous Tony Bridge.
 Right: the active Tony Kendle.



Diving in with the Cobra

Tony Kendle brings you the real way to get through Strike Force Cobra

This week we are carrying on with the tips for the first level of *Strike Force Cobra*. The game strikes me as incredibly difficult and I am sure you will need these tips. What happens after level one I hate to think.

We left you, in the November 13 issue, in control of man number three, taking care not to enter a lift.

Change now to man number four who starts at location E0 by a window. Throw two EFG's through the window to slow down the robot inside. Dive in and dive again to get past the robot and through the door. Continue past the patrol and stand near the two towers of blocks.

Now change back to man number three. Follow man four to the towers above. Stand on his shoulders, dive over and turn right (what an acrobatic game this is!). Enter the door at F5, avoid the fireballs and dive over the laserbeams (they make it sound so easy). Dive through the window and immediately crouch. Shoot out the flying saucer and then activate the door control. This activates the door at B8, which thereby allows man number four to back track and gain entry later.

Dive through the window at G7 and turn round immediately to avoid landing on the laser beams. Proceed through to G4, avoiding the robot at G5 of course.

Enter the door at G3 and by careful timing dive across the sliding hazard. First aid is available in the small room at G0 (you will need it). The hostage at G2 will give you part of the combination and also help you to get back to G3 by jumping on his shoulders.

Avoid or shoot the saucer at E5 and proceed to the lift at D4.

Now change back to man number four. Back track to location E0 and then go left to B0 and crouch.

You can earn yourself extra time by destroying the organic computer at D1. To do this you need to open the door using the lever at A0.

Proceed to A6 and enter the window at A7. The door at B8 is now open. Take care when going past the two patrols here.

First aid is available at location D8, although it is hidden. You may wish to leave this here until you have rescued the hostage (see below). The first aid box is

"This is where it gets silly. Walk left, dive and turn left, one step back and walk right, dive and turn left, take one step back and walk left and dive (take your partner and dosey-do)"

in the front right corner of D8 and you will have to jump up to reach it. If man number three is positioned at D7 you will see the layout.

Enter the door to your left at C6 and continue through to B5. Shooting the robot will slow it down but you risk hitting the hostage. With care you can dive past it. The hostage will give you your second combination number.

Return to C6 (and back up to get the first aid if not already used). Enter C5 and by using the block in the corner dive over the stacks. If you haven't shot it already you must avoid the flying orb.

You have now got these two men in position and it is time for the others to do some work.

Change to man number one who is at location O4, outside a locked door. Go round the perimeter of the building to the window at location J0. Throw an EFG at the saucer through the window and then enter. Stand on the pad to open the two lifting doors.

Change to man number two who is at location O8. Move left to location K8. Dive in through the window (turning back to avoid the row of blocks). Crouch to avoid the gun. Dive across the two rows of blocks, timing the jump very carefully.

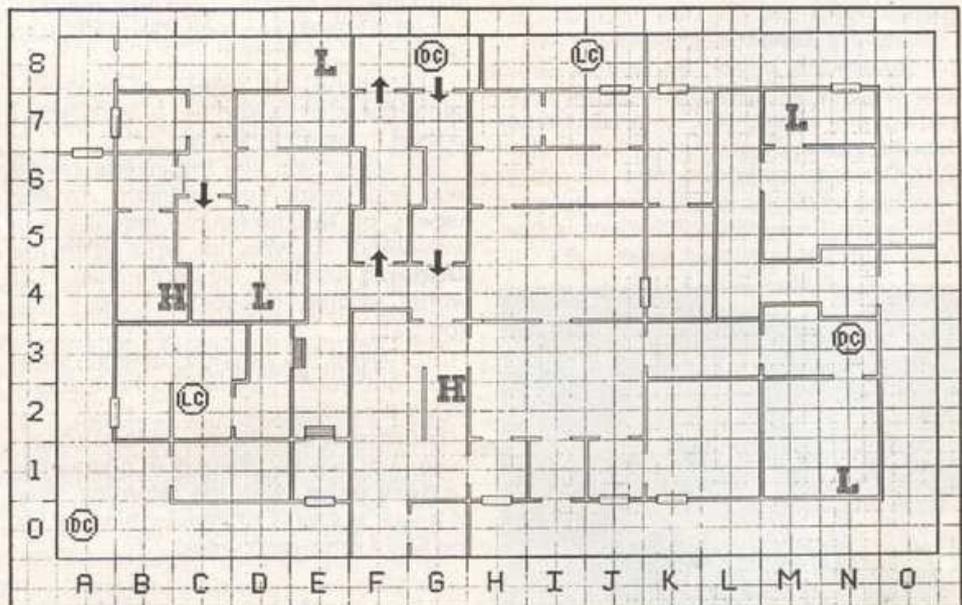
Kick the door at K6 twice to gain access to K5. Be very careful.

This is where it gets silly. Walk left, dive and turn left, one step back and walk right, dive and turn right, take one step back and walk left and dive (take your partner and dosey-do).

Dive through and turn to J4. Crouch beneath the guns. Avoiding the guns and the robots go to J6. Enter J7 and then J8. Dive across the moving hazard and activate the lift (for the use of men three and four at D4). Return to I5 the way you came, or try your luck in H6 if you like!

Dive across the lasers to I3, timing the jump carefully.

First aid is available at H1, use the window at H1 after shooting the saucer through the window. Do not use an EFG as this may destroy the first aid box! Once in this room do not stand on the



Strike Force Cobra map

pressure pad.

The door at K3 will be open. You may consider swapping over to man number one at this stage if man number two is particularly run down.

Enter to K3 and follow the scooter in a clockwise square. Enter M3 shooting as you go. Attempt to stop the scooter to gain access to the door control lever. This unlocks both doors O4 and M7.

Carefully enter N2 and turn and walk left. After a bullet passes walk out into the corridor and jump to avoid the next bullet (facing forwards whilst still in the air). Dive over the next bullet, take two or three steps forward, dive, turn right and dive.

If you are still in one piece stand by the lift. Change to man number one if you haven't done so yet. Back out through the window to location J0. Extra time is available by destroying the organic computer at location L2.

Proceed round to the door at O4 and into location N4. Round the corridor to L6. You will find first aid in location L7. Kick the door at M6, enter and throw two or three EFG's.

The robot will slow down long enough for you to be able to avoid it and rescue the hostages. Throw the EFG's again to slow the robot down and gain entry to the lift at M7.

You have now completed the first floor after which we leave you to it. Good luck.

Top Twenty

1 (20)	Paperboy	Elite
2 (3)	Trivial Pursuit	Domark
3 (2)	Computer Hits Vol 3	Beau Jolly
4 (8)	Konami's Coin-op Hits	Imagine
5 (-)	Scooby Doo	Elite
6 (5)	Breakthru	Data East/US Gold
7 (4)	180	Mastertronic
8 (7)	They Sold a Million (3)	Hit Squad
9 (10)	Infiltrator	Mindscape/US Gold
10 (9)	Five Star Games	Beau Jolly
11 (6)	Cobra	Ocean
12 (18)	Ollie and Lisa	Firebird
13 (1)	World Games	Epyx/US Gold
14 (19)	Ninja Master	Firebird
15 (13)	The Great Escape	Ocean
16 (-)	Konami's Golf	Imagine
17 (-)	Repton 3	Superior
18 (14)	Avenger	Gremlin Graphics
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All figures compiled by Gallup/Microscope

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The kid's a hit

Sadly, licensing deals can so often produce programs that don't live up to the products that they're based on. Surprisingly Microdeal's *Karate Kid II* exceeds all expectations.

Obviously this is a martial arts thrash, tied in loosely with the plot of the film, with you cast as Daniel and with the inclusion of two special tests of concentration.

The usual moves are available, punches, flying kicks, kicks to the shin and the like, but all are executed very smoothly and are accompanied by various grunts and yells. Compared to say, Paradox's *ST Karate* the figures are slightly smaller and the speed slightly slower although having said that *Karate Kid II* is fast enough in itself.

The basic premise is this: the land of Myagi's (the old martial arts master) birth has been taken over by the usual collection of power crazed bad guys and he decides to go back and sort them out with the help of his young protegee, Daniel. As the game follows the film you only get one life, so if you lose to an opponent that's your lot.

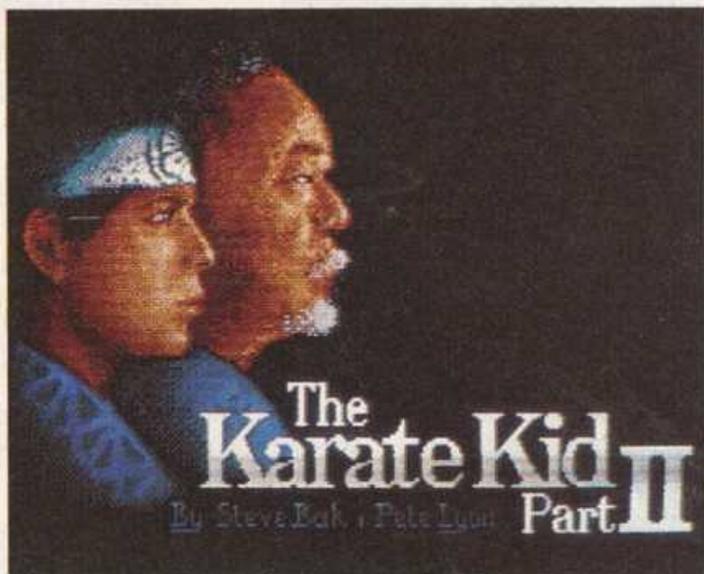
The first two scenes are set indoors with an opening out to a scenic background. There are five different sorts of scenery including a mountain, seaport, lake, villa/

mountains and pagoda and also five different, and excellent, illustrations on the walls (swallow, fish, elephant, tiger and dragon) all of which are randomly combined every time you play through the first two scenes.

After dispensing of Toshio and Taro in the first two screens, you move on to the first test of concentration where you are magically transformed into Myagi. To pass the test you must catch a fly with a pair of chopsticks. And yes, it's about as easy as you think it would be. The problem, besides the obvious, is that you can only move your chopstick-wielding hand over one quarter of the screen. A nice touch on this scene is how Myagi's eyes follow the fly and what happens when it lands on his nose.

Onwards then to Myagi's ruined garden where, back to being Daniel, you take on Toshio and Taro once more.

Having dispensed with them the second test of concentration arrives when you have to break sheets of ice with your hand. Doing this involves rotating your joystick frenziedly and thumbing the fire button when enough momentum is gained. The best part of this is watching the wonderful animation as Daniel swings into action,



smashing the ice to the accompaniment of a suitable scream.

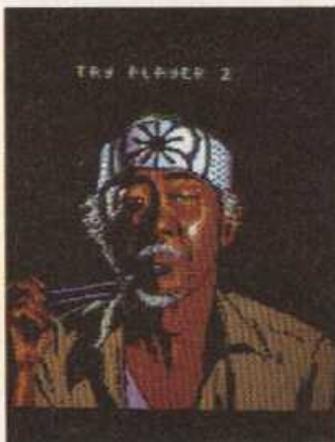
At last, you meet Chozen in The Final Encounter, one round of combat on a platform with a shadowy and very well designed background, the Castle of King Shohashi. Should you defeat Chozen you reach the ultimate test which consists of standing head to head with him

again and rotating your joystick manically to build up your concentration before he flattens you with a well aimed blow.

An additional plus point to the program is the Midi compatible soundtrack, *The Glory of Love* whilst on the down side when in two player mode the game only ends after player one (Daniel of course) has won three rounds of combat.

If you've seen the film then Microdeal's game is a must. Even if you haven't then the first rate quality of animation and graphics should make you bear *Karate Kid II* in mind when you're in the market for a martial arts game.

Popular Appeal ♦♦♦♦
Duncan Evans



Program *Karate Kid II*
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Off the beaten track

Imagine a game that combines elements of flight simulation with outstanding 3D, out-the-window graphics, a war game, and a strategic element in which the computer plays intelligently.

