

40 Rock

# POPULAR Computing WEEKLY

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Vol 4 No 29

## 'U'-turn as QL gets 3 $\frac{1}{2}$ " discs

SINCLAIR - in an apparent switch of policy - is to bring out a disc drive and interface for the QL under its own name.

The company had previously strenuously resisted such a move despite strong pressure, being committed to microdrives as its sole mass storage medium.

The Sinclair QL disc drive

will be by Microperipherals which already produces a disc unit for the machine.

The Sinclair-labelled version should be available within a month.

The 3 $\frac{1}{2}$  inch drive has an unformatted capacity of 1M, a formatted capacity of 720K, and takes double-sided, double-density discs. Up to four drives can be 'daisy chained'

together, the second drive plugging into the back of the first, and so on. The disc interface plugs into the QL's expansion port.

"It's not a new disc drive, we've been shipping since March," said Richard Miller, Microperipherals' technical manager. "Sinclair has been interested in badging a disc drive for about seven months now, so we were very pleased to get the contract,

continued on page 5

## Amstrad 128K in autumn launch?

IT APPEARS that Amstrad may now be planning to re-release its disc-based, 128K 6128 machine in the UK this autumn.

The 6128 is a version of the recently launched CPC 664, with a revamped keyboard, bank-switched memory up to 128K, and more enhanced versions of the CP/M and DR Logo which are bundled with the 664. The 6128 was first shown to the American market at the summer CES in

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## Sinclair looks at optical cards link

METALAB, Sinclair's research facility, has been looking at the applications of optical memory systems such as the Philips CD Rom player (pictured below).

The company is also very interested in a new form of optical memory storage, the

Drexon LaserCard. Manufactured by the Drexler Technology Corporation in California's Silicon Valley, the LaserCard is a credit-card sized piece of plastic with a strip of photo-optical recording material on it.

Up to an incredible four megabytes of information can be recorded on just one card, and there are two types - one is read only, the other write/read, or 'write once'. The former have to be factory prerecorded, while the lat-



Frankie is pick of the week

ter can be written to with a low power laser. Neither type is erasable.

The read only cards can cost as little as £2 to manufacture and a card-reader costs around £250.

Drexler has licensed the rights to develop applications for the cards to about 20 companies around the world.

The only licensee in the UK is Robert Maxwell's British Printing and Communication

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## INSIDE

● Sinclair  
£1.5m writ

● Rom card  
breakthrough



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SPECTRUM SCREEN SHOT

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The Drexler 4M optical Rom card and reader

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## EDITORIAL

It is now a month since the first announcement of Robert Maxwell's proposed 'take-over' of the troubled Sinclair Research.

If the details of the deal were uncertain then, they are now hopelessly confused.

Each week brings new conflicting reports detailing which parts of the Sinclair company are either included or have been left out of the deal. The only certainty now is that pressure is increasing quickly for Sinclair to finalise an agreement with Maxwell as soon as possible.

Sir Clive's problems are escalating and his separate venture Sinclair Vehicles is now in trouble, with Hoover pressing for payments of money it claims it is owed. He is being squeezed from both sides.

The Maxwell delays are beginning to damage Sinclair Research.

The uncertainty is bad for morale and the company urgently needs a sound financial footing to enable it to produce its up-coming new micros – the suggested 128K Spectrum and the Pandora portable.

At the same time Sinclair Research needs a confident business

direction to ensure it doesn't get side-tracked as it has done in the past with inadequately market researched decisions such as that to use microdrives in the QL. Perhaps Sinclair's agreement last week to endorse a disc drive for the QL signifies a change of attitude at the company; on the other hand the choice of the Microperipherals unit must be a set-back for software houses hoping for a standard DOS to emerge.

It must be hoped that the Maxwell deal eventually comes off. The two companies have a lot to offer each other. Maxwell's information technology interests are considerable – both as an information provider and with licensing deals like his acquisition of rights to Drexler Technology's 4M capacity optical Rom card.

However, the more protracted the Sinclair/Maxwell negotiations become the less likely is it that a successful deal will eventually be struck.

And all the time, the future of the UK's biggest volume micro manufacturer is balanced on a knife edge.

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# Home micro 'card' software arrives

SOFTWARE programs up to 128K in size will soon be available for all the top home micros in a convenient form, the shape and size of a credit card.

Developed in Japan by Astar International, the new software cards – an alternative to cassettes or discs – are being distributed in the UK by

Electric Software of Cambridge and will be available this autumn.

The program is contained either in a thin Rom chip or in a battery backed-up Ram chip which is then sandwiched between two slices of plastic, with an edge connector at one end. A special adaptor to plug in the cards is

needed for each type of micro which will be priced at around £10.

Already there is an MSX version with Electric Software developing Spectrum and QL versions. Other UK firms will be working on adaptors for the Commodore 64, BBC B, and other leading micros.

Electric Software's own range of Rom games for the MSX is already available on credit card – or Sofcard, as Astar calls it – retailing at between £14.95 and £19.95.

Astar and Electric Software are pushing the Sofcard as an anti-piracy device. According to Mike Hall, Electric Software's spokesman, "Beyond, Activision and US Gold are very positive, as are distributors like Lightning."

The major drawback, however, is price – as Mike Hall is ready to admit. "If we cannot get the price of games on Sofcard to £9.95 within a year, the whole thing will fail."

At present, Astar has produced Rom cards, which have to have the program put on the chip at the factory, and Eprom cards, which users can write to once only.

The next step is electrically erasable Eeprom cards, and then Ram cards. It is the last which Mick Rouse sees as offering a cheap and viable alternative to disc drives.

The cards will come in 16K, 32K and 128K sizes. The Ram cards will also include a small battery with an estimated life of two to three years.

While the 128K chip is likely to be the largest that will be put on to a Sofcard because of the restrictions on access via the edge connector, Mick

Rouse sees no reason why there cannot be more than one chip on the same card.

Electric Software's parent company, GST Computers, has been exploring business, industrial and commercial applications.

Amongst these are security devices, keys and smart credit cards. Business software houses are apparently particularly interested in the card's ability to self-destruct after a set period (when the battery runs out). "Some business software packages are licensed for a limited period – if you program them so that they will only run if a Sofcard is also present, you can enforce the licensing period by having the card destroy itself when the license period is up," observes Mick Rouse.



Home micro Rom card

Astar's UK agent, Peter Ryde, says that market research surveys conducted on behalf of the company have suggested that some 20 million Sofcards can be sold in Europe within the next 18 months – and up to 80 million within five years.

In Europe, however, the Astar card will be up against existing smart cards – French banks have already ordered three and a half million Ram cards to be used as intelligent credit cards from Bull, a French government-owned electronics firm.

## Optical Roms

continued from page 1

Corporation – and it is another of Robert Maxwell's companies, Hollis, which is to take a controlling interest in Sinclair Research.

Peter Howgate, managing director of the information services division of BPCC Graphics, the company which has been looking at the Drexon LaserCard, said that "discussions will take place with Sinclair."

He further commented that "the QL would fall squarely in the area where you could apply this technology." He believes that the card could easily be used to hold both business software and detailed documentation, but sees little immediate likelihood of it having any home use.

Metalab's chief Richard Cutting, however, said that Sinclair is "well aware of Drexler technology, and we have been talking to that company."

Sinclair is also apparently evaluating the potential of

compact optical disc storage devices. Metalab is thought to be currently looking at a prototype Philips CD Rom player, although Richard Cutting declined to comment on such a possibility.



Drexler optical data cards

Metalab's interest in these new high-capacity optical storage devices doesn't mean however that it is unlikely to continue with its large-scale wafer storage research.

Ricard Cutting claims Sinclair will still be pursuing the wafer scale integration project: "It was well publicised before the takeover that we were pursuing that line of research, and there is no reason why we should not continue to do so."

He also suggested that Sinclair was close to getting funding for the project, which has been estimated to require some £50 million.

● He also confirmed that the Pandora, the Sinclair 128K portable micro under development, would be compatible with the Spectrum, supporting Sir Clive's recent statement on Thames TV's *Database* that the Pandora would use Spectrum, rather than QL, microdrives.

If so, the Pandora would have to include a Z80 or compatible chip, but Richard Cutting also remarked that "the era of the Z80 is coming to an end" and went on to suggest that the 68000 was its logical successor.

This increased speculation that the Pandora may be a Z80-68000 twin processor machine.



Jerome Drexler

## Clive's writ

SIR CLIVE Sinclair's problems deepened at the weekend with news that Hoover – the company which manufactures the C5 electric vehicle – has taken out a writ against him for non-payment of £1.5m in outstanding debts, incurred by his Sinclair Vehicles project between November 1984 and June 1985.

The writ was obtained by Hoover some weeks ago and

has yet to be served on Sir Clive. Instead its existence is apparently being used to apply further pressure on Sinclair.

Commented a spokesman for Sinclair Vehicles: "Hoover has not to date attempted to serve that writ – and until they do, as far as Sinclair is concerned, it effectively does not exist." Sir Clive is currently on holiday in the US.



## UK firms let-down as USSR goes MSX

RUSSIA has made the first moves in its scheme to equip its schools with micros - and the first order has gone to MSX, the Japanese consortium.

The Russians, through the Institute of Science and Technology, will pay around £2m for 10,000 MSX machines.

The decision is a bitter disappointment for the British companies which are also vying for a share of the potentially huge Russian schools contract.

Acorn, Sinclair and Memotech were all hoping to sell a substantial number of machines to Russian educational establishments when the COCOM restrictions on technological exports to the Eastern bloc are lifted later this year.

"While the timing of this order is not surprising, it is a

little surprising it went to MSX," said Joe Black for Acorn International.

"This order looks like a short term contract, and I would think there will be a number of short term purchases made for different machines."

"The Russians did say they wanted 10,000 machines for this year to get their educational programme going, so this deal means Memotech did not get the initial order," said Memotech's Jeff Wakeford. "However, they have asked us to go back to the Soviet Union with the Memotech micros in August, so at least they're still interested."

It is thought that the Soviet contract with the MSX group does not involve any manufacturing rights, and is valid only for one year.

## GEC plans £150m chip factory

GEC, the electrical giant, has announced it is to spend £150 million on building a chip manufacturing plant in Britain.

This will be the largest British investment yet in the micro chip market, with an initial expenditure of around

£60 million.

The news comes as both Inmos and STC have found themselves struggling after the dramatic drop in the price of semi-conductors.

However, GEC will be manufacturing for highly specialised markets such as the military and telecommunications industries. The plant, for which no opening date nor exact location has yet been set, will be run by the GEC subsidiary Marconi Electronic Devices.

## MUD on the road

BRITISH Telecom is planning a major promotional campaign for MUD 2, the new version of the multi-user play-by-modem adventure game which is to be launched at the *Personal Computer World Show* in September.

The original MUD is still running on the University of Essex computer as well as on Compunet, but MUD 2 is an expanded version of the game specially commissioned by BT.



Richard Bartle and Roy Trubshaw, who wrote the original five years ago while at Essex University, are creating MUD 2 at the moment.

Users of the game, which will be running at night and on weekends, will have to purchase a 'MUD Pack' from BT. This will cost £20, which includes registration fee, full instructions for playing the game, a map of the Land of Mud, a credit card with personal codes on it, and 30 credits.

They will also need a 1275 baud modem and terminal emulation software.

One credit will last for six minutes, which means that the game will cost £2 per hour, plus phone charges, to play.

Mike Anderies of BT's New Information Services says that MUD 2 will be running on a Vax 11/750, with an initial 40 lines, increasing to over 100 lines later.

If MUD 2 proves successful, BT intends to put the game on computers across the country.