Sounds good? Yeah, I thought so too. And so did Rainbird. Pity the game is so bad.

The game in question is *Tracker* and I'd been looking forward to it for weeks.

The plotline puts some sort of gloss on the usual space scenario - a malevolent intelligence takes over the planet Calibos. Computer-controlled cycloid patrol craft roam the trackways, Calibos's transportation system, shooting down intruding craft.

Your mission is to control a team of up to eight ships in an attempt to knock out the HQ of the enemy at Centrepoin in the heart of the trackway system.

The game operates on three levels. First you can see the entire trackway system showing the positions of your fighters, enemy cycloids, communications nodes, and power points. Four levels of magnification allow you to

zoom in and out on different sectors of the trackways.

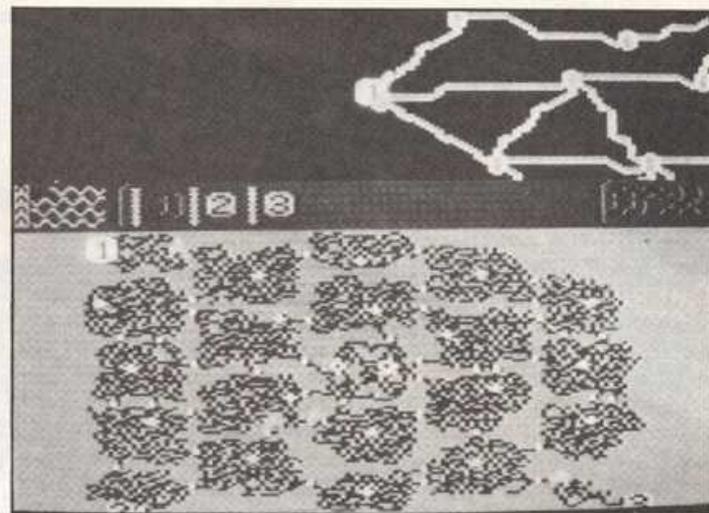
Second, you can set each of your fighters to operate in autopilot mode, rapidly switching between fighters to see how they're progressing.

Third, you can take over individual fighters and fly them through the trackways, fighting cycloids when you encounter them, and bombing power nodes.

In order to achieve your objective of knocking out Centrepoin, you have to secure a number of trackway sectors. You do this by cutting the communications links - just fly over them - and then bomb the power node in each sector. Doing this prevents the cycloids from entering the sector.

Unfortunately, comms and power nodes are re-established if a cycloid flies over them, so you not only have to carry out your sabotage, you have to prevent cycloids carrying out repairs, and watch for cycloids attempting to kill you too.

The end result of all this is that the game is virtually unplayable. Trying to control and protect more than two



fighters at once is difficult in the extreme. Trying to stop cycloids repairing things you've sweated to destroy is even more difficult. And the same controls are extremely complex, requiring joystick and keyboard together.

The 3D fighting sequences are the best, but even these are disappointing. The trackways are simple trenches which give you no room for manoeuvre so taking on a cycloid head-on is simply a matter of blasting away in the hope that you kill it before it kills you.

If a cycloid comes up from behind you're dead nine times out of ten.

The packaging is of the usual Rainbird standard - large box, 60 page play guide and specially-written novella, colour poster and separate

reference guide to the controls.

But where this kind of dressing up was welcome in *Elite*, *The Pawn* and *StarGlider*, it's a complete waste of effort and money in this case.

The novella is terrible anyway. I quote - "Holy Java," he said. "It's a Blarg. Why doesn't he just self-destruct and get it over with?" Good question.

Tracker could have been excellent. Instead, it's too complex, too slow, and the graphics are second-rate.

Popular Appeal ◆

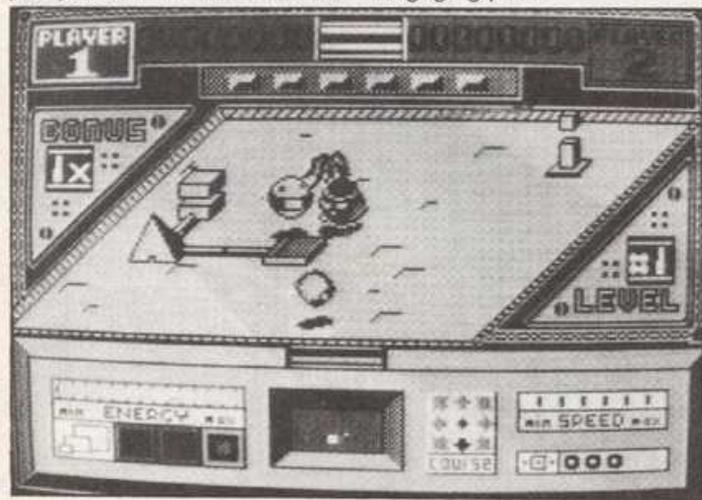
Peter Worlock

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Not so Terrorball

Don't let the fact that Streetwise is Do-mark's arcade label put you off. Its first release,

Orbix the Terrorball is a fine strategy/action hybrid with decent graphics and an engaging plot.



The huge playing area is viewed from a 45 degree angle, and scrolls in eight directions. You control a spherical rescue ship which bounces past an exotic landscape of radar installations, alien plants and sundry obstacles. You use your laser to fend off attacking insectoids and robots, some of which lay deadly mines, while others drop vital energy pods when destroyed.

Your task is to use your map screen and radar display to locate pieces of a crashed spaceship. To do this you have to find a detector module for each piece, then chase it down and destroy its guardian droid, and get the piece back to a central point within ninety seconds before it explodes. Although the scrolling is just a tad jerky, some of the

effects and designs are excellent, especially the molecule-like aliens.

What with retrieving the detectors, collecting bits of spaceship and rescuing astronauts (eight on each level), there's plenty to do, and I can't see anyone completing the game for ages, especially since the baddies react to your tactics by becoming more 'intelligent' as the game progresses.

This game isn't terrorball - in fact it's very good.

Popular Appeal ◆◆◆◆

Chris Jenkins

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Shining on in Starglider

It's difficult to work out what to do with the CPC version of *Starglider*. If you compare it with the standard 8-bit space operas it comes off very well, but there's always the nagging feeling that it's completely outclassed by the original version on the Atari ST.

The game itself is fairly simple – a lot simpler than the absurd novella attached to it would have you believe.

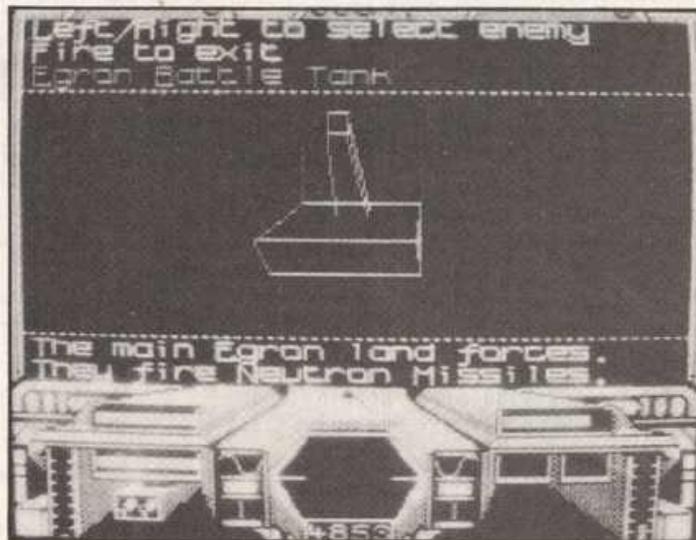
Your planet, says the script, has been invaded by an alien race which has fashioned its ships into the shape of a sort of giant intergalactic seagull to get past your Greenpeace-oriented (Save the Stargliders, man) planetary defences. You're piloting the last defence ship and must – etc, etc.

Once you've got the script out of the way you find the game boils down to 'if it

moves, shoot it' with refuelling and rearming options attached. As such it's not at all bad on the Amstrad – you're placed on a planet surface and presented with a variety of shapes to shoot, and it's at least as entertaining as other 'state of the art' games you'll find on the machine.

But comparing the Amstrad game with the ST version tells you a lot more about both implementations. The scripts are equally basic, but the graphics on the ST are better – albeit not as good as they ought to be – and compared to the ST's, the Amstrad's sound is primitive, to say the least.

The point here is that the ST allows the same game to be given a more elaborate treatment. It's still the same game, it just gives the impression it isn't. Not that you should let that put you off – if



you want a good space opera for the Amstrad, *Starglider* is an excellent buy – it's just a lot more spectacular on the ST.

Popular Appeal ♦♦♦
John Lettice

Program Starglider Micro
Amstrad CPC **Price**
£14.95 (tape) £19.95
(disc) **Supplier** Rainbird
Software, 74 New Oxford
Street, London WC1A
1PS.

Wearing Warrior

Sequelitis is successful as rarely in computer games as it is in films; the temptation to cash in on a proven success again and again tends to lead to dull formula productions rather than a string of goodies. If you saw *Battle for the Planet of the Apes* you'll know what I mean.

In the case of Nexus, the temptation to produce a follow-up to Beyond's *Psi Warrior* should have been resisted. As with the original, you control a Silver Surfer character, skimming through an underground complex featuring causeways, neutral barriers, slopes and accelerators. Armed with the latest laser-phaser-photon-zapper thingy, you must fight off octopoid guardians and amorphous mind-monsters in order to penetrate to the bottom of the maze.

At the bottom of the screen is a map of the current level, giving your position and warning of enemies. That aside and some well-designed puzzle elements, *Warrior 2* is pretty similar to the

original *Psi Warrior*.

When Beyond's *Psi Warrior*/*Psytron* programs originally appeared, they set new standards for graphic design

and animation. *Warrior 2* doesn't exceed that standard, and now looks merely average. If you own *Psi Warrior*, don't bother; if you don't, check it out, but don't let the distinctive Nexus pencil-box packaging fool you into thinking that you're getting something brand new and exciting.

Popular Appeal ♦♦♦
Chris Jenkins

Program Warrior 2 Micro
CBM 64 **Price** £9.95
Supplier Nexus Productions,
ABS House, 30 High Street,
Beckenham, Kent
BR2 0XW.

Kick-off time on Spectrum

One of the problems with writing a game across a whole range of formats is that there is a tendency to design it for the lowest common denominator, hoping to bolt extra stuff on for the more capable machines. The most celebrated example of this is first Star's *Superman* (coming via Beyond in this country) and although *Footballer of the Year* is by no means in this category of disaster, it could have been a whole lot better than it's turned out – on Spectrum at least.

In this strategy style game you take on the role of a young footballer, fresh to the game, with aspirations as large as Ian Rush's pay cheque. But a starting stake of £500 and an income of

£75 per week doesn't go far, even in the 4th Division.

You get higher status (and are therefore attractive to better teams) by scoring goals – this is done by using 'Goal Cards' (you start off with ten and can buy more as you go along, or get awarded extra by chance) giving you one to three scoring attempts in the arcade sequence, a pathetic representation of a goalmouth scramble or a penalty attempt.

Sure, the game has some neat frills, like a teleprinter printing out the team's results, but for a product that must rely on some realistic strategy to give it any credibility – it fails.

It took four seasons for Tarquin to make it to the rank of *Footballer of the Year* (a

long afternoon incidentally) achieved largely through accumulating many Goal Cards and pots of money by repeatedly selecting the 'Incident' option (the equivalent of *Monopoly's* Chance square).

Possibly entertaining and easy enough for a very young player – ten and under I should think – no way is this going to hold anyone that was expecting an improvement on *Football Manager*.

Popular Appeal ♦♦♦
John Cook

Program Footballer of the Year Micro Spectrum
(others to follow) **Price**
£9.95 **Supplier** Gremlin
Graphics, Alpha House, 10
Carver Street, Sheffield S1
4FS.