"Our intention," Anderies said, "is to make MUD 2 as cheap as possible."

For the first month of operation, between the September and November 5, MUD 2 will be free to users who have bought or ordered a MUD Pack.

## QL 'U' turn

continued from page 1

particularly as our interface uses a different DOS from the other QL disc units." Microperipherals' DOS is, in fact, written by Richard Miller himself.

Sinclair appears to have decided that a Sinclair-badged disc unit will boost sales of the QL, while a continued reliance from Sinclair

solely on the microdrive would not.



## Amstrad's 128K

continued from page 1

Chicago at the beginning of June. At that time, Amstrad said the 6128 would not be launched in this country until next year.

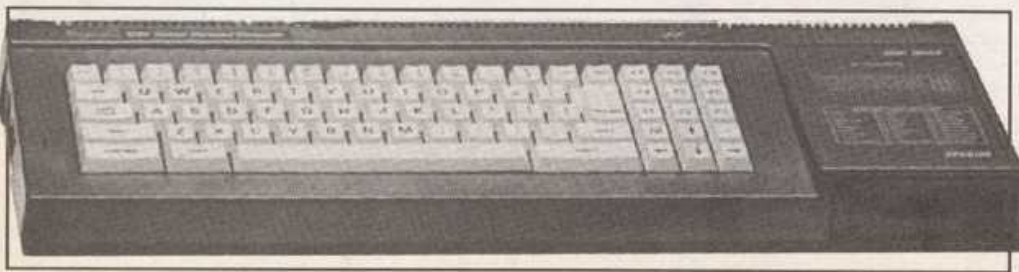
Now it is thought Amstrad may be planning a launch at the *Personal Computer World Show* during the first

week of September.

Adventure specialists Infocom and Kuma, which wrote some of the first Amstrad software, have both expressed an interest in writing for the 6128, and high-street chain store Rumbelows is also considering stocking the machine when it is launched.

"Amstrad machines sell

well and are very reliable. We are closely considering machines like the 6128. Although I have only seen it at the show it would seem to be the sort of machine that would appeal to people who have bought machines from other companies, as well as other Amstrad micros," commented a Rumbelows spokesperson.





## Popular QL

Having read John Ure's letter in *Popular* I feel that he fails to appreciate that the QL is a 'popular' computer (50,000 have been sold, I believe which may not be in the same league as the Spectrum or Commodore 64, but is more than many) and that some of us are serious users who like to know a bit about the serious software available.

Would Mr Ure consider spending £80 on a program he knew nothing about?

I am not particularly interested in arcade games, (although I must admit a liking of *Lords of Midnight*) but am more interested in serious work, as are many QL owners, and we don't moan about the games reviewed.

I Robertson  
Crewe  
Cheshire

## A key press

Just a little tip. When the Commodore 64 is switched on, you only get one letter however long you press a key. Typing *Poke 650,255* will give you multiple letters from one key press (depending on how long you press that key).

*Poke 650,00* returns it to normal and *Poke 650,100* will make all keys (including delete, etc) need multiple presses.

Hope you find the pokes useful.

Nicholas Coles  
Armsworth Park Farm  
Alresford  
Hants



## Micronet competition

This is the third clue in this competition being run jointly with Thames TV's *Database* program and Micronet 8000. Details of where to send your entries will be published next week.

### Part A

"Centuries ago as the water swelled,  
The Holy Grail lay in the Chalice Well,  
From Joseph's staff thrown down for a rest  
Grows the thorn bush, flowering in winter best,  
Where a wounded King, carried by  
six black clad Knights,

Was taken to die on this Isle, a Tor of great height."

### Part B

"Experience, though noon auctoritee  
Were in this world, is right ynogh for me  
To speke of wo that is in mariage;  
For, lordynges, sith I twelve yeer was of age,  
Thonked be God that is eterne on lyve,  
Housbondes at chirche dore I have had fyve,  
- If I so ofte myghte have ywedded bee,  
And alle were worthy men of hir degree."

No, no line noise, all the Tales are like this!

## Too serious?

As the writer of *Beatle Quest*, I would like to express my sadness at the reactions of Beatle 'fans' to *Popular's* complementary review. I took all the comments with my tongue in my cheek and laughed heartily at the mention of (Neil). I only hope

that all those 'fans' who buy and play *Beatle Quest* will forgive my own mention of (Neil); try dropping the cigarette!

As for myself, I haven't had my head in a bucket either, despite being 31. I have all the albums including those 'funny' ones with white labels and recommend that life isn't taken too seriously. As John said, "You'll get yours yet".

Gerry Marsh

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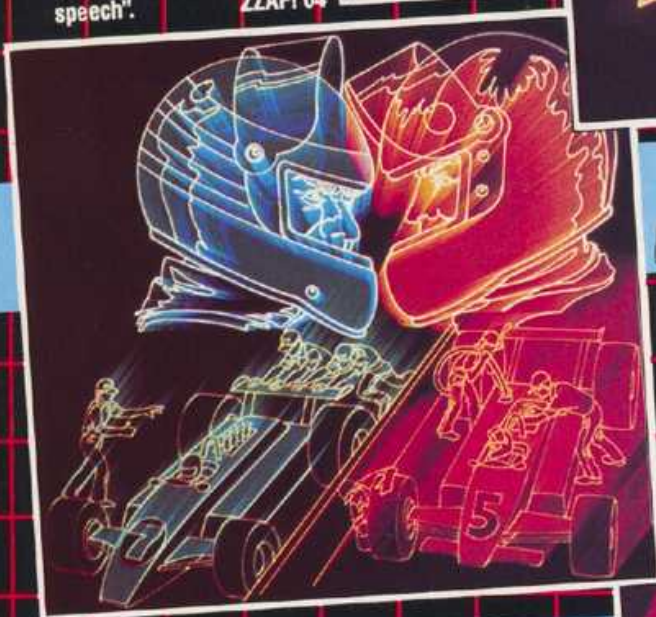
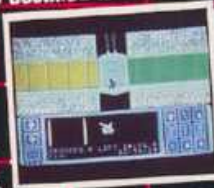
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## On the cards

**Program Rom Board Micro**  
Amstrad Price £39.95 **Supplier** Micropower, Sheepscar House, Sheepscar Street South, Leeds LS7 1AD

**M**icropower are producing an extremely extensive selection of Roms for the CPC machines to be released over the next few months and the inevitable corollary of this is that you need somewhere to plug them in.

Unlike the Arnor Rom reviewed a few weeks ago, the Superpower system gives you a board capable of taking up to seven plug in chips of 8 or 16K. The chips are supplied free standing and without any dangle protection – as in the BBC.

Arnor's Rom board, in its present form, will not accept free standing chips.

It doesn't make sense to buy both systems – leading to an expensive, and jumbled spaghetti of cards in the back of the CPC, no matter how good the rival programs are. The only serious omission from the Micropower product is that there are no Rom management commands as provided by Arnor – these can be used to interrogate the commands of all the Roms and turn off selected ones if they use parts of Ram that conflict with programs, etc.

The price can be mitigated somewhat – if you order quickly you will be entitled to a free Rom containing Micropower's game *Ghouls*. It was a big hit on the BBC and it runs much better on the CPC than the majority of conversions.

The other consideration is that Micropower's board is well made and has the support of an established company. It comes in a well finished box and wins the prize for the peripheral that fits best into the back – absolutely snug with the computer casing and no sign of wobble at all which is more than Amstrad themselves seem able to do. There is, of course, a through bus for the disc drive.

Documentation is also good – explaining how to fit the chips, the way in which the computer allots priority to a given Rom, how to lower the priority of the computer's Basic, etc. With the potential of their range of Roms that will be appearing, my feeling is that it could be one of the most important add-ons you could buy.

**Tony Kendle**

## Mailings

**Program Mailing List Rom**  
Micro Amstrad Price £39.90 **Supplier** Micropower, Sheepscar House, Sheepscar Street South, Leeds LS7 1AD.

**I**t is always difficult to comment on programs like this – a specialist utility with a very finely defined application. It could be exactly the thing you are looking for, or a complete waste of time. For people who have a desperate need for a mailing list database its usefulness may even be such that it justifies the cost of the entire hardware – computer and all.

The program is derived from Micropower's own mailing list utility that runs on a Nascom mini so it has a reputable pedigree. Putting it in Rom is less of an obvious move than with some utilities. Once the majority of club members or whatever has been entered it is conceivable that the program will only be accessed monthly – hardly an inconvenience to load it from disc or tape. However the principle reason is that it frees the entire Ram for storage of names, addresses and other details, helped by the fact that all records are of

variable length so that no space is wasted – typically about 300 people can fit. Ram is used wherever possible for speed of access but you are provided with a routine for splitting the data into linked files that can be read in turn when looking for data. In that way you can have lists of many thousands of people.

New names are entered in order so that searching is still very quick but this does make insertion slightly complicated when linked files cross several discs – you have to merge files, split them again once revised etc. It is made as automatic and painless as possible but still involves swapping discs all over the place – at this point the normally readable manual reaches its densest phase complicated by almost deliberately obscure choices of file names. Attempting this on a tape deck, may be a guaranteed ticket to the nut house. Still it does work, and following the instructions (slowly) will guarantee security of data.

The program is menu driven option that every time you press the appropriate key a screen of information appears giving help on the use of commands – the documentation need only be worked through once to pick it all up.

**Tony Kendle**

## Basic Plus

**Program Basic Extensions and Toolbox Rom**  
Micro Amstrad Price £39.90 **Supplier** Micropower, Sheepscar House, Sheepscar Street South, Leeds LS7 1AD.

**L**ocomotive Basic is generally accepted as being one of the best available on a home micro, but doubtless everyone could name some features that they would like added – whether it is games oriented sprite control or highbrow structured procedures.

The thing that Amsoft received most criticism for after the launch of the 664 was that there was to be no Rom upgrade available for 464 users to employ the graphics commands. If nothing else this is a disincentive to commercial companies to use them. However for those who want to have access to the facilities for their own programs, or for converting listings, you are supplied with the equivalent of most of them and much more besides on this chip, a very smart move since it could add considerably to its sales appeal. The only missing command that I would like to see is the disc error func-

tion *Derr*.

Ultimately your decision on whether it is worth the price tag depends on the available commands, and I could do no better than to list the major ones here. The version I had was pre-production, and it is possible that some additions will be made later so check with Micropower for more details. Of the 664 commands you are given these equivalents – graphics *Pen* and *Paper* colour control, transparent mode, masking to produce patterned lines, colour *Fill Copychr\$* for reading characters off the screen and frame for smoothing animation.

Additional graphics commands include a VDU command as in the BBC *circle* and some very fast turtle graphics.

Many people will welcome the music micro language as in the MSX machines – no more hunting through frequency tables – just type *GGB&DD* etc.

Programming aids include *Ltron* and *Ltroff* – sends the trace output to the printer, *RemKill*, string find and replace for your Basic programs, screen switching, an editor and a memory editor – the latter two are functional but not the best I have seen. There is an in-built UDG designer that automatically produces the appropriate Basic lines for inclusion in your programs. You can also obtain *Info* about start locations, length of files, etc, and *Unprotect* files. The *Command* command gives you on screen details about the function and syntax of all the new words.