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Error Trapping

J Collins

This routine for the Spectrum is an 'On error goto' facility, starting at 64000 and is 77 bytes long. Once run, and debugged, the listing

will save the machine code to tape using a filename specified by the user.

To use the routine in your own program add the following lines at the beginning of your own program. Line no. is the line number that will be jumped to when an error is encountered.

2 Load "filename" Code

4 Poke 64077, line no. - (256*Int(line no./256))

6 Poke 64078, line no./256

8 Poke 64079, 1

10 Randomize 64000

The number in line eight is the statement that the routine jumps in the specified line, on encountering an error.

```

1 CLS : PRINT "Generating code - Please wait"
5 LET chk=0
10 FOR n=64000 TO 64076: READ a: POKE n,a: LET chk=chk+a: NEXT n
15 IF chk<>7749 THEN PRINT "Error in data - recheck": STOP
20 INPUT "Filename ? "; LINE a$: PRINT "Saving code ....": SAVE a$CODE 64000,77
25 INPUT "Verify Y/N ? "; LINE B$: IF B$="Y" THEN PRINT "Verifying code ...": VERIFY a$CODE 64000,77
100 DATA 33,255,249,34,178,92,17,16,250,42,61,92,115,35,114,201,205,84,31,48,251,58,58,92,198,49,254,58,56,2,198,7,50,129,92,62,255,50,58,92,42,77,250,34,110,92,58,79,250,50,112,92,42,69,92,34,176,92,42,89,92,0,0,0,205,82,22,213,225,54,232,35,54,13,195,206,18
    
```

Programming: Amstrad CPC

Sembler

Robert Osborne

This week sees the final part of the assembler/disassembler listing.

When in assembler mode note that for relative jumps the address to be jumped to can be entered as a number in the range 0-255, which would have the

desired effect.

To save assembled machine code, break out of the program and use normal Basic routines. Alternatively you could add your own loading and saving routines to the program.

```

840 DATA JR NC,LD SP,"LD (@),A",INC SP,INC (HL),DEC (HL),LD (HL),SCF,JR C,"ADD H L,SP","LD A,(@)",DEC SP,INC A,DEC A,LD A,DCF
850 DATA B,C,D,E,H,L,(HL),A
860 DATA "ADD A,","ADC A,","SUB A,","SBC A,","AND ","XOR ","OR ","CP "
870 DATA "RET NZ",POP BC,JP NZ,"JP ","CALL NZ,PUSH BC,ADD A,RST 00,RET Z,RET,JP Z,RLC B,CALL Z,CALL,ADC A,RST 08,RET NC
880 DATA POP DE,JP NC,"OUT (@),A",CALL NC,PUSH DE,SUB A,"RST 10,C000",RET C,EXX,JP C,IN A,CALL C,INVA,SBC A,RST 18
890 DATA ROM E0,POP HL,JP PO,"EX (SP),HL",CALL PO,PUSH HL,AND,RST 20,RET PE,JP (HL),JP PE,"EX DE,HL",CALL PE,INVA,XOR,RST 28
900 DATA RET P,POP AF,JP P,"DI ",CALL P,PUSH AF,"OR ",RST 30,RET M,"LD SP,HL",JP M,"EI ",CALL M,INVA,"CP ",RST 38
910 PEN 2:PRINT:PRINT "Disassembler."
920 PRINT "Start>":PEN 1:INPUT "",A$
930 PEN 2:PRINT "Finish>":PEN 1:INPUT "",B$:PEN 2
940 IF VAL(B$)<VAL(A$) THEN PRINT "Finish is too low.":GOTO 920
950 CLS:P=VAL(A$)
960 J=0
970 PEN 2:X=PEEK(P)
980 A$=MNE$(X)
990 PRINT " HEX$(P) " "HEX$(X):" ";
1000 IF TYPE(X)=2 THEN GOTO 1140
1010 FOR I=1 TO LEN(MNE$(X))
1020 IF MID$(MNE$(X),I,1)="#" THEN GOTO 1170
1030 NEXT I
1040 IF MID$(MNE$(X),1,2)="JR" OR MID$(MNE$(X),1,2)="DJ" THEN GOTO 1210
1050 IF X=&36 OR X=6 OR X=&E OR X=&16 OR X=&1E OR X=&26 OR X=&2E OR X=&3E OR X=&C6 OR X=&CB OR X=&CE OR X=&D3 OR X=&D6 OR X=&DB OR X=&DE OR X=&E6 OR X=&EE OR X=&F6 OR X=&FE THEN GOTO 1240
1060 X#=MNE$(X)
1070 PEN 1:PRINT TAB(21)+X$:PEN 2:P=P+1:J=J+1:X$=""
1080 IF J=18 OR P>VAL(B$) THEN GOTO 1090 ELSE GOTO 970
1090 IF P>VAL(B$) THEN GOTO 230
1100 PRINT TAB(10)"Press 'C' to continue ";
1110 A$=INKEY$:IF A$="" THEN 1110
1120 IF UPPER$(A$)="C" THEN J=0:CLS:GOTO 970
1130 CLS:GOTO 220
1140 C1=PEEK(P+1)
1150 C2=PEEK(P+2)
1160 PRINT HEX$(C1);" ";HEX$(C2);:X#=MNE$(X)+","&"+HEX$(C2)+HEX$(C1):P=P+3:GOTO 1070
1170 C1=PEEK(P+1):C2=PEEK(P+2)
1180 PRINT HEX$(C1);" ";HEX$(C2);TAB(21)
1190 X$=LEFT$(MNE$(X),I-1)+"&"+HEX$(C2)+HEX$(C1)+MID$(MNE$(X),I+1)
1200 P=P+2:GOTO 1070
1210 PRINT HEX$(PEEK(P+1));
1220 IF PEEK(P+1)<127 THEN C1=P+PEEK(P+1) ELSE C1=P-(256-PEEK(P+1))
1230 X$=MNE$(X)+","&"+HEX$(C1):P=P+1:GOTO 1070
1240 C1=PEEK(P+1)
1250 PRINT HEX$(C1);
1260 X$=MNE$(X)+","&"+HEX$(C1)
1270 P=P+1:GOTO 1070
    
```

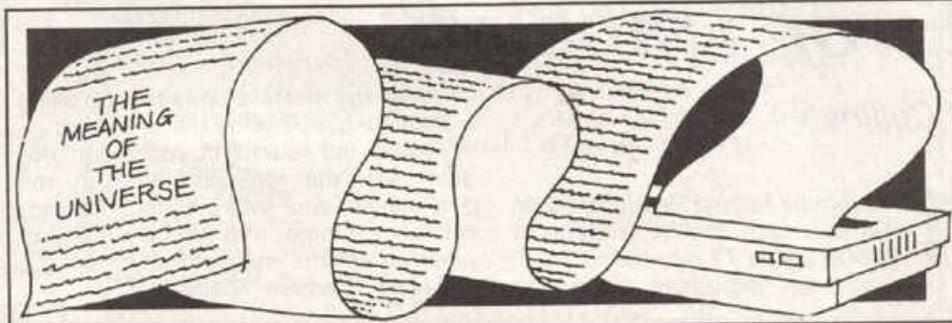
Formatted Printing

David Stewart

Using\$ is a function for the QL which returns a number given to it in a neat tabulated form. It is most useful in programs with a great deal of numeric output which needs to be correctly tabulated.

The function only requires two parameters, one to inform the computer of the form the output will take and the actual number.

This first parameter takes the form of a



string of any alphanumeric characters separated by a point. The characters before the point represent integer places (maximum of six), and the ones after, decimal places (maximum of five).

Any number which exceeds the specified places is returned unformatted. If the

number's decimal places exceed those catered for it will be rounded off.

An example of the syntax is as follows:

`A$ = Using$ ('***** *', 1065.897665).` This would return "1065.898" as the value of A\$.

```
10 INPUT #0: 'FORMAT ';;FORM#;' NUMBER ';;no;'
20 PRINT USING$(FORM#,no)
30 GO TO 10
29997 :
29998 REMark David Stewart
29999 :
30000 DEFine FuNction USING$(format#,number)
30010 LOCAL n,no,intpl,decpl,int#,dec#,shift,r#,sign:no=number
30020 IF format#='' THEN RETURN no
30030 FOR n=1 TO LEN(format#)
30040 IF format$(n)='.' THEN GO TO 30070
30050 NEXT n:n=n+1
30060 no=INT(no+.5)
30070 intpl=n-1:decpl=LEN(format#)-n:IF intpl>6 THEN intpl=6
30080 sign=-2*(no<0)+1:no=ABS(no)
30090 IF LEN(INT(no))>6 OR LEN(INT(no))>intpl THEN RETURN no*sign
30100 IF decpl>5 THEN decpl=5
```

```
30110 int#=INT(no):dec#=no-INT(no)
30120 dec#=INT(dec#*10^decpl+.5):dec#=dec#/10^decpl
30130 IF dec#=1 THEN int#=int#+1:dec#=0:IF LEN(int#)>6
OR LEN(int#)>intpl THEN RETURN sign*int#
30140 r#="FILL$( ' ',intpl-LEN(int#)):IF sign=-1
THEN r#="r#"-':ELSE r#="r#"':END IF r#="r#"int#
30150 IF LEN(dec#)<4 THEN GO TO 30200
30160 IF dec#(LEN(dec#)-2)='E' THEN
30170 shift=ABS(dec#(LEN(dec#)-1 TO))
30180 dec#="FILL$( '0',shift)&dec#(1 TO LEN(dec#)-3)
30190 END IF
30200 IF LEN(dec#)<2 THEN decpl=0:GO TO 30220
30210 dec#=dec#(2 TO)
30220 IF decpl>0 THEN r#="r#".'&dec#
30230 RETURN r#
30240 END DEFine
```

Programming: BBC

Memory Edit

Mark Gidley

The following BBC/Electron program allows the user to scroll through memory displaying the

address, hex code and Ascii values.

On first running the program the desired starting location should be entered in hex.

Using the cursor keys scrolling can be up or down. To edit a byte of memory

use the left/right cursor keys then press the appropriate letter on the keyboard.

To quickly jump to another part of the memory press *Escape* then enter the new value. Pressing *Escape* for a second time results in an exit from the program.

```
10REM *** Memory List/Edit ***
20REM *** Written by ***
30REM *** Mark Gidley 1986 ***
40:
50REM Page can be set to any
60REM value from :
70REM &E00 to &7600
80:
90MODE7:VDU23:8202:0:0:0:PROCstart:a
$=CHR$131:PRINTTAB(0,0);a$;"ADDR ";CHR$1
48;" , , , , , ";CHR$134;"HEX CODE";CHR$148;"
, , , , , ";a$;" ASCII":*FX4,1
100VDU28,0,24,39,2:Y%=0:ON ERROR PROCs
tart:GOTO100
110ch=FALSE:REPEAT:PROCa
```

```
120Y%=Y%+1:IFY%=22 THEN PROCedit
130I%=I%+8:UNTILI%>&FFFF
140I%=0:GOTO110
150:
160DEFPROCchex:IF ch=FALSE THEN FORJ%=0
TO7
170IFch=TRUE PRINTTAB(x%+1,10);
180mem%=?(I%+J%):PRINT;"00";:IF mem%>&
F THEN VDU8,8 ELSE VDU8
190PRINT;"~mem%:" ";:IFch=TRUE ENDPROC
ELSE NEXT:ENDPROC
200DEFPROCaddr:PRINTTAB(1,Y%);"0000";:
IFI%<&10 THEN X%=4 ELSE IFI%<&FF THEN X%
=3 ELSE IFI%<&FFF THEN X%=2 ELSE X%=1
210PRINTTAB(X%,Y%);~I%:" ";:ENDPROC
```

```

220DEFPROCascii:PRINTTAB(32,Y%);:FORJ%
=0 TO7:mem%=?(I%+J%):IF mem%>31 AND mem%
<127 OR mem%>160 PRINT;CHR$(mem%);:NEXT
ELSE PRINT;".":;:NEXT
230ENDPROC
240DEFPROCedit:x%=6:ON ERROR CLS:PROC=
tart:GOTO100
250PROCp:key=GET
260*FX15,1
270IF key=136 PROCleft
280IF key=137 PROCright
290IF key=139 PROCup
300IF key=138 PROCdown
310IF key<135 OR key>140 THEN PROCchan
ge
320GOTO250
330DEFPROCw:t=TIME:REPEAT UNTIL TIME>t
+10:ENDPROC
340DEFPROCd:PRINTTAB(x%,10);" ";TAB(x%
+3,10);" ":ENDPROC
350DEFPROCp:PRINTTAB(x%,10);"[";TAB(x%
+3,10);"]":ENDPROC
360DEFPROCleft:PROCd:x%=x%-3:IF x%<6 T
HEN x%=27:ENDPROC ELSE ENDPROC
370DEFPROCright:PROCd:x%=x%+3:IF x%>27