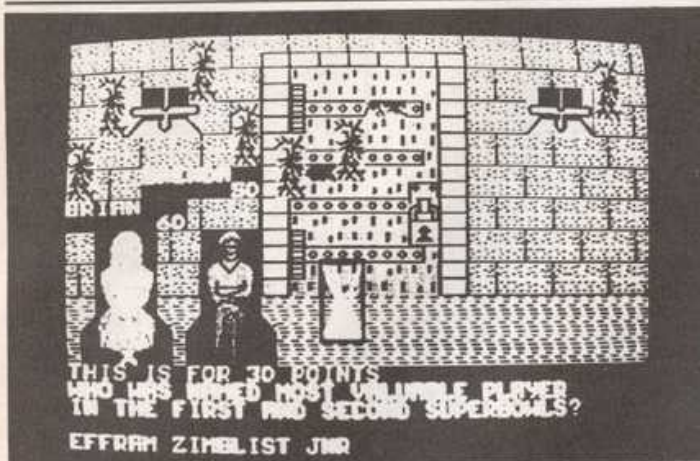
Printer controls have been expanded to include a monochrome and a shaded screen dump and an *Echo* function that reproduces what is printed on screen. Printers can be toggled between Epson and Amstrad types.

More than any other language Basic has lost all pretensions to standardisation in favour of control over the hardware.

Some of these facilities are fudging the definition even more between ordinary commands and in-built utilities, but there is no doubt that this is a step up for the 464's sound and graphics.

**Tony Kendle**





## Monstrous

**Program** *Monster Trivia*  
**Price** £9.95 **Micro** Commodore 64 **Supplier** US Gold, Unit 10, Parkway Industrial Estate, Heneage Street, Birmingham B7 4LY.

If you think that the title *Monster Trivia* suggests some sort of arcade game then you're in for a big shock. US Gold's latest offering is, in fact, a rather weird quiz game based on last year's Christmas biggy *Trivia Pursuit*.

At first sight, the claim that the program contains two thousand different questions seems impossible. However, this problem resolves itself when you realise that the 18 different levels each require a separate data base, loaded from side B of the tape.

The quiz takes place in the cellar of the mad professor's mansion. Behind a door lives the hideous, unspeakable, incredibly dumb - the *Trivia Monster*. During the quiz you see him pounding on the door

and peering through the windows. If a contestant makes too many mistakes, he breaks down the door and drags the culprit off. All very terrifying!

Now, down to the questions. They are taken from six different categories - sport, history, arts, science, showbiz and grab-bag. Each player answers three questions from all the sections. Most of the questions are pretty obscure - for example, "What is a biologist who studies smut interested in?" Who would have guessed that the answer is fungi? Still, I suppose it all adds to the fun. Being an American game, the questions are all related to the USA, so they can prove to be a bit taxing for us Brits. (Do you know how the Cleveland Browns got their name?). Surely they could have changed a bit for this country - there's a difference between deliberately obscure questions and impossible ones. I love the monster sequence, though.

Tom Hussey



## Nostalgia

**Program** *Adventure* **Price** £3.95 **Micro** ZX81 16K **Supplier** Gavin Barker, 12 Fleming Field, Shotton Colliery, County Durham DH6 2JF.

I'd forgotten the joys of the ZX81; the screen flash for every input; the blackouts while it thought... Could this be the future of computing? No messy attribute problems! No complaints of weak sound

(there ain't none)! And no need for a reset button when Ram-pack wobble does that for you!

Seriously, about the only games for which this venerable micro is suitable are strategy and adventure. Here are three of the latter and for once you know they're not *Quill*-ed! In fact, they're Basic, but packed full by using separate Loads for Instructions.

*The Challenge* and *Haunted House* both contain graphics in that chunky Lego style we all once loved, but they're effective enough, although

## Checker

**Program** *QSpell* **Price** £19.95 **Micro** Sinclair QL **Supplier** Eidersoft, Hall Farm, North Ockendon, Upminster, Essex RM14 3QH.

The most useful add-on to a word-processor, after the mailing shot facility, is the spelling checker. All the standard business programs have one and now we have *QSpell*.

*QSpell* contains some 25,000 words in its dictionary, which is not an awful lot compared with upwards of 80,000 in many of the standard US checkers. The dictionary does not contain words like *wouldn't*, *fare* and many other "ordinary" words.

*QSpell*, is very very slow and long-winded. First, the text is written using standard *Quill*. Having previously made a special version of *Quill*, using the main *QSpell* program, this is fired up and your file loaded in. Now the checker works (extremely slowly) through the file, stopping at words which cannot be matched successfully against the resident dictionary (either the standard one as supplied or your own custom-made version, containing, maybe, technical words peculiar to your own profession). The user then is given the choice of marking the word, or ignoring it altogether, if it is actually correctly spelt (it is, unfortunately, not possible to add these "unique" words to the dictionary at this time, unlike the American spell checkers). Once the file has been worked through, it is once more saved to cartridge. Only now can we alter and correct the spellings of those marked words - the file is

loaded back into the *QSpell* version of *Quill*, which contains special commands to retrieve the highlighted text. Now, work through the text again, using *Quill* in the normal way to correct the spellings. Save once again. Now, the dictionary may be accessed and amended as desired.

Although I am usually a good speller, I'm a pretty haphazard typist, and I find on other spell checkers I can quickly run through the text after writing, correcting as necessary if I'm stumped over the correct spelling, I can quickly scan through similar words in the dictionary. Using *Quill*, it would be very much quicker to band the text down and then, afterwards, calmly go through again altering wrongly-spelt words from within *Quill* itself. Using *QSpell*, the bad speller would have to make a note of each word picked out by the checker, and then compare it with the dictionary.

As a facility, then, for serious users, it has the drawback of extreme slowness (due, I believe, to the very slow display of the QL) and the fact that you cannot directly compare text words with dictionary words. This is the first version and a second version will correct another fault that this idiot found - the program allowed me to save a file with a normally disallowed ten-letter filename. Of course, I couldn't load it back for later editing, and had to resort to Superbasic, which luckily saved my skin and allowed me to re-save the file with a legal name.

For the writer working with long files a very slow and labourious way of cleaning up spelling.

Tony Bridge



for my money I'd prefer more words as in *In Search Of The Black Stuff*. Still, presentation is neat with right justified text and only a few spelling errors, though objects taken have an irritating habit of remaining till you *Look* again.

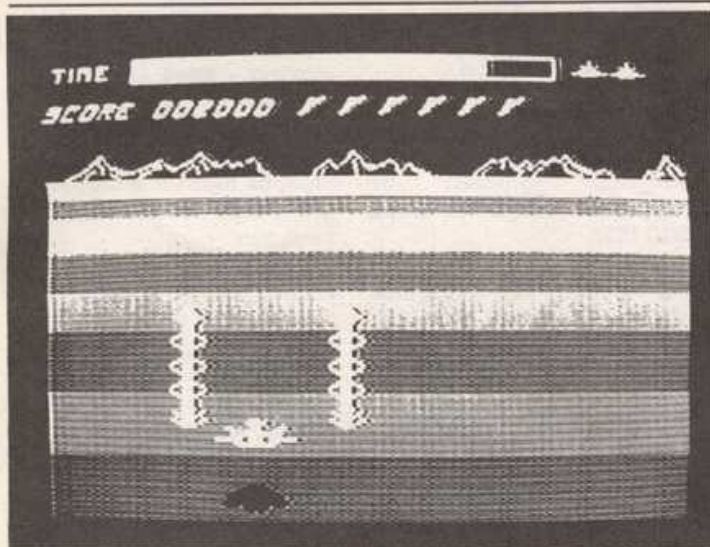
This competent coding is let down somewhat by content. There's an element of collect the objects, use them correctly and walk through.

There also appear to be a couple of odd bugs. So while it's hardly *The Hobbit* and not even *Artic*, and you won't want to dust off your hard membrane keyboard especially, any secret sub-cultures of semi-Luddite 81ers should add an extra star and probably buy.

John Minson







## Fast buck

**Program** *Buck Rogers* **Price** £7.95 **Micro** Spectrum 48K **Supplier** US Gold, Unit 10 The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY.

**I**s this really Buck Rogers in the 25th Century? I mean, it looks more like

Buck Rogers vintage '83. Actually it's a fairly good copy of the arcade classic, which is a speedy shoot 'em up and should please all who like that sort of thing. But like so many of these American imports it looks stone-aged compared with state of the art games originated for home micros.

For those who've never squandered their ten pences on a pub machine, you fly your little craft over the fast

moving surface of a planet, between posts (like some intergalactic ski run) zapping baddies. Then it's into space to kill a lot more little green meanies before you tackle the mothership.

Movement is fairly smooth, though I found judging the screen depth of the aliens difficult; you have a shadow but they don't. The demo mode is rather long and can't be bro-

ken out of, but that won't worry fans of the original, high score freaks and the odd homicidal paranoid who believes it's his or her duty to rid the universe of all malevolent life forms with a bit of mindless zapping. The more cost conscious should balk at the price though!

John Minson



## Tiny horrors

**Program** *Project X - The Microman* **Price** £2.99 **Micro** Spectrum 48K **Supplier** Compass Software, 63 Cozens Road, Norwich NR1 1JP.

**I**f *Project X - The Microman* sounds like a 50's 'B'-movie, found late at night on telly, it should come as no surprise that this game lifts its basic premise from that s-f classic, *The Incredible Shrinking Man*.

Actually a mole is a more likely adversary in this out-of-scale world where even a

button and pin may prove useful and death can lurk at every turn.

There's a save to buffer option to encourage risk taking - an advance in adventuring I wholeheartedly applaud.

The atmosphere is strong; obviously the author has given some thought to the credibility of the setting it pays dividends.

Though the price is budget, the product doesn't look it, just the best of those films it imitates. It's only available by mail order and deserves success.

John Minson



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# Language Reviews

## Fashionable

**Program Forth Price £19.95**  
**Micro CPC 464 Supplier**  
Kuma Computers Ltd., Unit 12, Horseshoe Park, Horseshoe Road, Pangbourne, Berks RG8 7JW.

**F**orth is a very fashionable 'alternative language' on home micros since it offers the promise of the speed and compactness of assembler with many high level friendlier features. In brief you define various tailor made words, built up from smaller primitive words, which then become your program - the language is said to grow to match the end result and as a result can be very easy to read. As each word is defined it is compiled, giving speed but the final program is run in an interpretive way making for easier debugging, etc. The price to be paid is the superficially frightening reverse polish notation, eg, 'print 1+2' is written as '1 2 + .'. This looks to be almost perversely obscure but familiarity with the language shows that it derives much of its power from the arrangement (although there is no harm in redefining the word '.' to read 'print').

Kuma's version is to the Fig Forth standard, and also contains a library of routines such as screen editing colour graphics and sound, the latter especially being much simpler to use than the Basic's sound commands. One of the fundamental philosophies of

Forth is that a defined word can be included in future programs without rewriting - so supplying a library makes a lot of sense.

Another integral feature of the standard is that the language should allow you complete access to, and control of the hardware. Usually this includes the storage device, discs, as a virtual memory system. Tape based Forths often try to avoid this and use Ram as pseudo storage (reverse polish mentality). However, Kuma Forth bravely attempts to exploit the cassette as far as possible. You can format an entire tape into a series of blank blocks each of which acts as a Forth program 'screen' for keeping your library of routines and data. The disadvantages are that you have to do a lot of rewinding, etc, but if ever a machine could minimise the inconvenience of this it is the all in one 464 (this version will not exploit discs, but a disc based release is also planned).

Tape handling is minimised by the addition of some clever additional words, expanded buffer size, intelligent header reading, etc. It is no more limited by this system than any tape based Forth but it does make it potentially more powerful for programs utilising lots of data.

The documentation is good and can take you a long way before you need to resort to a separate text, although some of the latter examples could do with more idiot proof explanation. Altogether an implementation that Kuma can be proud of.

**Tony Kendle**

## Unusual

**Program Ada Price £49.99**  
**Micro Commodore Supplier**  
First Publishing, Unit 20B, Horseshoe Road, Horseshoe Park, Pangbourne, Berks.

**A**da is an unusual language that supports a high level syntax like Basic or Pascal, but converts this into machine code assembly language, and allows this machine code directly into memory under control of resident machine Basic.

The language was original-

ly designed to control guided missiles, but fortunately has some other uses.

The package is divided into several units; Editor, Syntax checker, Grammar checker, Assembler and Disassembler. The manual is, in the main, excellent and does go some way to actually teaching you Ada rather than merely listing the features of the program.

Menus are a constant feature of the system - the Editor divides into start menu, write/edit and commands. The high level language is a fairly standard Basic variant with If/then operations and

## Framed

**Program Dlan Price £9.95**  
**Micro CPC 464 Supplier**  
Campbell Systems, 57 Trapp's Hill, Loughton, Essex IG10 1TD.

**S**omething of a departure for Campbell Systems, who seem to have been permanently seconded to Amsoft these days.

Dlan is short for Display Language - a series of commands that fit into Basic Rem statements and which are designed to allow the screen to be used to produce eye-catching moving text displays for shop windows or other business uses.

However, as with any computer 'language' it is the ingenuity of the programmer that determines the potential use. You are provided with an Epsom screen dump facility, or you could use your own for a different range of printers, and the display can be used to produce posters, club infosheet titles, labels or whatever.

I have also used it to add fancy lettering to a picture

produced with a screen designer and also for producing moving titles for home videos.

A variety of text fonts in a wide range of sizes are available, or there is a utility program included for designing your own.

This text can be scrolled, rolled, colour changed or whatever in the screen windows (many more are available through this utility than normal with the Amstrad screen) and each window can be bordered by a choice of frames.

Setting up the display via the supplied commands is incredibly simple, quick, and easy to use - the language also includes some simple input, subroutine and debugging commands; eg, single stepping, and the whole thing can be easily interfaced to your own Basic programs within the 12K free memory limitation.

Unless you tell it to stop, the routine will repeat and a nice touch is that the display can be 'locked' so that it can't be broken into or the computer reset by spotty boys (short of switching it off).

**Tony Kendle**

## No effort

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**B**last is not a computer language, but fulfills the objective of writing fast programs without recourse to machine code.

Blast is a compiler - one of many available on the Spectrum, but it is significantly different.

Blast gives you the option of having your programs compiled either into machine code or a special form of machine code called P-code. This has two major advantages

so doesn't present any real problems.

Used correctly, Ada can go some way to removing the need to program in machine code.

**Graham Taylor**

over previous offerings.

Firstly, as object code (what your Basic program is turned into) it is much shorter than equivalent machine code and most important of all, it will convert all Basic commands.

This means that with almost no effort anything you write in Basic can be made to run around 40 times faster.

The ifs and buts are really only a matter of how much code can be held in memory at any one time.

It means that a) a microdrive is highly recommended b) if you are going to compile a long program from tape it has to be saved in a special way following instructions provided in a special Toolkit utility provided on the same tape.

Essentially all it does is divide your program up into manageable chunks.

The manual is superb and the system is a doddle to use. Marvellous, a vital utility for any Basic programmer.

**Graham Taylor**



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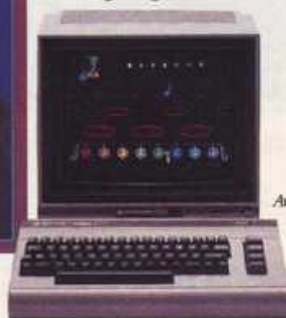
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## Making small talk

*The end of the line for Basic? Boris Allan looks at the state of languages today and speaks his mind*

**W**hilst home computers still, stubbornly, come equipped with Basic there is every reason to believe that Basic's days are numbered. There are a number of developments in computer languages that go beyond tinkering between different versions of Basic but fundamentally rethink how a language is used and the way it operates.

The future looks interesting because, increasingly, computing is becoming interactive, and the environment in which computing takes place is becoming standardised.

By standardisation I mean the way that microcomputer, minicomputer, mainframe and supercomputer, are starting to seem the same to the user, differentiated only by speed of execution. Given the increased importance of communications networks, where micro can talk to supercomputer and let the supercomputer do the work, the concept of the 'micro' as an independent machine is going to seem less relevant.

This convergence is explained by many factors, but the main reason is the increasing importance of the operating system, and the effect this is having on the languages we use. First, however, my choice of languages for the future:

- Functional programming languages (for example, Apl);
- Object oriented languages (for example, Smalltalk-80);
- List processing languages (for example, Lisp or Logo);
- and
- System programming languages (for example, C or BCPL).

Different aspects of these languages will interact to produce new hybrids such as Objective-C (an object oriented systems programming language), but these are the four key styles in the future development of programming languages.

All these languages will probably be programmed within a similar sort of system, and it is for this reason that I think it is useful to establish what distinguishes an operating system from a programming language. Aspects such as windowing, use of mouse, or drawing by turtle graphics are relatively unimportant, because all these facilities can be emulated in most languages. What is important are the other things a language can do.

If you consider machine code as being the fundamental level of computer operation, in that computers function by executing sequences of instructions expressed as machine code, then an operating system is the opposite end of

the scale in computer operation. Programming languages occupy various points along the continuum from machine code to operating system, and some operating systems overlap in their capabilities with some programming languages.

The difference between an operating system, a programming language, and machine code, is best illustrated by how each copes with the peripherals and devices attached to the computer. For example, control of a device (say a printer) by use of machine-code programs is usually a matter of depositing information in specific computer locations according to specific rules. An ordinary programming language usually controls a device by name, without the user having to know anything about how the device works, eg, Llist. An operating system, however, will frequently allow the printer to be accessed via an on-screen command, so that the printer becomes only one of a range of possible output devices (including disc files).

The extensiveness of an operating system is reflected by the system's ability to control the devices available to the programmer. The more powerful and the more extensive the operating system, the fewer the facilities for input and output needed by any programming language. Unix, for example, has so many facilities (indeed an abundance) for controlling the operation of the system, that the programming language developed to implement Unix has absurdly simple input and output facilities.

C is a very low-level programming language (like BCPL) - close, if you like, to machine code - whereas Unix is a

very high-level operating system. C does not depend upon Unix. C is a language which gives almost complete control over the workings of your computer (a bit like Forth) but in a more human manner than most Forth systems. I have chosen a systems programming language as one of my four languages of the future because such a language fulfills a particular and unique set of requirements.

Alan Kay, one of the key language innovators - author of the icons language, Smalltalk, believes there is no real need for operating systems, because the programming language should fully contain and therefore replace the operating system. What Alan Kay means is the idea of an 'environment', where an environment is a program where language and operating system are united, and the user does not have to continually move from one set of commands to another different set to perform different types of task. Many of the integrated packages now available on computers illustrate such environments.

Interestingly, primitive Basic on a ZX80 was an environment (there was only one command level), and Smalltalk is an environment, but most disc operating systems do not provide a coherent environment. Smalltalk applies a consistent philosophy to the construction of a programming language. The basic notion is that of an 'object'. An object is something which can accept information (messages), and act on that information in some way which is specific to the object, and then return information (a message) in a suitably modified form.

For example, if the object is the variable *X* and the message you send to *X* is *Sin* then the message you get returned is *Sin(X)*. Though the object metaphor may seem trite in this case, there are more powerful facilities. Objects can be placed in 'classes', and thus if there is a *RectangleClass* then any object in that

Language	Year	Author	Comments
Fortran	1957	John Backus - FORMula TRANslation - first high level language - scientific and technical language - developed by IBM soon implemented on most modern mainframes	Basic
Lisp	1958	John McCarthy - LIST Processing - first list processing AI orientated language	Pascal
Cobol	1959	Common Business Orientated Language. Popular data processing language for business use.	Prolog
Algol-60	1960	Committee design - first language with hierarchical structure.	Smalltalk
Logo	1960	Seymour Papert - first Educationally orientated language.	C
Forth	1960	Fast language based on concept of 'word' used to define procedures. Hampered by 'reverse polish notational' and stack concepts.	ADA
Fortran IV	1962	Main implementation of original Fortran	Occam
	1965	Kurtz and Kereny - Beginners All-purpose Symbolic Instruction Code - has been continuously refined since original implementation.	
	1970	Niklaus Wirth - powerful Algol-60 derivative.	
	1972	Philippe Roussel - first symbolic logic programming language.	
	1972	Alan Kay - precursor of present 'icon and window' driven systems.	
	1978	Dennis Ritchie - low level language with high level data structures and control features.	
	1979	Jean Ichbiah - winner of American Department of Defence 'state-of-the-art' programming language competition - has structure and concurrency features.	
	1983	David May - novel concurrency and communication features - designed for parallel processing.	



# Languages

class knows (inherits) the knowledge of what it is to be a Rectangle, and it does not have to be reminded. There might be a WindowClass, of which RectangleClass is a subclass with restricted facilities. Smalltalk, by treating everything as an object to which messages can be sent or received, achieved an integration of operating system and language not equalled by any other system.

As, during its development, Smalltalk produced those ideas which led to the use of windows, icons, and the mouse, Smalltalk (and the subject oriented philosophy) is going to be very influential for years to come.

In the real world of commercial data processing there are certain languages (such as Cobol or Fortran) whose whole aim is to crunch numbers or (in the case of Cobol) perform simple sums. Recently certain numerical programmers have isolated the 'von Neumann bottleneck' in languages such as Cobol or Fortran, where the bottleneck is how quickly data can pass through via the data bus. When a computer performs its operations, it can only perform one action at a time, though amazingly quickly in the case of some computers. Traditional programming languages, such as Algol, Pascal, or Basic, were developed around ideas which assumed the bottleneck: everything was repetitive, one step at a time, because the computer was repetitive, one step at a time.

To add a series of numbers, for example, the sequence is something akin to:  
sum = 0  
for i = 0 to count  
sum = sum + array (count)  
endfor

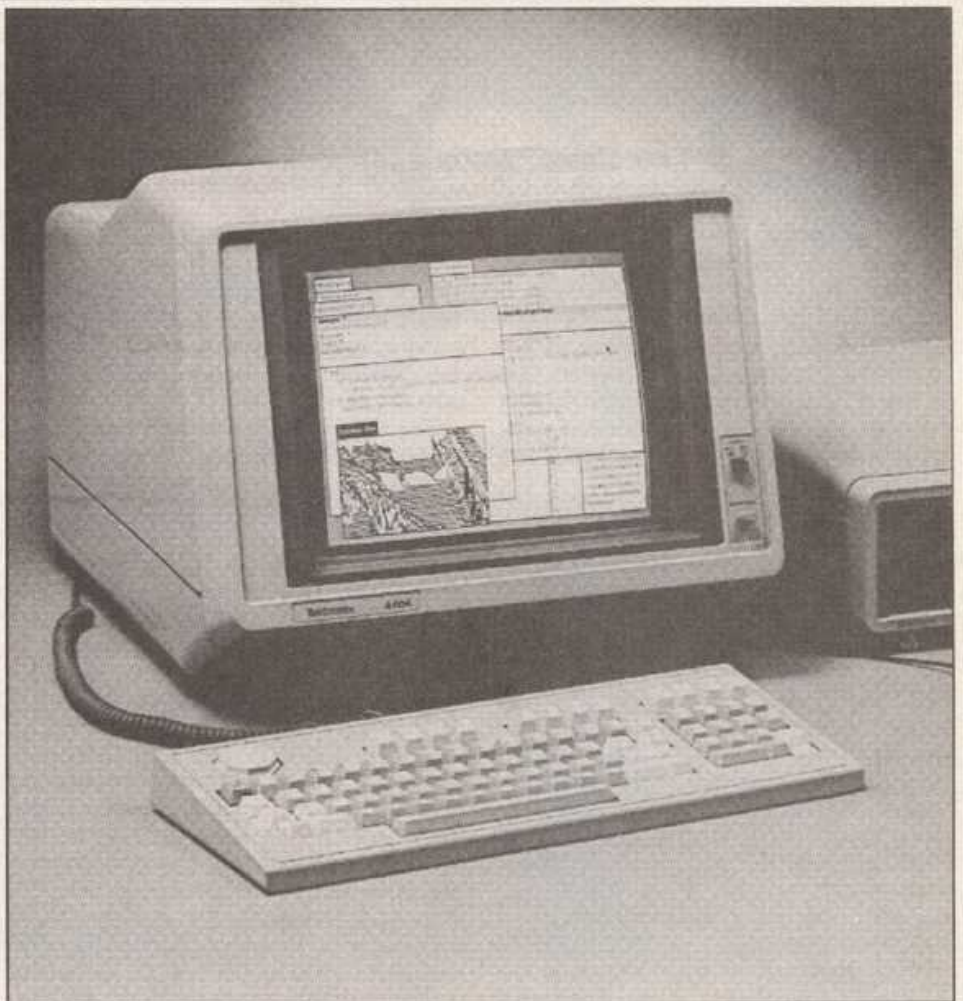
in no language in particular. The idea is that it would be far better to say something like:

apply + array

that is, apply the plus operator to the elements of the array. The result of this approach is to produce languages which are slowish on conventional von Neumann computers, but with multiple processors (and parallel computers) they begin to become far more attractive (APL is one example). For numerical work in particular, such languages are far better suited to newer forms of computer.