```

```

THEN x%=6:ENDPROC ELSE ENDPROC
380DEFPROCup:I%=I%+&B0:IF I%<0 THEN SO
UND1,-15,150,1:I%=I%+&B0:ENDPROC
390Y%=0:PROCd:VDU28,0,23,39,2:PRINTTAB
(0,0);CHR$11:PROCa:PROCp:I%=I%+&A8:VDU28
,0,24,39,2:ENDPROC
400DEFPROCdown:I%=I%+8:IF I%>&FFF8 THE
N I%=0
410Y%=21:PROCd:PRINTTAB(0,21);CHR$10:P
ROCa:PROCp:ENDPROC
420DEFPROCa:PROCa:PROChex:PROCascii
:ENDPROC
430DEFPROCchange:J%=(x%/3)-2:pos%=I%
-&58:pos%=pos%+J%:?pos%=(key):PROCc:x%=x
%+3:IF x%>27 THEN x%=x%-3:PROCd:x%=6:PRO
Cdown:ENDPROC ELSE x%=x%-3:PROCright:END
PROC
440DEFPROCc:Y%=10:I%=I%+&58:PRINTTAB(7
,10);:ch=TRUE:PROChex:PROCascii:ch=FALSE
:PROCp:I%=I%+&58:ENDPROC
450DEFPROCstart:ON ERROR END
460PRINT"CHR$131:"Start address ":"CH
R$134;"&":INPUT""A$:CLS:I%=EVAL("&"+A$)
:IF I%<0 OR I%>&FFFF THEN CLS:GOTO460 EL
SE ENDPROC

```

Programming: Commodore 64

Astro Load

P R Brain

Astro Load is a turbo tape program which occupies memory from \$CC00 to \$D000 (52224-53248).

If an *Illegal Quantity Error in 50* is reported then use the following line to find out where the mistake is.

?100+(N*260):"to";350+(N*260)

To run the machine code enter Sys

52855.

The commands that Astro Load accepts are as follows, where "Fn" is the filename.

@S"Fn" saves the program currently in memory.

@S"Fn" (address) saves the current program but when reloaded control jumps to the machine code at the address specified.

@S"Fn",start,end saves the data between the addresses start and end.

@S"Fn" (address),start,end is as above but after loading control jumps to code at

address specified.

@C"Fn" will convert a standard loading program (unprotected) to fast load. Firstly the program to be converted is loaded. Then must insert a blank tape and press F1.

@C"Fn" (address) copies as above but when reloaded jumps to address.

To save a fast loading version of Astro Load enter -

@S"Astro-load"(53241),52224,53248

Then type in New to avoid an out of memory error.

READY.

```

0 REM *****
5 REM * ASTRO-LOAD FOR THE C-64 *
10 REM * WRITTEN BY PAUL BRAIN *
15 REM * NOV. 1986 BRISTOL *
20 REM *****
25 PRINTCHR$(147);TAB(5)"PLEASE WAIT WHILE DATA IS READ"
30 S=52224:E=53248:N=0
35 T=0
40 FORL=1TO25
45 FORJ=0TO9:READV:T=T+V
50 POKES+J,V:NEXTJ
55 S=S+10:IF S>E THEN S0
60 NEXTL:READC
65 IFT=CTHEN N=N+1:GOTO35
70 X=100+(N*260):Y=X+250
75 PRINT"ERROR IN DATA BETWEEN LINES";X;"&";Y:END

```

Programming: Commodore 64

```
80 READC:IFT<>CTHEN70
90 PRINTCHR$(147);"DATA CORRECT --- SYS 52855 TO INITIALISE"
100 DATA160,0,185,43,0,153,172,0,200,192
110 DATA4,208,245,169,0,133,193,32,56,248
120 DATA169,153,141,145,204,169,172,141,175,204
130 DATA169,11,141,17,208,120,169,5,133,1
140 DATA169,124,141,254,255,169,204,141,255,255
150 DATA169,152,141,250,255,169,204,141,251,255
160 DATA160,127,169,129,140,13,220,140,13,221
170 DATA141,13,220,173,13,221,173,13,220,169
180 DATA0,133,2,170,168,202,208,253,136,208
190 DATA250,169,25,141,14,220,169,8,133,163
200 DATA169,2,133,189,169,80,133,251,88,165
210 DATA2,240,252,169,55,133,1,32,147,252
220 DATA32,132,255,96,72,152,72,138,72,32
230 DATA0,205,208,13,6,189,198,163,208,7
240 DATA169,8,133,163,76,195,204,104,170,104
250 DATA168,104,64,198,251,240,6,169,2,133
260 DATA189,208,240,169,170,133,189,169,174,141
270 DATA145,204,208,229,165,176,133,189,238,175
280 DATA204,173,175,204,201,176,208,215,169,195
290 DATA141,145,204,208,208,160,0,177,172,133
300 DATA189,69,193,133,193,230,172,208,2,230
310 DATA173,165,172,197,174,165,173,229,175,144
320 DATA182,169,228,141,145,204,208,175,165,193
330 DATA133,189,169,239,141,145,204,208,164,169
340 DATA0,133,189,169,250,141,145,204,208,153
350 DATA 37688
360 DATA169,255,133,2,208,147,165,189,10,169
370 DATA96,144,2,169,253,162,0,141,4,220
380 DATA142,5,220,173,13,220,169,25,141,14
390 DATA220,165,1,73,8,133,1,41,8,96
400 DATA120,169,5,133,1,169,81,141,254,255
410 DATA169,3,141,255,255,169,131,141,250,255
420 DATA169,3,141,251,255,160,127,169,144,140
430 DATA13,220,140,13,221,141,13,220,173,13
440 DATA221,173,13,220,169,117,141,4,220,169
450 DATA3,141,5,220,169,0,133,2,133,193
460 DATA174,32,208,88,165,2,240,252,142,32
470 DATA208,169,55,133,1,32,132,255,165,193
480 DATA197,194,240,3,76,226,252,96,72,152
490 DATA72,138,72,173,5,220,160,25,140,14
500 DATA220,238,32,208,73,2,74,74,38,189
510 DATA165,189,176,16,76,110,3,201,2,208
520 DATA9,169,132,141,108,3,169,254,133,189
530 DATA173,13,220,104,170,104,168,104,64,201
540 DATA2,240,239,201,170,208,7,169,158,141
550 DATA108,3,208,228,169,110,141,108,3,169
560 DATA0,133,189,240,221,133,172,238,159,3
570 DATA173,159,3,201,176,208,205,169,177,141
580 DATA108,3,208,198,160,0,145,172,69,193
590 DATA133,193,230,172,208,2,230,173,165,172
600 DATA197,174,165,173,229,175,144,174,169,208
610 DATA 33526
620 DATA141,108,3,208,167,133,194,169,110,141
630 DATA108,3,169,172,141,159,3,165,174,133
640 DATA45,165,175,133,46,169,255,133,2,208
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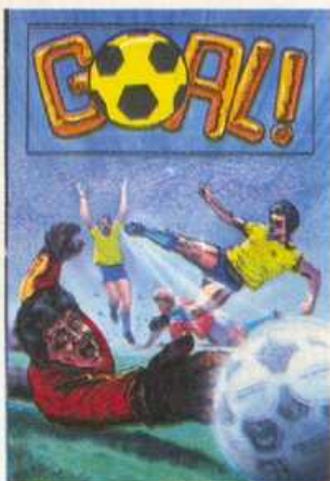
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```
650 DATA141,169,11,141,17,208,32,83,228,32
660 DATA167,2,32,147,252,76,131,164,65,83
670 DATA84,82,79,45,76,79,65,68,13,13
680 DATA32,32,70,65,83,84,32,76,79,65
690 DATA68,47,83,65,86,69,32,83,89,83
700 DATA84,69,77,32,70,79,82,32,84,72
710 DATA69,32,67,66,77,32,54,52,13,13
720 DATA32,32,32,32,32,32,32,32,32,32
730 DATA40,67,41,32,49,57,56,54,32,80
740 DATA65,85,76,32,66,82,65,73,78,13
750 DATA0,169,147,32,210,255,169,6,141,32
760 DATA208,141,134,2,169,15,141,33,208,24
770 DATA162,1,160,15,32,240,255,169,36,160
780 DATA206,32,30,171,169,76,133,115,169,165
790 DATA133,116,169,206,133,117,96,230,122,208
800 DATA2,230,123,140,188,206,160,0,177,122
810 DATA201,64,240,7,172,188,206,76,121,0
820 DATA0,32,115,0,201,83,208,3,76,247
830 DATA206,201,67,208,3,76,156,207,76,8
840 DATA175,169,32,160,15,153,65,3,136,16
850 DATA250,96,160,0,185,34,205,153,167,2
860 DATA200,192,88,208,245,160,0,185,122,205
870 DATA 25498
880 DATA153,81,3,200,192,171,208,245,96,32
890 DATA209,206,32,115,0,201,34,240,3,76
900 DATA8,175,32,115,0,160,0,177,122,201
910 DATA34,240,8,153,65,3,200,192,16,208
920 DATA242,152,24,101,122,133,122,165,123,105
930 DATA0,133,123,32,220,206,32,229,207,32
940 DATA121,0,201,44,208,26,32,115,0,32
950 DATA138,173,32,247,183,132,43,133,44,32
960 DATA253,174,32,138,173,32,247,183,132,45
970 DATA133,46,169,234,141,2,3,169,3,141
980 DATA3,3,169,3,141,60,3,162,60,160
990 DATA3,32,218,247,169,167,141,61,3,169
1000 DATA2,141,62,3,169,4,141,63,3,169
1010 DATA3,141,64,3,169,105,32,105,248,173
1020 DATA61,3,172,62,3,133,193,132,194,173
1030 DATA63,3,172,64,3,133,174,132,175,32
1040 DATA103,248,32,83,228,32,0,204,32,143
1050 DATA246,76,116,164,169,1,170,168,32,186
1060 DATA255,169,0,32,189,255,169,0,32,213
1070 DATA255,160,3,185,61,3,153,43,0,136
1080 DATA16,247,169,204,160,207,32,30,171,165
1090 DATA197,201,4,208,250,169,0,133,198,76
1100 DATA247,206,13,73,78,83,69,82,84,32
1110 DATA84,65,80,69,32,38,32,80,82,69
1120 DATA83,83,32,70,49,13,0,32,115,0
1130 DATA 27004
1140 DATA201,40,208,12,32,138,173,32,247,183
1150 DATA140,249,3,141,250,3,96,32,119,206
1160 DATA76,116,164,0,0,0,0,0,0,0
1170 DATA 2861
```

READY.



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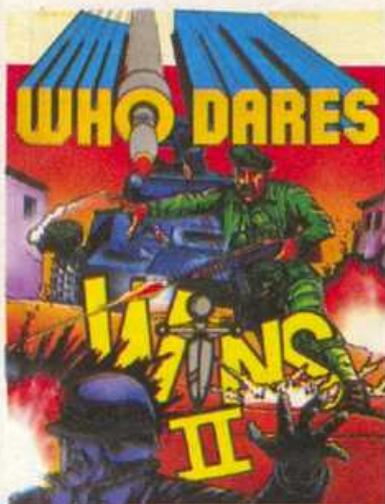
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Variable Trace

Mario Richard

This machine code utility for the C64 is a very useful debugging tool. It displays the current variable being used in the top left hand corner of the screen during execution of a Basic program.