My final style of language for the future are the list processing languages such as Lisp or Logo, both of which are languages of great flexibility in database applications, or fields such as Artificial Intelligence and Expert Systems. Though both Lisp and Logo overlap with Smalltalk in that Smalltalk also has list processing facilities, there is sufficient difference in orientation for me to believe in their separate futures. Given the undoubted benefits of some of the techniques of AI, list processing specific languages are bound to continue to be of use.

In practice, no language could ever be



Tektronix 4404 Artificial Intelligence System running Smalltalk 80

perfectly suited for every type of application, so there will always be a demand for specific types of language (such as those isolated above).

For example, list processing languages such as Logo are capable of constructing very complex data structures (due to the power of the idea of a 'list'), but this strength is bought at the expense of speed of execution for floating point arithmetic. In theory, a language could be all powerful and all encompassing (as could an intelligent computer?), but the size of such a language translator would be so large that problems would be created.

Even if Ram was so cheap that it did not present any problem, and a processor was so fast that it could cope (or multiple processors could cope), there are certain rather more insoluble problems.

The main one is how to produce a highly complex system which is completely reliable (we all know how unreliable even simple micro systems are). It makes more sense to have specific language systems (with good general facilities) where each language can easily communicate its results for use by other languages. For such an arrangement we need an operating system, preferably an environment which is also a language.

This is my future scenario. The micro of the future is a workstation. The computer is essentially a total environment

running an object oriented language (such as Smalltalk), where the appearance of the screen display has much in common with the Xerox Star workstation or the Tektronix 4404 Artificial Intelligence System (like the Mac or ST). The object oriented system produces a coherent, consistent environment in which the user can program, can use packages, or can use the computer to communicate with other systems.

For many purposes the object oriented language will fulfil all the requirements for general programming, but for specific types of application the user will choose to use one of the other types of language. The object oriented language is interactive, and distinctions between compilers and interpreters will become less obvious (and much less important).

Operating systems on microcomputers are becoming more important all the time, and languages are developing so quickly that - given the relative decline in the cost of hardware - in a few years cheap systems with the facilities of the Tektronix 4404 will be with us.

The liberation of the individual which started with the Apple II will grow apace, as computers become far more open systems with fewer restrictions - and that's good news for everybody, not just programmers.



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POP/2



## The parallel dimension

*"Everyone and their dog thinks they can design a new computer language," says David May, author of Occam. John Cook investigates*

In the beginning, when mainframes were mainframes, and real programmers didn't use Pascal – simply because it hadn't been invented – there was machine code. Or, if you were lucky, assembler.

Yet the few massive number crunchers then around were such a godsend to those relatively few academics who had access to them, no-one was complaining.

As prices began to fall and computing power increased, however, the nature of the average computer user started to change. No longer was computer access confined to just the dedicated computer scientist or mathematician, but instead mainframes began to be used by those who wanted computing power, without having to invest the time and effort in learning a low-level programming language.

Thus, in the middle 1950s, the need for a high-level programming language evolved. That is, a way of communicating with the computer without an intimate knowledge of what is going on inside. Look at a short example – the Basic program; 10 Input a 20 Print a. The program will read a single number input from the keyboard and then print it to screen. Easy.

Now think of the actual machine operations involved in this 'simple' process, even leaving out how the program itself is stored in memory and run, it's not so easy. The variable must be stored in memory, loaded into the accumulator on the chip, a number must be added, the result stored, then outputted to the screen. Try changing line 20 to Print  $a + 1 * (76a / 7.876 \wedge \sin 69)$  and you're running into serious problems.

In the 1950s of course Basic didn't exist, but the first step towards Basic was Fortran. Fortran (short for FORMula TRANslation) has a pretty solid claim to be the first high-level language, it was developed by IBM in 1957 to run on their 704 machine. This satisfied the scientific community, but the business world had to wait for Cobol (COMMON Business Orientated Language), released in April 1960 – around the same time as the Pascal precursor, Algol 60.

Our familiar Basic (Beginners All-purpose Symbolic Instruction Code) first appeared at Darmouth College, New Hampshire in the USA – written by JG Kemey and TE Kertz as a simple introduction to computer programming.

Developed from Fortran II (one of the many Fortran dialects) the fact that it is still the built-in language of most beginners micros – where are you now Jupiter Ace? – suggests the authors succeeded

in writing probably the most easily accessible beginners language.

From the early sixties, as computing power and research activity increased a wealth of computer languages has built up – some devoted to education, Logo, others to artificial intelligence, such as Prolog and Lisp, specialist languages like Ada used for US defence work or dedicated to graphics production like the Fortran derivative Gino-F.

Obviously a great deal of time and effort has been devoted to developing new languages, many of which, even if they do get as far as seeing the light of day, certainly don't stick around until lunchtime.

One feels forced to ask the big question, why? Why can't we all write in Basic? Why go to the bother of developing new languages when there are so many around already?

Mr David May, Chief Computer Architect at Inmos, the British semi-conductor manufacturer, is as well qualified as the next person to answer such questions. He is the author of one such new computer language – Occam – designed to complement Inmos' novel Transputer chip.

"Everyone and their dog thinks they can design a new computer language," he explained, grinning broadly. "It's only when you start getting down to it that you encounter the difficult problems."

Down to basics then (no pun intended)

– what is a computer language? "Obviously it's a way of programming machines, but it's also a way to communicate programming ideas and concepts, as the authors of Agol-60 emphasised."

Right then. But why write a new language? David answered: "There wasn't one there for our needs – the need to express concurrency."

Concurrency – which can be trivially described as the ability to walk and chew gum at the same time – together with 'multi' – and 'parallel' – processing are the

key words of the artificial intelligence world of the 5th generation computer.

Many modern computer applications demand that several tasks be undertaken at the same time – David gave the example of his work with mobile robots in the early 70s.

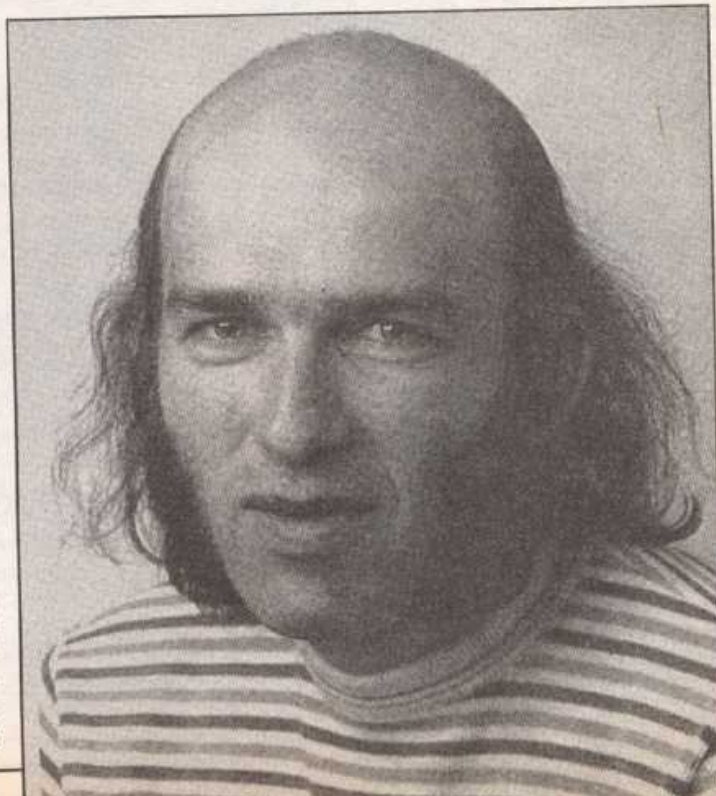
"It was difficult using conventional sequential programming (that is, as in Basic, when one instruction is carried out at a time). Our robot needed to move and analyse sensory information at the same time. Switching from one task to another tended to produce very jerky movement."

The other trend that led to the development of Occam was the progress of VLSI (Very Large Scale Integration) chip technology – not totally unconnected with Inmos' own Transputer chip.

"The usual Von Neumann-type computer architecture assumed that processing power was expensive compared to memory – so you had one central processor linked to memory by one data bus. But with Memory/Processor equality now in both size and cost, this all changes."

The result is the Inmos T424 – a 32-bit Transputer chip with 4K on-board Ram, an external memory interface, a peripheral interface, and importantly, four high speed serial links (which can be connected to other Transputers), all on a single silicon slice. If networks of Transputers, or any similar multi-processing systems, are to be easily programmed, then a method of programming a number of tasks running simultaneously and a facility for easy communication between processing units is vital. Enter Occam, Stage Left.

"In order to exploit the technology properly, we needed another new language." Occam was that language, written (on and off) between 1980-83, pri-





marily by David himself, with Professor Tony Hoare of Oxford University acting as his consultant, with various members of the Inmos team passing comments, writing test programs, compilers, etc.

Much of the groundwork towards the creation of Occam had been done during David's research into concurrent programming at Warwick University in the mid-seventies; in fact when writing it, he deliberately attempted to take the best features of all the work that was going on in concurrency about that time.

Initially, a great deal of effort was spent in defining what he calls the 'Semantics' of the language. "Generally too much time is spent on syntax - it's usually described very formally, while description of the semantics reads more like prose! Syntax is important 'though - for familiarity... like packaging almost."

May maintains that his new language genuinely offers something novel and isn't just a rehash of an existing system. "I think a lot of language development in the 1970s was tending to elaborate on existing sequential languages instead of presenting new ideas."

Occam was named after the 14th century English philosopher William of Occam, whose learned principle can be abbreviated to: 'If in doubt, leave it out.' David applied this rigorously to Occam. "One of the big snares in language

writing is putting things in which only *might* be needed. Soon it then becomes bulky and unwieldy - and once you've put a particular feature in, it's harder to take it out."

With only 22 reserved command words - no-one can claim that Occam is a bulky language. "Each additional concept is genuinely adding something quite new," claims David. He continued, "Having got some kind of spec, I would write a very rough compiler to satisfy myself it would implement various things efficiently. I was writing the instruction set for the Transputer at the same time - the two went hand-in-hand."

An important and novel aspect of Occam is its 'formalism'. The idea is that a program can be broken down into components that can be proved formally - in the same way that a mathematical theorem can be proved - without running extensive test programs and simulations. Given the potential size and complexity of multi-processor systems, such tests could never be exhaustive, so Occam adheres to a number of formalistic principles: good structure, no jumps and no pointers.

Although Occam was designed in tandem with the Transputer, May hopes he has produced a new language of general usefulness.

There is a version running at present

on the 68000-based Sage IV machine, so it could be adapted with relative ease for the ST and Amiga machines - the home micro market may yet see a version of Occam!

But what would be its advantages over a decent Basic? "It depends what you wanted to do. If you wanted to write more interactive programs with multi-tasking like disc searches while using the terminal, or printing while doing another job, then you'd just write separate processes that would run at the same time." Such parallel processing just isn't possible in Basic.

He does stress the ease of writing programs in Occam - several universities now use it as a first language to teach concurrency. "There are tricks in the compiler and the instruction set that the programmer doesn't need to worry about. What I tried was to present applications programmers with a virtual machine, so they can concentrate 90% on the application and only 10% on the programming."

Over 6,000 copies of the Occam Programming Manual have been sold now - and it is significant that half have found their way to the Land of the Rising Sun - underlining the fact that Occam has been tipped as one of the possible 5th Generation artificial intelligence languages of the future.

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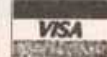
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# Cycles

Light cycles on the Spectrum by D Semmens

**R**ecently, we published a two player m/c light cycles game for the BBC B. Now, by public demand, something similar for Spectrum owners!

The game itself is 100% machine code - taking up just over 1K of memory - including screen drawing, scoring, etc. When the game is over (first to five victories) the program returns to Basic, and asks for a new skill level.

First, type in Program One, and save on tape with Save "1" Line 20. Then type in Program Two (the machine code loader) and run it. The code generated should be saved after Program One on the tape with Save "2" Code 40000,582.

Finally, type in Program Three, and save this directly after the code with Save "3" Line 15.

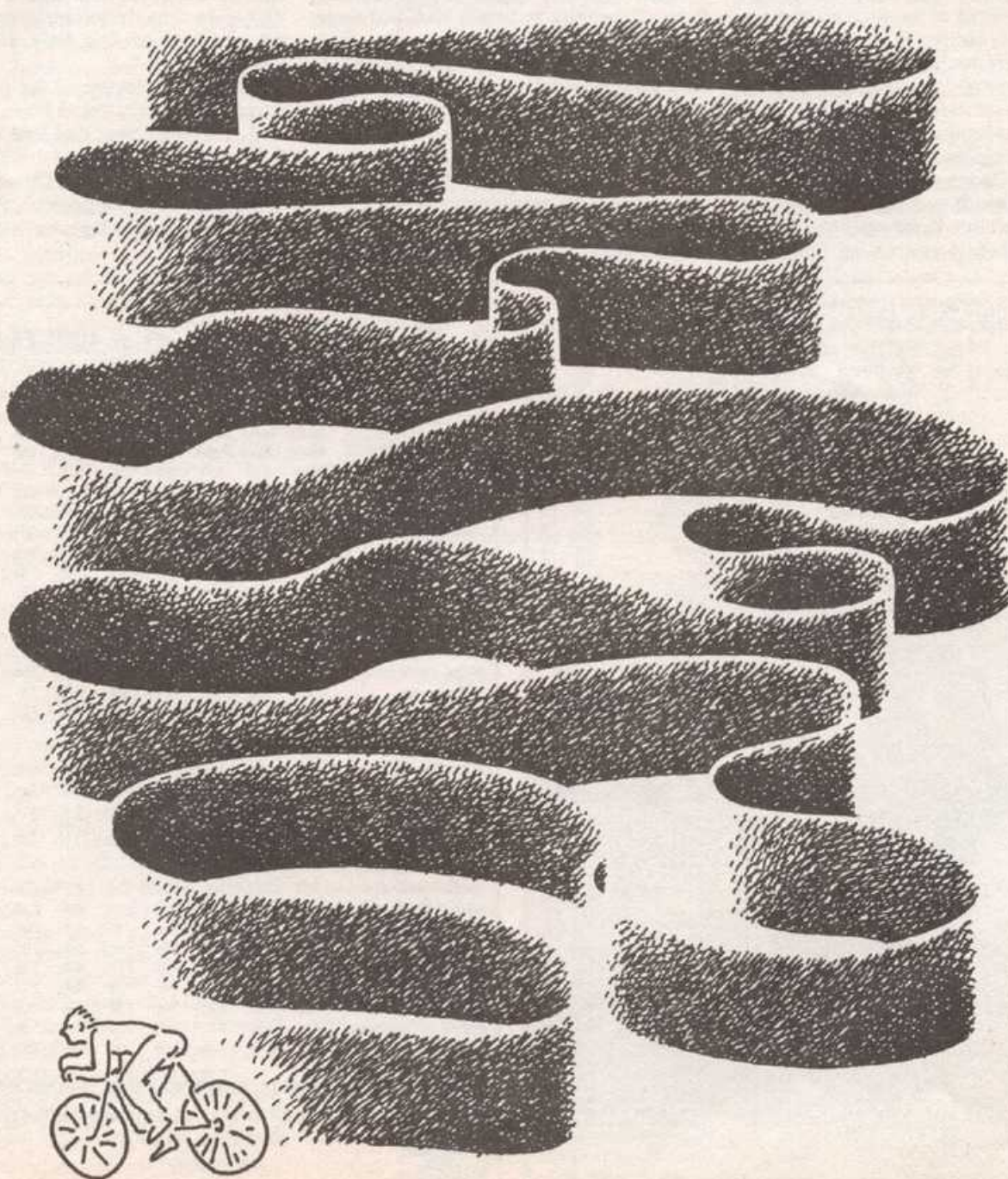
Now clear the machine with New,

rewind the tape and load as normal - the program should autorun.

If this does not work, check the machine code loader for errors.

## Controls

Player One	Player Two
Z - left	N - left
X - right	M - right
C - down	Space - down
F - up	Enter - up





```
10 REM ** PROG 1 **
20 CLEAR 39999
30 LOAD **CODE
40 LOAD **
```

```
10 REM ** PROG 2 M/C LOADER **
15 CLEAR 39999
20 FOR i=40000 TO 40581: READ a: POKE i,a: NEXT i
30 PRINT "SAVE ON TAPE AFTER PROG 1 BY TYPING SAVE ^1^"
CODE 40000,582"
40 STOP
100 DATA 175,50,156,99,50,157,99,50,8,92,62,1,50,162,99,62
110 DATA 2,50,163,99,62,10,50,158,99,50,160,99,205,107,13
120 DATA 62,2,205,1,22,62,11,50,159,99,62,21,50,161,99,62,1
6,215,62,2,215,62,17,215
130 DATA 62,7,215,6,30,62,22,215,175,215,120,215,62,144,215
,62,22,215,62,20,215
140 DATA 120,215,62,144,215,16,233,6,20,62,22,215,120,215,6
2,1,215,62,145,215,62,22
150 DATA 215,120,215,62,30,215,62,145,215,16,232,62,17,215,
62,1,215,205,25,158,205
160 DATA 97,158,205,223,157,62,16,215,62,6,215,62,22,215,58
,158,99,215,58,159,99,215
170 DATA 62,146,215,62,16,215,62,4,215,62,22,215,58,160,99,
215,58,161,99,215,62,147
180 DATA 215,33,162,99,58,8,92,254,122,202,105,157,254,110,
202,125,157,254,120,202
190 DATA 110,157,254,109,202,131,157,254,99,202,120,157,254
,32,202,143,157,254,102,202
200 DATA 115,157,254,13,202,137,157,58,162,99,254,1,202,149
,157,254,2,202,159,157,254
210 DATA 3,202,169,157,58,159,99,60,50,159,99,58,163,99,254
,1,202,179,157,254,2,202
220 DATA 189,157,254,3,202,199,157,58,161,99,60,50,161,99,5
8,158,99,71,58,159,99
230 DATA 79,205,209,157,126,254,9,194,233,157,58,160,99,71,
58,161,99,79,205,209,157
240 DATA 126,254,9,194,1,158,195,185,156,54,3,195,18,157,54
,4,195,18,157,54,1,195,18
250 DATA 157,54,2,195,18,157,35,54,3,195,18,157,35,54,4,195
,18,157,35,54,1,195,18,157
260 DATA 35,54,2,195,18,157,58,158,99,61,50,158,99,195,43,1
```

```
57,58,158,99,60,50,158
270 DATA 99,195,43,157,58,159,99,61,50,159,99,195,43,157,58
,160,99,61,50,160,99,195
280 DATA 68,157,58,160,99,60,50,160,99,195,68,157,58,161,99
,61,50,161,99,195,68,157
290 DATA 33,0,88,17,32,0,25,16,253,22,0,89,25,201,58,164,99
,198,4,71,118,16,253
300 DATA 201,205,223,157,205,223,157,205,223,157,58,157,99,
60,50,157,99,254,5,202,25
310 DATA 158,195,71,156,205,223,157,205,223,157,205,223,157
,58,156,99,60,50,156,99,254
320 DATA 5,202,25,158,195,71,156,62,16,215,62,5,215,62,22,2
15,62,21,215,62,14,215
330 DATA 6,0,58,156,99,79,205,27,26,62,21,215,62,1,215,6,13
,62,32,215,16,251,62
340 DATA 21,215,175,215,58,157,99,79,205,27,26,201,80,76,65
,89,69,82,46,49,32,32,32
350 DATA 32,32,32,80,76,65,89,69,82,46,50,62,21,215,62,1,21
5,62,16,215,62,5,215
360 DATA 62,22,215,62,21,215,62,4,215,6,22,33,75,158,126,21
5,35,16,251,62,21,215,175,215,201
```

```
5 REM ** PROG 3 **
10 REM ** CYCLES BY D.SEMMENS **
15 FOR i=USR "a" TO USR "d"+7: READ a: POKE i,a: NEXT i
20 FOR i=1 TO 2: BORDER 1: PAPER 1: CLS : NEXT i: INK 7
30 INPUT " LEVEL (1 TO 10) (<1=HARD>) ";a
40 IF a<1 OR a>10 THEN GO TO 20
50 POKE 25508,a: INK 1
55 POKE 23561,1: POKE 23562,1
60 RANDOMIZE USR 40000
65 POKE 23561,35: POKE 23562,5
70 INK 7: PRINT AT 10,10;" GAME OVER "
80 FOR i=1 TO 1000: NEXT i
90 GO TO 20
100 DATA 239,239,239,0,254,254,254,0
110 DATA 119,119,119,112,119,119,119,7
120 DATA 60,110,223,191,191,223,110,60
130 DATA 60,102,219,189,255,255,126,60
```



## Quantum leaping

When is a bug not a bug – another quirk of the QL experience by **Alan Turnbull**

**S**urely, all QL owners have noticed that famous – or should it be, infamous – 'bug'. Yes, I mean the one when you press (Ctrl), (Alt) and 'T' at the same time. Just when you are expecting the QL to greet you with another one of those strange 'graphic' characters, it instead decides to pack up and go to sleep, leaving the bemused user somewhat 'out in the cold'!

You think to yourself, 'Oh dear, another Rom bug' and hope that one day Sinclair Research will up-grade the Rom and let you get your eager hands on it. Much to my amusement, the problem was still quite evident when I received an up-grade to my AH QL in the form of the JS Rom. But the famous QL bug is not a bug at all.