Install the routine in memory before loading your own programs and start it with Sys 49152. It can be turned off by pressing Restore.

```
60 FOR X=49152 TO 49225:READ A:POKE X,A
70 NEXT X
80 :
100 DATA 120,169,13,141,20,3,169,192
105 DATA 141,21,3,88,96,169,32,141
110 DATA 0,4,141,1,4,141,2,4
115 DATA 165,69,240,43,233,63,141,0
120 DATA 4,165,70,201,128,48,7,233
125 DATA 128,162,36,142,2,4,201,0
130 DATA 240,9,201,58,48,2,233,64
135 DATA 141,1,4,173,32,208,141,0
140 DATA 216,141,1,216,141,2,216,76
145 DATA 49,234

READY.
```

System Time

Paul Hutchison

This routine for the Amstrad CPCs allows the system variable *Time* to be reset to zero. The machine code lies between locations &AB00 and &AB09.

To call the routine use *Call &AB00* after saving the code.

```
10 MEMORY &2999
20 MODE 1
30 CAT:PRINT:PRINT
40 INPUT"Enter PAGE NAME to display"; filename#
50 LOAD filename#,&3000
60 INPUT "ENTER DISPLAY MODE (0 or 1)";modedisplay
70 IF modedisplay<0 OR modedisplay>1 THEN 60
80 MODE modedisplay
90 :DISPLAY,&3000
100 WHILE INKEY#="" :WEND:WHILE INKEY#<>"" :WEND
110 MODE 1
120 PRINT"Press ENTER to run again":PRINT"Press P to send page to PRINTER"
130 INPUT entkey#
140 IF UPPER$(entkey#)="P" THEN GOSUB 160
150 RUN
160 MODE 1
170 PRINT"ensure PRINTER is ready, Then press":PRINT"the ENTER key"
180 WHILE INKEY#="" :WEND:WHILE INKEY#<>"" :WEND
190 :PRTPAGE,&3000,1
200 RETURN
```

Teletext Aid

R Rodden

This routine for the Amstrad CPCs uses the Volex Teletext Adaptor and displays a previously saved page, and gives you the option of sending it to the printer.

The two different display modes are catered for and the printer routine will show hidden information.

```
10 MEMORY &AAFF
20 FOR a=43776 TO 43785
30 READ b
40 POKE a,b
50 NEXT
60 MODE 1
70 PRINT "USE 'CALL &AB00' TO RESET TIME"
80 NEW
90 DATA 17,0,0,33,0,0,205,16,189,201
```

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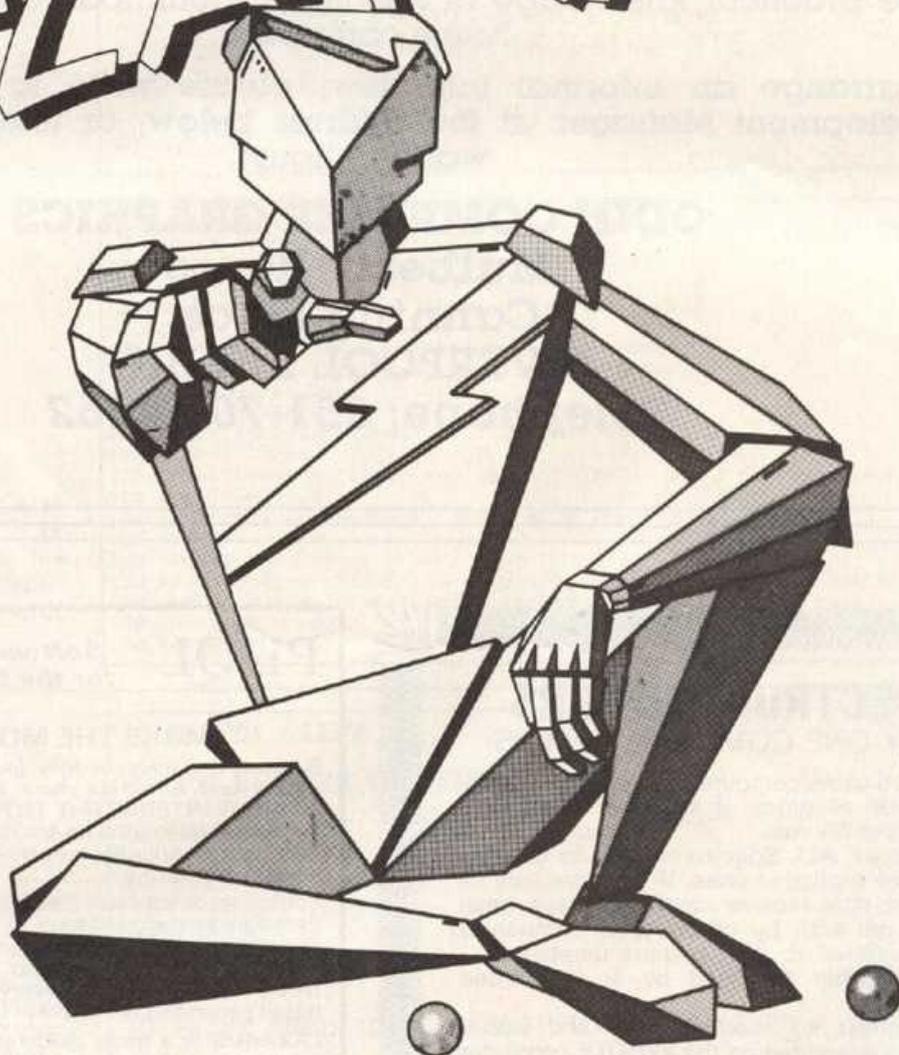
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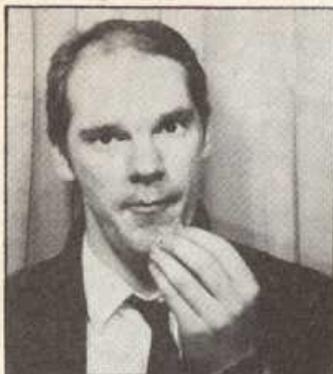
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With Kenn Garroch

Whatsits and thingummies

Janet Kiff of Sutton in Surrey, writes:

Q Having bought *Popular*, November 20, I was rather alarmed to read Jim Gibb's letter and your reply (neither of which I understood, I might add).

The words I did not understand applied to my set up. I have two micros, an Electron, with Plus One and Centronics GLP1 printer, running *View*, thus facilitating this letter, plus a CPC 464. Both micros are used with a Ferguson TX TV/Monitor, since I bought the Amstrad secondhand with a green screen monitor (I'd hoped to use this with the Electron - no such luck). I tend to use the Electron more for letter work, and the Amstrad more for games.

I was using the Amstrad with an old colour TV and modulator, but had problems with *Ghosts and Goblins* in black and white. To solve the problem, I went out and bought a Ferguson TX and obtained a lead from the Amstrad User show. I was told to leave out the Modulator's RGB lead and just use it as a power supply. I have had no problems with this lead. After seeing the comments about colour problems on the Ferguson, am I doing any damage to any of the equipment? Everything seems fine and certainly the displays from both machines are far superior to the old colour TV.

Please could you explain in non-electronics language about the whatsit you have to have made up in a computer shop as per the diagram, of the thingummywhatsit will go kaput. I don't know what resistances, luminance or sync are.

A All I can say is, I'll try. To others who may not know what this is all about, see *Popular*, November 20.

RGB (red, green and blue) signals are what the computer puts out to form the picture you see on the monitor. The monitor screen is made up from small groups of three phosphors (chemicals that glow when an electron beam hits them, one each for red, green and blue) which are so close together that illuminating all three at different brightnesses produces a specific colour.

The RGB signals are used to light up each phosphor, producing a different colour depending on their relative strengths (the luminance signal would also do this but only for the overall brightness of the three phosphors). For instance, all signals at low power will produce black, red on and blue and green off produce red, and all at full strength produce white (or a reasonable facsimile thereof).

The Amstrad can produce 27 colours on screen so the RGB signals have to be mixed in 27 different ways to produce each colour. The problem that Keith Platt seemed to be having was that the signals were not missing properly and so he was not getting the full range of colours. This was because the RGB signals put out by the Amstrad did not match the RGB signals expected by the monitor.

To match the signals, the resistor whatsits are used. All these do is change the amounts of the signals being fed into the monitor to an acceptable level and range so that all the colours appear, ie,

the signals mix in such a way as to produce the correct brightnesses for each phosphor.

The sync signal is used to tell the monitor when to start displaying the picture. The complete image is made up by starting at the top left of the screen and scanning across a line at a time, each line of the picture being made up from a series of dots, or pixels, of different colours. When the line is complete, the next line down is started at the left of the screen and scanned across. This is continued until the complete picture is formed.

The whole screen is scanned 50 times a second so, taking into account persistence of vision, no flicker is seen. The sync signal is used to coordinate the frames (whole screen images) and lines so that everything is synchronised and the picture is stable.

The main thing to remember is that if it is working, leave it be. From the sounds of things, your picture is satisfactory and the lead you obtained does the job. You would find it quite hard to damage your equipment from the monitor outputs since the signals involved are so low.

Interrupted by the crash

S Dunn of Weston-Super-Mare, writes:

Q I have a Commodore 64 and have been mucking around with machine code. I wonder if you could help me with the following problem. How do I utilise the IRQ and NMI interrupts directly without having to use the indirect addresses and kernal Rom? Is it possible to switch the kernal out and install my own interrupt

addresses? I have tried this but all I get is a crash.

A What you suggest is quite feasible; all it needs is a little care and some understanding of how the interrupts are generated. Both *IRQ* (interrupt request) and *NMI* (non maskable interrupt) are generated by the interface chips. Specifically *NMI* can be derived from CIA? and *IRQ* from CIA1 and the VIC II chip.

```

*0200      ASSEMBLE AT 4012
STEP      00          SPINBLE WIG
          LDA #127      DISABLE NMI
          STA 56589     SWITCH IN BACK EXCEPT I/O
          LDA #00011001  LOC 1 IS SYSTEM PGM CONTROL
          STA 1         LOW BYTE OF SPINBLANK
          LDA #000      HIGH BYTE 00
          STA 87FF      800 VECTOR SETUP
          LDA #400      LOW BYTE OF NMI ROUTINE
          STA 87FA
          LDA #400      NMI VECTOR SETUP
          STA 87FB
          LDA #120      ENABLE MASTER INTERRUPT
          STA 524E      ZERO THE 8TH MASTER BIT
          LDA 524E
          AND #127
          STA 524E      RESET 5 DONE IN INT ROUTINE
          LDA #100      TEST VALUE FOR NMI
          STA 56589     IN HIGH BYTE OF TIMER
          LDA #1        START TIMER B CH2
          STA 56591     COUNT SYSTEM CLOCK PULSES
          LDA #100      SET NEW AND TIMER B
          STA 56589     TO 00 STATUS (MMSA SPEAK)
          OR          SAVE TO 00
          OR          CONTINUOUS LOOP
          JMP 4012
          JUMP 84 01 TO STOP ROUTINE
NMI ROUTINE
          PMA          STACK ALL THE BESS
          TBA
          TPA
          PMA
          MC 5204      CHANGE SCREEN COLOURS
          PLA
          TAY
          PLA
          TAY
          LDA 56589     RESET CH2 INT 000
          PLA
          SET          RETURN FROM INTERRUPT
          JMS ROUTINE
          PMA
          TBA
          TPA
          LDA 000      SWITCH TOP OR BOTTOM?
          LDR #200      FLIP SWITCH
          STA 000
          BLS TOP      ZERO TOP
          LDA #1
          STA 5200     BURROCK WHITE
          LDA #1
          STA 5206     NEXT BIT AT TOP OF SCREEN
          JMP 000
          LDA #0
          STA 5200     BURROCK BLACK
          LDA #100
          STA 5206     NEXT SPLIT APPROX CENTRE SCREEN
          PLA
          STA 5213     RESET MASTER INTERRUPT
          PLA
          TAY
          PLA
          STA
          BLS
          BPL 0       ALL DONE
          BPL 0       SPLIT SWITCH
          END
    
```

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Kenn Garroch and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD*

Before switching the kernal out, you will need to disable the interrupts, otherwise the 64 will crash. *IRQ* is easily disabled with the SEI machine code instruction, *NMI* is disabled by storing 127 in location 56589, resetting the *NMI* flag in CIA 2s interrupt control register. Once this has been done, the Roms, can be switched out and the new interrupt addresses installed.