The keys (Ctrl), (Alt) and 'T' were used by the Sinclair Research design engineers, when the QL was in the early development stages, to simulate a non-maskable interrupt. The keys are sufficiently spaced apart so as not to be pressed accidentally (you hope). Upon pressing this sequence of keys, the QL's main processor is made to jump to a non-maskable interrupt server routine, the address of which the MC68008 expects to be held in a table of vectors in the first 'page' of memory (addresses 0 to 1023).

Unfortunately, when the QL was let loose on the public, someone forgot to whip out all of the 'test frig' and hence the bug which is not a bug! So much for the bad news. The good news is that the kind old souls in Cambridge have provided

a mechanism within QDOS – the QL's operating system – for redefining the vectors which QDOS does not use for its own purposes.

QDOS needs vectors for its own Trap servers, etc, but certain system vectors which are provided for by the 68008 architecture are simply not used. In fact if the circumstances that would cause such vectors to be accessed ever arise, the behaviour of the QL cannot be guaranteed. The Sinclair programmers have used the memory usually reserved for these vectors for other purposes.

Table 1 shows the vectors normally expected by the 68008 processor. Table 2 shows the vectors which are not used by QDOS and, hence, are the ones which QDOS allows to be redefined.

The ultimate good news you have all been waiting for is that the non-maskable interrupt vector is not used and, therefore, can be redefined for our own purposes. Just think of the possibilities – you could provide a 'warm reset' key on the QL without getting a soldering iron out or invalidating the Sinclair warranty!

So what of the actual details of the mechanism within QDOS for allowing

**Table One**

- |               |   |
|---------------|---|
| (1)           | - The initial value for the 'supervisor' stack pointer.   |
| (2)           | - The initial value for the program counter (on the QL, this points to the 'cold-reset', Ram test routine).   |
| (3)           | - Bus error.  |
| (4)           | - Address error.  |
| (5)           | - Illegal instruction (illegal bit pattern found in next instruction).  |
| (6)           | - Divide by zero error.   |
| (7)           | - CHK instruction executed (used for checking data register value limits).  |
| (8)           | - TRAPV instruction executed.   |
| (9)           | - Privilege violation (ie, an instruction reserved for use within 'supervisor' mode has been attempted from within 'user' mode).  |
| (10)          | - Trace. This vector allows applications to provide a trace or 'monitor' facility. After each instruction is obeyed by the processor, a jump is made to the monitor program through this vector, if the processor is in the trace mode. |
| (11)          | - Opcode 1010 (binary) emulation. This vector, and the next, usually allow applications programs to give meanings to unused opcodes. The facility has not been provided for you by Sinclair Research!                                   |
| (12)          | - Opcode 1111 (binary) emulation (cannot be used).  |
| (13) to (24)  | - Usually reserved for Motorola applications programs.  |
| (25)          | - Spurious interrupt received.  |
| (26) to (32)  | - Level 0 to Level 7 (non maskable) interrupt servers.  |
| (33) to (48)  | - Trap #00 to Trap #0F instructions (QDOS uses Trap #04, inclusive)   |
| (49) to (256) | - User vectors (obviously, not available as this space is in Rom).  |

```

00100 INT_LEV7 EQU $1C
00110 MT_TRAPV EQU $07
00120 TRAP5 EQU $20
00130 LEA $0000C,A0
00140 LEA TRAP_TAB(PC),A1
00150 MOVEQ #7,D0
00160 BSR SET_UP
00170 LEA TRAP_TAB+INT_LEV7(PC),A1
00180 MOVE.L #$00168,(A1)
00190 LEA $0008A,A0
00200 LEA TRAP_TAB+TRAP5(PC),A1
00210 MOVEQ #11,D0
00220 BSR SET_UP
00230 LEA TRAP_TAB(PC),A1
00240 MOVEQ #-1,D1
00250 MOVEQ #MT_TRAPV,D0
00260 TRAP #1
00270 RTS
00280 SET_UP: MOVE.L (A0)+,(A1)+
nters
00290 DBRA D0,SET_UP
00300 RTS
00310 TRAP_TAB: DS.L 19
; offset in new table of NMI vector
; TRAP #01 key for redefining vector table
; offset in new table of vector for TRAP #05
; point to Address error vector in QL ROM
; point to new vector table
; seven entries to be copied
; copy from ROM to new table
; point to NMI entry in new table
; make entry point to 'cold-reset'
; point to TRAP #05 entry in ROM
; point to TRAP #05 entry in new table
; eleven entries to be copied
; copy from ROM to new table
; point to new vector table
; flag: current job ID
; tell QDOS which manager function
; do a manager QDOS call
; return to SuperBASIC
; copy source to destination and increment poi
; loop until all done
; return to caller
; 19 long word entries

```



this do-it-yourself bug fixing? The system call to QDOS to redefine the *Trap* vectors is *Trap #1* with *DO* holding 7, *D1* holding the job *ID* (which, for the SuperBasic command interpreter, would be -1) and *A1* pointing to the new vector table.

Listing 1 shows a 68008 assembly language program to set up a new vector table with the same contents as the old one, except for the non-maskable interrupt entry which I have redefined to

**Table Two**

- (1) Address error.
- (2) Illegal instruction.
- (3) Divide by zero.
- (4) Chk.
- (5) Trapv.
- (6) Privilege violation.
- (7) Trace.
- (8) Interrupt level 7 (non-maskable).
- (9) to (19) Trap #05 to Tap #0F.

point to the 'cold-reset' routine (the one which the 68008 executes upon power-up or pressing of the reset button). This, I agree, is not much use as it stands but merely illustrates the point of this article and proves to readers that the potential for great things is there!

Listing 2 is for those of you who have no access to an assembler and wish to enter the code using a Basic loader. This will pose no problem as the code is short.

```
100 LET reserved_address=RESPR(512)
110 FOR data_item_number=1 TO 54
120 READ data_item
130 POKE reserved_address+data_item_number-1,data_item
140 END FOR data_item_number
150 CALL reserved_address
160 :
170 DATA 65,248,0,12,67,250,0,48,112,7,97,34,67,250,0,68,34,188,0,0,1,
104,65,248,0,138,67,250,0,58,112,11,97,12,67,250,0,18,114,255,112,
7,78,65,78,117,34,216,81,200,255,252,78,117
```

**Listing 2: The SuperBASIC program.**

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## Off at a tangent

Try this implementation of Logo for the BBC B  
written by T N Richardson

**T**his program is a very simple introduction to a few simple commands in the language called Logo. The program has been designed in such a way that it is fairly easy to add your own commands at leisure. The present commands are only the tip of the Logo iceberg, but they clearly show what a simple program can do.

Each command must be followed by

the *Return* key, on which a Prompt will appear in the box at the bottom left of the screen asking 'how far?', 'how many degrees?'. Simply type in the required number and the turtle should move on the large graphics area.

The commands available are listed in the bottom right-hand box on the screen. Full instructions are included in the program.

### Program Notes

Line No	
10-20	Title & instructions if required
30-50	Sets break key to re-run program when pressed. Bleeps when error (escape) occurs
60	Makes block appear in front of cursor
130-150	Sets up variables & windows. Puts turtle on to screen
160-240	Loop which waits for input
260-320	Window drawing procedure
340-410	Turtle drawing procedure
420-760	Movement procedures
770-820	Commands to be printed
840-1010	Instructions
1020-1060	Double height printing routine

```

10 MODE7
20 PROCinstruct
30 MODE0
40 *KEY10 0. ||M RUN||M
50 ON ERROR VDU7
60 VDU23;106;0;0;0;
70REM *****
80REM *** SIMPLE LOGO ***
90REM *** VERSION - 1.04 ***
100REM *** by T.N.RICHARDSON ***
110REM *** (C)copyright 1985 ***
120REM *****
130 PROCvars
140PROCwindows
150PROCTurtle
160 INPUT"Command : "T$
170 IF T$="RIGHT" THEN PROCright
180 IF T$="FORWARD" THEN PROCforw
ard
190 IF T$="LEFT" THEN PROCleft
200 IF T$="PENDOWN" THEN D%=1:VDU
7
210 IF T$="PENUP" THEN D%=0:VDU7
220 IF T$="CENTRE" THEN VDU7:PROC
turtle:TX%=500:TY%=500:ANG=0:PROCTu
rtle
230 IF T$="BACK" THEN PROCbackwar
ds
240 IF T$="EXIT" THEN VDU22,7:END
250 GOTO160
260DEF PROCwindows
270 GCOL0,131:CLG
280 VDU24,50;250;1200;1000;:GCOL0
,128:CLG
290 VDU28,40,30,77,25:COLOUR128:C
LS
300 PROCcommands
310VDU28,1,30,37,25:COLOUR128:CLS
320 ENDPROC
330
340DEF PROCTurtle
350 GCOL3,3
360VDU29,TX%;TY%;
370MOVE SIN(RAD(ANG))*100,COS(RAD
(ANG))*100
380DRAW SIN(RAD(ANG+160))*100,COS
(RAD(ANG+160))*100
390DRAW SIN(RAD(ANG-160))*100,COS
(RAD(ANG-160))*100
400DRAW SIN(RAD(ANG))*100,COS(RAD
(ANG))*100
410ENDPROC
420DEF PROCright
430INPUT"Number of degrees:"D
440 PROCTurtle
450 ANG=ANG+D:PROCTurtle
460 ENDPROC
470DEF PROCvars
480TX%=500:TY%=500
490ANG=0
500 D%=0
510
520ENDPROC
530DEF PROCforward
540 INPUT "How far : "F
550PROCTurtle
560 GCOL0,1
570MOVE0,0
580 IF D%=1 THEN DRAW SIN(RAD(ANG
))*F,COS(RAD(ANG))*F ELSE MOVE SIN(
RAD(ANG))*F,COS(RAD(ANG))*F
590 TX%=TX%+SIN(RAD(ANG))*F:TY%=T
Y%+COS(RAD(ANG))*F
600 PROCTurtle
610 ENDPROC
620DEF PROCleft
630INPUT"Number of degrees:"D
640PROCTurtle
650ANG=ANG-D:PROCTurtle
660ENDPROC
670DEF PROCbackwards
680INPUT "How far : "F
690PROCTurtle
700GCOL0,0
710MOVE0,0
720DRAW SIN(RAD(ANG-180))*F,COS(R
AD(ANG-180))*F
730TX%=TX%+SIN(RAD(ANG-180))*F:TY
%=TY%+COS(RAD(ANG-180))*F
740PROCTurtle

```







## Life in the fast lane

Fast saving and loading on the CPC464  
brought to you by **Brian Cadge**

The CPC's cassette system is designed to save and load programs at a variety of speeds; two are available in Basic, 1000 and 2000 baud. However, even at the faster of the two speeds, saving a screen dump to tape takes nearly two minutes. This is mainly because all cassette data is written out, and read back in blocks of 2048 bytes long. Between each block there is an interblock gap and header of about five seconds. This is there to allow Basic to perform operations on the data read in (especially on text files). On long files of continuous data, such as screen dumps, these gaps simply waste time.

The program presented here adds two new RSX commands to Basic. These are **|FSave** and **|FLoad**. They allow screen dumps (or any other block of data from memory), to be saved as one continuous block at the fastest safest speed of 2200 baud. This speeds up loading times dramatically; for example, the screen dump now saves and loads at twice the speed of the normal 2000 baud save/load commands. For longer sections of data the saving is even better.

The commands support filenames of up to 20 characters long and upper/lower case is significant. The syntax of the commands are as follows. The **|FSave** command is followed by the filename string, and optionally the start and length of the data. If only the filename is given, as in the following; **|FSave, "Picture-1"**; **|FSave, @FS**, then the program assumes that a screen dump is to be saved, and the data saved starts at 49152 and is 16384 bytes long.