IRQ's address is placed in locations \$FFFF and \$FFFF (low byte high byte respectively) and *NMI*'s in \$FFFA and \$FFFB. The interrupt routines themselves should stack all the registers, perform whatever operation is required, and then reset the interrupt source so that it occurs again in the example below, the *IRQ* is used to split the border into two colours, and the *NMI* to flash the background colours.

The Fax of life and mail systems

David Wallin compares the relative virtues of snail mail, E-mail and Fax machines

I gather from Telecom Gold that I inadvertently quoted the wrong prices for joining the network, so this week, I'm going to go into some detail about Gold charges, and the advantages of electronic mail.

There are two ways to join Telecom Gold: club membership and corporate membership, the latter being both the most expensive and giving the most flexibility and features.

Club membership costs you £40 per mailbox, compared to corporate membership £300 for unlimited mailboxes – you may add more at any time, for no extra cost. Also, training charges are different. Corporate members get free training by Telecom Gold, but club members have to pay £30 per person. This effectively raises the cost for one club mailbox to £70. For corporate members, extra training is available which is not even an option for Club members.

There are disadvantages to joining as a corporate member, one being that the minimum monthly invoice is £100 (discounts are apparently available), compared to a club membership minimum charge of only £10. Corporate members do get their first month's storage and connect time for free, which if you have 20 or so users could well amount to a sum in excess of £500.

The payment method is different for each type of membership. Corporate members are invoiced each month and can pay by cheque, whereas club members can only pay by direct debit mandate or credit card.

Basically, corporate membership is for the businesses with ten, twenty or even more branches which employ lots of people and want to keep in contact with them all via E-Mail and therefore will need lots of mailboxes. One example of a company who installed E-Mail for this kind of purpose is the Westinghouse Corporation. It cost them \$4.9 million to install worldwide and now saves them \$42.1 million a year! This is for many reasons, particularly that high speed transmission of data is faster than talking. Also E-Mail is much cheaper and better than Telex.

The charge for using Telecom Gold is the same whether you joined club, corporate, MicroLink (see below) or whatever.

Connect Charge:	11p per minute – standard rate (Monday to Friday; 0800–1900)
	3.5p per minute – cheap rate (other times + public holidays)
Storage:	20p per unit of 2048 characters a month (undeleted mail, stored files, etc.)
PSS connection:	2.5p per minute (300 baud)
	3.0p per minute (1200 baud)
	Direct dial to the London Telecom Gold number is free
National E-Mail:	Free
International:	Charges vary by country
UK Telex – send:	5.5p per 100 characters
Telex – receive:	Now free – was 50p per telex
Manuals:	Vary: £2–£10
Databases:	Vary: 9p–£2 a minute

Telecom Gold use is not cheap and my bills at the present are averaging about £45 a month. I'm trying to keep this down – Gold does offer help and advice on how to keep storage, etc. down. One big tip: *never* connect at the standard rate, it's *four times* the cost of cheap rate.

There are other differences between club and corporate membership and the full, most up-to-date charges and information sheet is available from either Telecom Gold, or Jenny Bailey Associates – Public Relations. Telecom Gold's address is 60–68 St Thomas Street, London SE1 3QU. Jenny Bailey Associates' address is 2 Avenue Road, Epsom, Surrey KT18 7QT.



Database Publications has corporate membership and offer the general public and business the ability to have a mailbox set up for them. This costs Database nothing, but it charges £5 to cover a manual and the time taken to set up a mailbox. This is the service more commonly known as MicroLink.

Derek Meakin, managing director of Database has made a few interesting points about E-Mail (all E-Mail services, not just MicroLink) compared to conventional Snail-Mail (GPO mail). He claims that, "Trusting the Post Office to get your message through efficiently is like shooting yourself in the foot".

Indeed, there are figures available to prove that the Post Office is in fact unreliable at getting mail through. POUNC – the Post Office Users National Council and the Post Office itself have compiled figures and reports on the speed of snail mail. The PO admits that 12 million of the 100 million first class letters posted each week do not reach their destination by the following day, this is a 12% failure rate, whereas E-Mail is 100% efficient at getting messages to people instantly.

The failure rate of first class mail, from London to any of five of the county's largest cities, arriving the next day is 25%. It's the same from these counties into London. Belfast to London has a 30% failure rate.

Snail-Mail can only be received when you're at home. E-Mail can be collected from anywhere there's a phone and computer with modem. For sending business letters, E-Mail is clearly more efficient, inferior only to faxing. Fax is a method of sending pictures over the phone line. It's more expensive to set up – Fax machines cost thousands of pounds and are more expensive to use. An A4 page takes one minute to send on the fastest machines – and it's all at the normal phone rate. An A4 page contains 500 odd words, but E-Mail at 1200 baud can send thousands of words a minute. E-Mail only loses out to faxing and the post in that it can't send any graphics, whereas fax can send pictures, diagrams, etc. and you can post just about anything.

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Looking out for number one

Martin Bryant tells you what to look for in a computer chess program

Video games may come and go, but chess programs will just grow bigger and better every year. In this article I will take a look at what you should expect from the best micro programs currently available.

Certain chess programs are already very well-known – for example, *Colossus Chess*, *Cyrus*, *Psion Chess*, *Superchess* and *White-Knight*. All of these programs have existed for several years and are written by enthusiastic computer chess programmers. This is an important guide to the quality of the program, because today's chess programs have reached such a level that no 'new' program could be written by a casual programmer owing to the years of development that have gone into these programs.

Of course, an overall verdict of the 'best' program is impossible because people have different requirements and expectations. Also the hardware which the programs run on varies greatly, so direct comparison is impossible.

The best program should offer all of the following features: good playing strength, 3D and 2D board, analysis display, anticipation of opponent's move, openings book, comprehensive manual, useful sounds, alter-position, backward/forward step, blindfolded play, clocks, colour adjustment, force move, joystick move entry, legal moves display, modes of play, new-game, next-best move, orientation change, playself, problem solving, replay game, save/load games and supervisory mode.

Gone are the days (thankfully) of chess programs which couldn't even beat a casual player on a bad day – and even took ages over each move. The programs that took minutes (even hours) to solve a simple mate-in-two are also obsolete – although some may still be available.

Today's programs can give even the best club players a run for their money, on tournament or blitz levels, and mate-in-two should now take at most a few seconds. Several programs are now able to spot mates-in-five or even six on blitz levels in the middle game.

Most modern programs will now think

on the opponent's time by anticipating your move and continuing its search. If you play the same move, it can save itself a lot of time and thus search further ahead and play much better. Problem

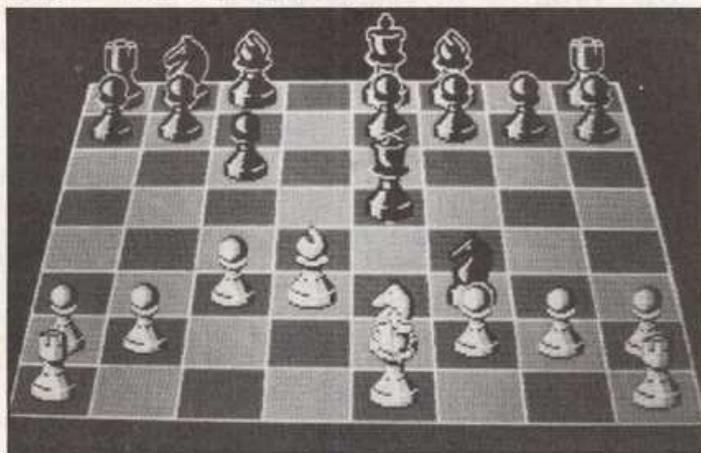
solving. The better programs offer the ability to check problems for 'cooks' – an alternative solution to the one the problem-author had intended. *White-Knight* has been used extensively

to check hundreds of problems in this way and has found several in error. (A problem is considered spoiled if it has more than one solution.)

Nowadays, chess programs usually offer more than the standard levels. The move is towards modes-of-play and levels being totally user selectable by entering an average move time you wish to play at, thus providing thousands of levels. The new modes-of-play add to the normal average move

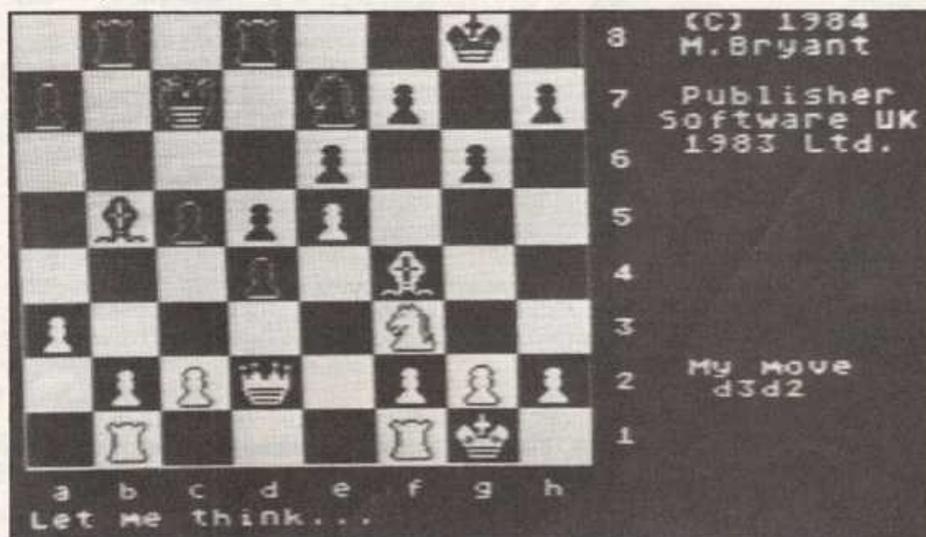
times levels and they include easy play, where the program deliberately plays weaker moves so that even novice players stand a chance; all the moves where the whole game must be completed within a certain pre-agreed time – as in most casual games in chess clubs; equal time, where the program kindly monitors your rate of play and adjusts its own to fit in with yours; infinite search where the program just looks further and further ahead to be told to stop – useful for postal games where you can just leave the computer to ponder position overnight – or even all week!

Martin Bryant is the author of Colossus Chess.



*Psion Chess (above),
Cyrus and White-Knight:
"written
by enthusiastic
computer chess
programmers"*

solving has also come a long way. *White-Knight MK12* is actually used by British International Chess Grandmaster John Nunn to aid in problem solving and design. If a Grandmaster finds it helpful, think how much it could help club players – or anyone else interested in chess



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Give your Amstrad an Emu

Mark Jenkins with new packages for Ataris and Amstrads

It's interesting to see an Atari 520ST/1040ST music package which isn't exclusively dedicated to the use of the micro's output port to control Midi synthesizers. It's not all that expensive to buy a couple of Midi synths, but those whose interest in music is, shall we say, budding, will prefer to get started without having to make any further investment than the one already represented by the micro.

Musix 32 is a German package developed by Tommy Software, and therefore comes with a handbook in typical Teutonic English. Sample: "I have to do the thankless task again of writing a preface. When you ask now, if it is really so difficult to write such a text, take attention at the way in which such prefaces are written". The way in which the handbook is written is pretty clear though; it takes us through the cursor functions, music and sound programming, tuning, printout and Basic/Pascal program use. The prime use of the program is to simplify music and sound creation using the Atari's built-in sound chip, and so inserting your results into games programs is a vital facility.

Musix sets up a Ram Disc which must leave about 100K of memory for the program to operate; you can copy *Musix* but will still need the original disc to start it up.

The main screen shows a selection of note lengths, a pair of music staves, and a wide selection of alternative functions which make full use of the GEM operating environment. The cursor can take the form of a note, rest, sharp/fast or special symbol such as delete, depending on what mode you're in, and direction arrows at the sides of the screen scan through the music which has been programmed.

Time signatures from 1/8 to 8/4 can be programmed and each of the three available sound channels works independently, so you can add to or delete them as well as tuning Channel A. In fact it's only Channel A which has a choice of envelopes, with piano-like plunk available as an option.

It is possible however to print out music with a choice of 16ths per line, line distance, lines per page and left margin spacing, while the Cut, Copy and Paste functions which use a clipboard method

"Musix seems a versatile way of including music in games and other programs, but it isn't the best bet for the more serious composer"

of operation allow you to move sections of notes about the screen. The clipboard section is shaded in black and a scissors symbol indicates that you can cut out and copy this section as many times as necessary.

There are several demos on the program disc with a minimally classical leaning, and you can store your own compositions in normal form and in XBIOS form for use in your own programs (XBIOS files can't be read or edited by *Musix* so you really ought to store pieces on both forms). A normal Pascal load routine makes your files available for use in games or other programs - sample programs are given in the handbook for Pascal, C and GFA-Basic.

Overall, *Musix* seems a versatile way of including music in games and other programs. Until the envelope and Midi options become available it isn't the best bet for the more serious composer, but at least registered users will be entitled to cheap updates when these come along. You can contact the marketing company, Creative Computer Design (CCD) at the address given below.

On to EMU, an Electronic Music Utility on tape for the Amstrad CPC 464 which wisely avoids using icon operation in favour of clear, English labelling. The opening menu offers Env, Ent, Voice, Music, Save/Load Data and Save RSX; the examples and help notes are on the B-side of the cassette.

Loading a demo is in fact quite complex, requiring a lot of moving about on the Load Page and the main menu page, although the music display (in three-part harmony on a conventional music staff) is quite impressive when you eventually



do come to it. Press *Copy* to make the music play and you'll hear a reasonably complex, slow ballad picked out in three stringy voices.

The screen display allows you to mute voices, set tempo, count notes remaining, set key, time signature and clef and choose new note and rest values to insert, and also shows you what note is playing or being programmed at any particular time on a miniature display of a one-octave keyboard. Notes are inserted one at a time using the Edit functions, or "live" from the top two rows of micro keys used as a basic piano keyboard. The software will record your performance and notate it on the screen - quite an achievement.

You can tie notes together, enter all sorts of score markings, and change the sounds used with the Env page and the Ent page, the latter defining envelope repeats. The former is a comprehensive display (within the limitations of the Amstrad's sound chip) of the time, volume and timbre of a note, and gives as much control as you could reasonably expect over the sounds available. You can vary the overall volume during a piece of music and save a piece normally or in RSX (Resident System Extension) form for use in a Basic or machine code program.

The handbook has a comprehensive list of keystrokes for programming plus a useful summary of the *Block Copy* function which allows you to reproduce any section of any voice as many times as you like. Overall, EMU seems powerful but fiddly. Some of the terms, such as ENV and ENT, are too easily confused (as are some of the displays) and the method of moving around the program is unnecessarily complex.

But it's certainly a powerful package, leaving little more to be wrung out of the Amstrad's sound chip. The options of real time or single note entry are very welcome, and of course the ability to incorporate music in your own programs will be much appreciated by those who find music and atmosphere every bit as important as general game play.

CCD, D. Beyelstein, Burgstrasse 9, D-6228 Eltville, West Germany.
EMU - Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS (0742) 753423.

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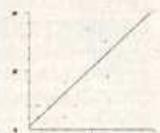
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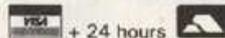
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Pick of
the week

John Cook looks through this week's new arrivals

Amiga

Program Metacomco Shell
Type Utility **Micro** Commodore Amiga **Price** £49.95
Supplier Metacomco, 20 Portland Square, Bristol BS2 8RZ.

An improved version of the standard Amiga Command Line Interpreter by the authors of AmigaDOS itself.

Amstrad CPC

Program Defcom **Type** Arcade **Micro** Amstrad CPC **Price** £8.95 **Supplier** Quick-silva, Victory house, Leicester Place, London WC2.

Program Palitron **Type** Arcade Adventure **Micro** Amstrad CPC **Price** £8.95 (tape), £14.95 (disc) **Supplier** The Edge, 36-38 Southampton Street, Covent Garden, London WC2E 7HE.

Program Footballer of the Year **Type** Strategy/Arcade **Micro** Amstrad CPC **Price** £9.95 (tape), £14.95 (disc) **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

Program Winter Wonderland **Type** Graphic Adventure **Micro** Amstrad CPC **Price** £7.95 **Supplier** Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW.

First of the new Medallion label from Incentive - all adventures produced by their excellent GAC package.

Excellent atmospheric stuff, but you'd think that the price might be a bit lower, considering the author hasn't had to spend time writing a complex development system. Oh well...

Program The Legend of the Apache Gold **Type** Graphic Adventure **Micro** Amstrad CPC **Price** £7.95 **Supplier** Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW.

Another Medallion adventure written by Peter



Torrance, author of previous Firebird releases *Subsunk* and *Seabase Delta* - which were Quilled. Another defection.

Program Kat Trap **Type** Arcade **Micro** Spectrum **Price** £8.95 (tape), £14.95 (disc) **Supplier** Streetwise, 20 Worple Road, London SW20.

Atari XL/XE

Program Special Delivery **Type** Arcade **Micro** Atari XL/XE **Price** £1.99 **Supplier** Sparklers, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hants GU14 0NP.

Program River Rescue **Type** Arcade **Micro** Atari XL/XE **Price** £1.99 **Supplier** Sparklers, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hants GU14 0NP.

Program Java Jim **Type** Arcade **Micro** Atari XL/XE **Price** £1.99 **Supplier** Sparklers, Unit B11, Armstrong



Program Paradroid/Uridium **Double Pack** **Type** Classic Arcade **Micro** Commodore 64 **Price** £8.95 **Supplier** Hewson, 56b Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX.

What you have here must be the Commodore bargain of the year that should have the punters breaking shop doors down in

then get those pennies ready, because this is one of the few really essential purchases if you are a games-playing 64 owner.

Paradroid, a wonderful combination of arcade and brain skills, has been speeded up by around 50% for this event and *Uridium* (well in line for arcade game of the year) has been substantially redesigned and reworked; almost



order to buy it - a double pack from the keyboard of Andrew Braybrook, *Paradroid* and *Uridium*. Both games are classics in their own rights and if you haven't already got both,

enough to make it a Mk II version.

Oh bliss, oh rapture, oh rapture, oh bliss - and if you'll excuse me, I'm wanted back at the joystick.

Mall, Southwood Summit Centre, Southwood, Farnborough, Hants GU14 0NP.

Program Footballer of the Year **Type** Strategy/Arcade **Micro** Atari XL/XE **Price** £9.95 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

Program Spitfire 40 **Type** Arcade/Simulation **Micro** Atari XL/XE **Price** £9.95 (tape), £12.95 (disc) **Supplier** Mirrorsoft, Maxwell House, 74 Worship Street, London EC2A 2EN.

BBC/Electron

Program Footballer of the Year **Type** Strategy/Arcade **Micro** BBC/Electron **Price** £9.95 **Supplier** Gremlin

Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

Program Fleet Street Editor - Admin Xtra **Type** Utility **Micro** BBC B **Price** £14.95 (disc only) **Supplier** Mirrorsoft, 74 Worship Street, London EC2A 2EN.

Some add-on programs that might make your life a little easier if you are an avid Fleet Street user. One converts screen files in other Modes to Mode 4, another is a database to get your files organised.

Program Fleet Street Editor - Walt Disney Graphics Library **Type** Utility **Micro** BBC B **Price** £14.95 (disc only) **Supplier** Mirrorsoft, 74 Worship Street, London EC2A 2EN.

Selection (around 50) of Disney characters for use in your Fleet Street creations. Two problems – each time you use a graphic, it has to have the Disney copyright notice printed out as well, but more importantly, you can only use the graphics on work that is not sold for profit. You may or may not find these conditions limiting, but there's no doubt that the graphics themselves are very appealing.

Program Adventure Creator Type Utility Micro BBC/Electron **Price** £14.95 (tape) **Supplier** Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW.

Version of the highly successful Graphic Adventure Creator – but without the Graphics. Includes extra facility for chaining together adventures to create huge multi-partners. Anyone want to make a start on The Many Coloured Land?

Program The Winter Wonderland Type Graphic Adventure Micro BBC B **Price** £7.95 **Supplier** Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW.

Program Revs + Revs 4 Tracks Type Simulation Micro BBC B **Price** £12.95 (tape), £14.95 (disc) **Supplier** Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.

Possibly the best simulation on any home micro, certainly the best racing game, this Geoff Crammond masterpiece has now been re-released, together with the 4 Tracks package that you used to have to buy separately. It's fabby, fabby, fabby, fabby, fabby – worth every single penny – and I can promise you that if you haven't got this program, you aren't getting the most out of your BBC.

Program Revs + Revs 4 Tracks Type Simulation Micro BBC Master Compact **Price** £19.95 **Supplier** Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.

C16/Plus 4

Program Footballer of the Year Type Strategy/Arcade Micro C16/Plus 4 **Price** £6.95 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

Program Space 2 Type Arcade Micro C16/Plus 4 **Price** £2.99 **Supplier** Midas Marketing, 35 West Hill, Dartford, Kent DA1 2EL.

A double helping of shoot-em up which, while gaining no awards in the originality stakes is a good each-way bet in the value steeplechase.

Program Harvey Headbanger Type Arcade Micro C16/Plus 4 **Price** £1.99 **Supplier** Firebird, 76 New Oxford Street, London WC1A 1PS.

Cute arcade/strategy played against a friend or the computer itself – surprisingly addictive, rather like the cocktail of a similar name.

Program Prospector Pete Type Arcade Micro C16/Plus 4 **Price** £1.99 **Supplier** Mastertronic, 8–10 Paul Street, London EC2.

Entertaining enough arcade action which has you burrowing through the earth in order to grab the goodies.

Commodore 64

Program Sky Runner Type Arcade Micro Commodore 64 **Price** £9.95 (tape), £12.95 (disc) **Supplier** Cascade Games, 1–3 Haywra Crescent, Harrogate, North Yorkshire HG1 5BG.

Cascade, of course, spent years churning out that woeful Cassette 50 thing, but came good about 18 months back with Ace. Now the first of their follow-up titles, Sky Runner, which they obviously hope will do just as well – but will it?

The Popular camp was split on this one. There was the 'yawn – oh good grief, this is the most boring game in the

universe,' team and a smaller, but exceptionally vocal cell screaming, 'wow, this is the most fabby thing since the invention of the digital watch.'

Me – I was simply astounded that it should evoke such extreme emotions.

Professionally programmed enough with reasonable, but far from outstanding graphics, Sky Runner has little to lift it out from the crowd. Maybe I'm missing something?

Program Java Jim Type Arcade Adventure Micro Commodore 64 **Price** £1.99 **Supplier** Sparklers, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hants GU14 ONP.

Program Orc Arrack Type Arcade Micro Commodore 64 **Price** £1.99 **Supplier** Sparklers, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hants GU14 ONP.

Program Slurpy Type Arcade Micro Commodore 64 **Price** £1.99 **Supplier** Sparklers, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hants GU14 ONP.

Program Robot Rascals Type Strategy Micro Commodore 64 **Price** £16.95 **Supplier** Ariolasoft, Long Acre, Covent Garden, London WC2.

Interesting combination of card and computer game by the team that designed M.U.L.E. and Seven Cities of Gold. For 2–4 players, I should think it will appeal if you want to get young children around the monitor, although once you bolt on some optional rules, it's complex enough for anyone.

Program X-29 Fighter Mission Type Arcade Micro Commodore 64 **Price** £2.99 **Supplier** Midas Marketing, 35 West Hill, Dartford, Kent DA1 2EL.

Midas Marketing looks like it's the budget arm of Anirog/Anco team – but although it's a flight simulator/shoot-em up, it's any-



thing but a flying start. Vague instructions, unresponsive controls, unsatisfactory.

Program Footballer of the Year Type Strategy/Arcade Micro Commodore 64 **Price** £9.95 (tape), £14.95 (disc) **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

Program Headcoach Type Strategy Micro Commodore 64 **Price** £9.95 **Supplier** Addictive Games, 10 Albert Road, Bournemouth, Dorset BH1 1BZ.

Even though they've fiddled about with the rules, it's the best American Football strategy game on the market at the moment, although great things are hoped for from Nexus early in the New Year.

Program Skate Rock Type Arcade Micro Commodore 64 **Price** £8.95 **Supplier** Bubble Bus, 87 High Street, Tonbridge, Kent TN9 1RX.

Skateboarding action on your 64, sports fans – but before you switch off and reject the thing as seven years too late, you might be interested to know that Atari have recently introduced a coin-op about the same subject, called 720.

Almost topical from that standpoint then, the game has the dodging elements of Paperboy played on a low-res, horizontal scrolling, multi-colour screen, as you skate around, collecting flags scattered around the place. Decent sound effects add some polish, but I'd have been happier recommending this if it had been cheaper.

Spectrum

Program Pro Golf Type Simulation **Micro Spectrum Price** £1.99 **Supplier** Atlantis Software, 20 Station Road, London SE25 5AG.

Program Battle of Britain Type Strategy/Arcade **Micro Spectrum Price** £9.95 **Supplier** PSS, 452 Stoney Stanton Road, Coventry CV6 5DG.

Never in the field of computer conversions has so little ever taken so long. The Amstrad version has been out for almost a year; now relive those tally-ho days of 1940 on your Spectrum.

As with most of the War-gamers Series, an agreeable mix of strategy and optional arcade action.

Program Tarzan Type Arcade Adventure **Micro Spectrum Price** £8.95 **Supplier** Martech, Martech House, Bay

Terrace, Pevensey Bay, East Sussex BN24 6EE.

Program Judge Dredd Type Arcade **Micro Spectrum Price** £8.95 **Supplier** Melbourne House, 60 High Street, Hampton Wick, Kingston Upon Thames, Surrey KY1 4DB.

Program Satan's Servants Type Adventure **Micro Spectrum Price** £7.50 **Supplier** K Marshall, PO Box 19, Redcar TS10 2YS.

Program The Legend of the Apache Gold Type Graphic Adventure **Micro Spectrum Price** £7.95 **Supplier** Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW.

Program Scalextric Type Arcade **Micro Spectrum Price** £9.95 **Supplier** Virgin Games, 2-4 Vernon Yard, Portobello Road, London W11 2DX.

A motor racing construction set, plus a kind of Pit Stop II – decent racing games are few and far between on the Spectrum, so this is well worth looking at, Sterling.

Program Winter Wonderland Type Graphic Adventure **Micro Spectrum Price** £7.95 **Supplier** Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW.

Program SAS Operation Thunderflash Type Arcade Adventure **Micro Spectrum Price** £2.99 **Supplier** Sparklers, Unit B11, Armstrong Mall, Southwood Summit Centre, Southwood, Farnborough, Hants GU11 ONP.

Program Harvey Headbanger Type Arcade **Micro Spectrum Price** £1.99 **Supplier** Firebird, 76 New Oxford Street, London WC1.

Program Kat Trap Type Arcade **Micro Spectrum Price**

£8.95 **Supplier** Streetwise, 20 Worple Road, London SW20.



The second of Domark's releases under the Streetwise guise – and not as good as the first. Well enough programmed by Graham Stafford of Design Design, but somehow fails to inspire.

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Towards the computerised Filofax

It doesn't seem very long ago that the major driving force in computer design was miniaturisation. Computers had shrunk from room-sized to table-sized, and micros and pocket calculators were taking the trend even further.

Several manufacturers brought out pocket sized computers; typically, they were the size of large calculators, equipped with a one-line screen, 1K to 4K of memory, and tiny calculator keys.

Today this trend seems to have gone into reverse; pocket computers were never wildly successful, so the typical portable computer is now briefcase-sized rather than pocket-sized, and pocket computers are almost forgotten.

The only survivors are the Psion Organiser, several calculators with limited text facilities, and a few pocket 'notebook' machines. All still have tiny keys and displays.

The trouble with the last generation of pocket machines was that they were marketed as computers, but generally perceived as glorified calculators. Their limitations made them useless for most serious applications.

The Organiser is an exception; it profited from some of its predecessor's mistakes, adding comparatively large memory, Ram cartridges, and a range of peripherals for specialised data gathering.

When all is said and done, though, it's still a long way from the full-featured pocket

computers that were predicted a few years ago. Meanwhile technology has advanced in several areas; maybe it's time for manufacturers to have another think about the way these machines should be built.

To begin with, let's assume that the largest practical size for a pocket computer is about the same as a thick paperback book; about 11 by 18 centimetres, five centimetres thick. What can we put into nearly 1000 cubic centimetres?

"Let's assume that the largest practical size for a pocket computer is about 11 x 18 x 5 centimetres. What can be put into 1000 cubic centimetres?"

The first priority has to be a reasonably sized Qwerty keyboard, with comfortable-feeling keys. My old ZX-81 had such a board, a microswitch array that replaced the original plastic membrane without occupying any more area. The keys were 15 millimetres square, about the same size as the top of an IBM key, but packed closely to form a 40-key array 16 by six centimetres.

This still leaves a little room on our basic book shape, so let's add a space bar, some

more punctuation keys, and a few function keys. Keys that won't be used much can be a little smaller, down to calculator size.

All these keys don't leave a lot of room for a display, so why not take it off the keyboard completely, and put it on to a folding lid instead? This could be a fairly big display; the Epson PX-8 screen is only a little wider, and all pocket TV set screens are smaller. Let's say it's an 80 column screen with ten lines; that should be legible, and sufficient for a wide range of applications.

So far we've developed the external appearance of the machine; essentially, a box with an LCD screen in its lid and a keyboard in the base. What else do we need?

One major consideration is a lot of memory; 64K is the minimum (about 10,000 words), 128K would be better. Software built in as 'firmware' should include a programming language, operating system, a word processor, communications, calculator, a diary, and a notebook-style database.

To support the diary the machine should have an internal clock. A modem would be nice, and a couple of RS-232 sockets are essential; most users will be transferring files to and from other computers fairly frequently. Data storage could be on micro-cassettes or discs, but Eprom cartridge storage (as in the Psion Organiser) is probably safer, and certainly smaller and lighter.

It would also draw less power, an important consideration for a pocket machine, and would be compatible with Rom-based add-on software. The power supply should be rechargeable, with back-up for memory from a separate cell. Other facilities should be available as add-ons, but wouldn't be part of the main machine; possibilities include a pocket printer, bar code readers, and so on.

This machine could easily be built today; all the components are available, and the latest surface mounting technology makes it easy to cram them all into a book-sized housing. It might even be possible to build the entire system (including memory) into a single chip, though this is probably still a year or two away.

The main limiting factor is money. If this machine cost £300-£400 it would be up against the Epson PX-8 and other lap-held machines with bigger keyboards and more facilities. It's hard to believe that it would be a huge success. At around £100 it would be a worthy opponent of Psion and Hewlett-Packard. If the price dropped to £50-£60 it could compete with the ultimate enemy of pocket computers; not IBM, not Epson or Hewlett Packard, but a company that maintains a virtual monopoly of this applications area. At this price it would be a direct challenge to Filofax...

Marcus L Rowland

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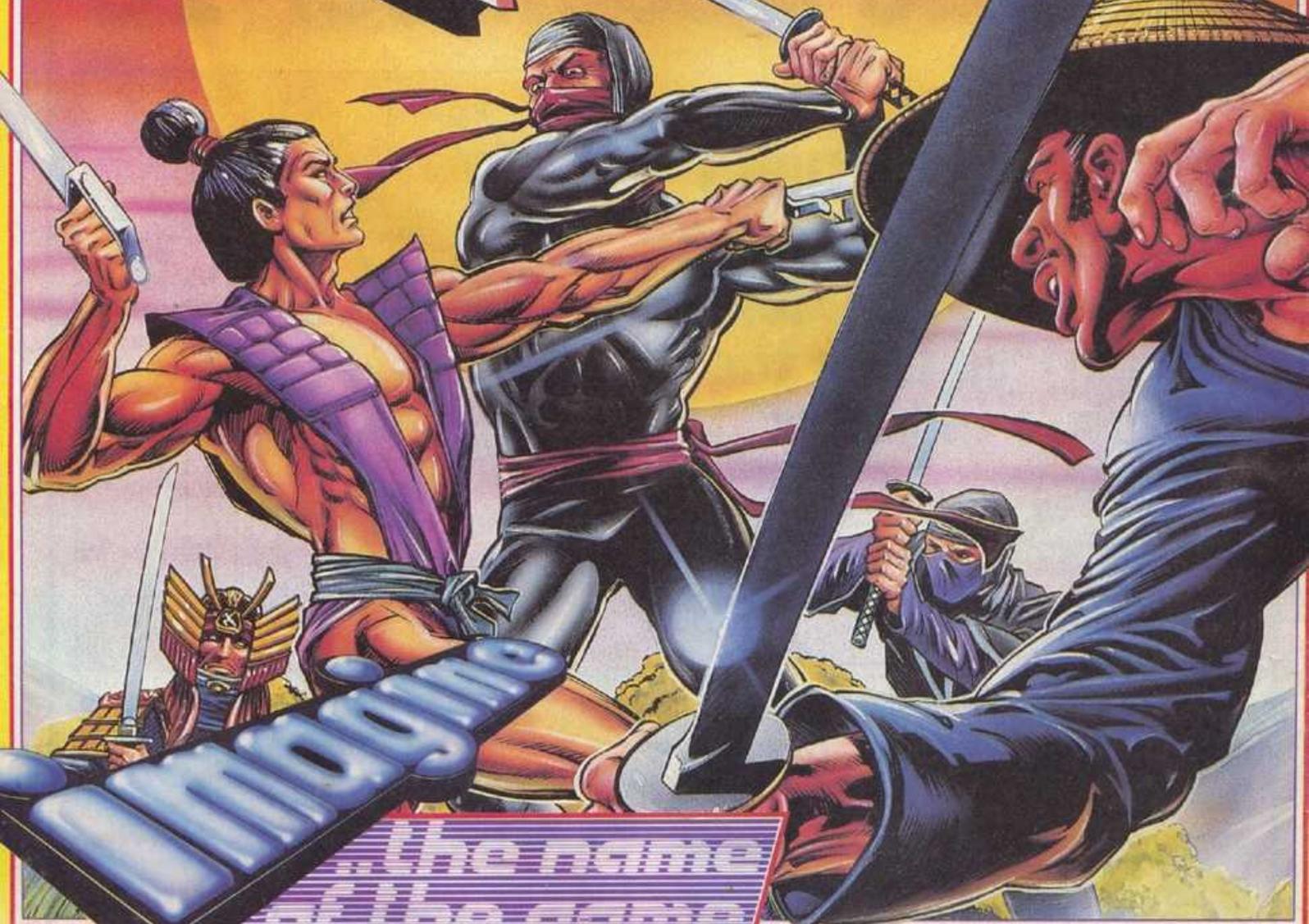
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