You can save any other block of data by using the full format of the command as follows; **|FSave, "Data File-1"; |FSave, @FS, 30000, 5000**, the memory starting at address 30000 will be saved for 5000 bytes. A 30 byte header is saved before the data block, this contains the filename, start and length values. There will be no prompts to 'Press Play', etc, with these new commands. Pressing **Esc** will report an Input/Output error, as will faulty tape loads.

The **|FLoad** command has three formats. In its simplest form, **|FLoad** on its own will load in the first **|FSaved** file it finds, regardless of filename. The following messages are output by the **|FLoad** command; "Searching..." means that **|FLoad** is still waiting to find an **|FSaved** file.

"Found: filename" means that **|FLoad** has found the file 'filename' but this does not match the filename given, so it is being skipped over, and "Loading: filename" means that the file is being loaded.

The second format of the **|FLoad** command is to follow it by the specific filename to be loaded, as in; **|FSave, "Picture-1"; |FLoad, @FS** any file encountered before "Picture-1" will be skipped over. Finally, the third format of the **|FLoad** command is to add an optional '1' to the end as in; **|FSave, "Picture-1"; |FLoad, @FS, 1**. This tells the program not to print any messages, although Error messages are always printed. This last option is useful from within programs to stop a screen display being disturbed. It is logically similar to adding an '1' as the first character of a

standard filename.

As different sync characters are used in the headers of the header and data blocks, the normal CPC cassette commands **|Load**/**|Save**/**|Cat**, etc, will not recognise **|FSaved** files and will skip over them, and similarly, **|FLoad** will not recognise files saved by the normal CPC commands and will skip over them.

To use the program, type in and save the Basic Loader program, taking care, as always, with the data statements. Once this has been **Run** successfully it can be **Newed** and the two new commands will be available until the machine is Reset or turned off. Of course, it is not worth loading in the new commands if you only intend to save small amounts of data, but for a program, such as a screen designer where screens are to be saved and loaded frequently, the time saved is well worth the effort of typing in the program.

```

10 ;
20 ; Fast Load and Save for CPC's
30 ;
40      ORG 42001
50      LD BC, CMDTAB
60      LD HL, OSBUF
70      CALL #BCD1
80      RET
90 CMDTAB DEFN CHDS
100     JP SAVE
110     JP LOAD
120 CHDS DEFN "FSAV"
130     DEFB "E"+128
140     DEFB "FLOA"
150     DEFB "D"+128
160     DEFB 0
170 GETHAM LD L, (IX+0)
180     LD H, (IX+1)
190     LD B, (HL)
200     INC HL
210     LD E, (HL)
220     INC HL
230     LD D, (HL)
240     PUSH BC
250     LD HL, FNAME
260     LD B, 20
270 BLKHAM LD (HL), 32
280     INC HL
290     DJNZ BLKHAM
300     POP BC
310     LD A, B
320     OR A
330     RET Z
340     CP 21
350     JR C, LENOK
360     LD A, 28
370 LENOK LD B, A
380     LD HL, FNAME
390     LD A, (DE)
400     LD (HL), A
410     INC DE
420     INC HL
430     DJNZ COPNAM
440     RET
450 SETFSP LD HL, 145
460     LD A, 58
470     CALL #BC68
480     RET
490 OUTMES LD A, (HL)
500     OR A
510     RET Z
520     CALL #BB5A
530     INC HL
540     JR OUTMES
550 SAVE CP 1
560     JR Z, SAVSCH
570     CP 3
580     JP NZ, ERROR
590     LD L, (IX+0)
600     LD H, (IX+1)
610     LD (LENG), HL
620     LD L, (IX+2)
630     LD H, (IX+3)
640     LD (START), HL
650     INC IX
660     INC IX
670     INC IX
680     INC IX
690     JR SAVCOD
700 SAVSCH LD HL, 49152
710     LD (START), HL
720     LD HL, 16384
730     LD (LENG), HL
740 SAVCOD CALL GETHAM
750     CALL SETFSP
760     LD HL, FNAME
770     LD DE, 30
780     LD A, 0
790     CALL #BC5E
800     JP NC, IOERR
810     LD HL, (START)
820     LD DE, (LENG)
830     LD A, 255
840     CALL #BC5E
850     JR NC, IOERR
860     CALL #BC55
870     RET
880 LOAD CP 1
890     JR Z, PRMON
900     CP 2
910     JR NZ, NOPAR
920     LD A, 0
930     LD (NOISY), A
940     INC IX
950     INC IX
960     JR LOAD2
970 PRMON LD A, 255
980     LD (NOISY), A
990     JR LOAD2
1000 NOPAR CP 0
1010     JR NZ, ERROR
1020     LD A, 128
1030     LD (NOISY), A
1040 LOAD2 CALL GETHAM
1050     CALL SERMS
1060     LD HL, FNAME2
1070     LD DE, 30
1080     LD A, 0
1090     CALL #BCA1
1100     JR NC, IOERR
1110     CALL PRFHAM
1120     LD A, (NOISY)
1130     CP 128
1140     JR Z, SAME
1150     LD HL, FNAME
1160     LD DE, FNAME2
1170     LD B, 20
1180     LD A, (DE)
1190     CP (HL)
1200     JR NZ, NOTSAM
1210     INC DE
1220     INC HL
1230     DJNZ CMP
1240 SAME CALL PRLDMS
1250     LD HL, (START2)
1260     LD DE, (LENG2)
1270     LD A, 255
1280     CALL #BCA1
1290     JR NC, IOERR
1300     RET
1310 NOTSAM LD A, (NOISY)
1320     OR A
1330     JR Z, LOOK
1340     LD HL, CRLF
1350     CALL OUTMES
1360     JR LOOK
1370 ERROR LD HL, MES03
1380     CALL OUTMES
1390     RET
1400 IOERR LD HL, MES04
1410     CALL OUTMES
1420     RET
1430 SERMS LD HL, MES01
1440     LD A, (NOISY)
1450     OR A
1460     RET Z
1470     CALL OUTMES
1480     RET

```



1490 PRFNAME LD HL,MES02	1630 CALL OUTMES	1770 MES04 DEFB 13,10
1500 LD A,(NOISY)	1640 RET	1780 DEFB "I/O Error reported"
1510 OR A	1650 ; Message strings start here	1790 DEFB 13,10,0
1520 RET Z	1660 MES01 DEFB 13,10	1800 ; Header block one starts here
1530 CALL OUTMES	1670 DEFB "Searching..."	1810 FNAME DEFS 22
1540 LD A,0	1680 DEFB 13,10,0	1820 START DEFS 2
1550 LD (FNAME2+20),A	1690 MES02 DEFB "Found"	1830 LENG DEFS 2
1560 LD HL,FNAME2	1700 DEFB 59,32,32,0	1840 OSBUF DEFS 4
1570 CALL OUTMES	1710 MES03 DEFB 13	1850 NOISY DEFS 1
1580 RET	1720 DEFB "Loading"	1860 ; Header block two starts here
1590 PRLDMS LD HL,MES05	1730 DEFB 59,32,0	1870 FNAME2 DEFS 22
1600 LD A,(NOISY)	1740 CRLF DEFB 13,10,0	1880 START2 DEFS 2
1610 OR A	1750 MES03 DEFB "Syntax error in command"	1890 LENG DEFS 2
1620 RET Z	1760 DEFB 13,10,0	

10 ' Fast Load/Save - Basic Loader

20 MEMORY 42000

30 FOR i=42001 TO 42440

40 READ a\$:v=VAL("&"+a\$)

50 cs=cs+v:POKE i,v

60 NEXT i

70 IF cs<>49067 THEN PRINT"DATA ERROR - Check listing";CHR\$(7):STOP

80 CALL 42001

90 CLS:PRINT"oFLOAD and oFSAVE commands loaded"

100 END

110 DATA 01,1B,A4,21,E3,A5,CD,D1,BC,C9,23,A4,C3,6B,A4,C3,C2,A4,46,53,41,56  
 120 DATA C5,46,4C,4F,41,C4,00,DD,6E,00,DD,66,01,46,23,5E,23,56,C5,21,C9,A5  
 130 DATA 06,14,36,20,23,10,FB,C1,78,B7,C8,FE,15,38,02,3E,14,47,21,C9,A5,1A  
 140 DATA 77,13,23,10,FA,C9,21,91,00,3E,3A,CD,68,BC,C9,7E,B7,C8,CD,5A,BB,23  
 150 DATA 18,F7,FE,01,28,21,FE,03,C2,32,A5,DD,6E,00,DD,66,01,22,E1,A5,DD,6E  
 160 DATA 02,DD,66,03,22,DF,A5,DD,23,DD,23,DD,23,DD,23,18,0C,21,00,C0,22,DF  
 170 DATA A5,21,00,40,22,E1,A5,CD,2E,A4,CD,59,A4,21,C9,A5,11,1E,00,3E,00,CD  
 180 DATA 9E,BC,D2,39,A5,2A,DF,A5,ED,5B,E1,A5,3E,FF,CD,9E,BC,30,7B,CD,65,BC  
 190 DATA C9,FE,01,28,0F,FE,02,20,12,3E,00,32,E7,A5,DD,23,DD,23,18,10,3E,FF  
 200 DATA 32,E7,A5,18,09,FE,00,20,52,3E,80,32,E7,A5,CD,2E,A4,CD,40,A5,21,E8  
 210 DATA A5,11,1E,00,3E,00,CD,A1,BC,30,41,CD,4C,A5,3A,E7,A5,FE,80,28,10,21  
 220 DATA C9,A5,11,E8,A5,06,14,1A,BE,20,16,13,23,10,FB,CD,63,A5,2A,FE,A5,ED  
 230 DATA 5B,00,A6,3E,FF,CD,A1,BC,30,16,C9,3A,E7,A5,B7,28,C1,21,95,A5,CD,62  
 240 DATA A4,18,B9,21,98,A5,CD,62,A4,C9,21,B2,A5,CD,62,A4,C9,21,6F,A5,3A,E7  
 250 DATA A5,B7,C8,CD,62,A4,C9,21,80,A5,3A,E7,A5,B7,C8,CD,62,A4,3E,00,32,FC  
 260 DATA A5,21,E8,A5,CD,62,A4,C9,21,8A,A5,3A,E7,A5,B7,C8,CD,62,A4,C9,0D,0A  
 270 DATA 53,65,61,72,63,68,69,6E,67,2E,2E,2E,0D,0A,00,46,6F,75,6E,64,3A,20  
 280 DATA 20,20,00,0D,4C,6F,61,64,69,6E,67,3A,20,00,0D,0A,00,53,79,6E,74,61  
 290 DATA 7B,20,65,72,72,6F,72,20,69,6E,20,63,6F,6D,6D,61,6E,64,0D,0A,00,0D  
 300 DATA 0A,49,2F,4F,20,45,72,72,6F,72,20,72,65,70,6F,72,74,65,64,0D,0A,00

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## Go Forth

Random disc access with Forth users in mind  
on the CBM 64 by **Adrian Warman**

The following article and program details an introduction to the techniques of random access to disc storage. By way of a concrete example, we will consider here the way in which a well-known language package behaves in its disc storage, and hence use this to demonstrate how any disc drive owner can inspect the contents of any disc sector.

For most computer owners, the choice of languages available, other than Basic, will almost always include Forth. Forth is beginning to enjoy increasing popularity as programmers find out about its extremely powerful and very fast operation.

Spectrum owners (and more recently, CBM owners) will be aware of an excellent implementation of Fig-Forth (one of the most common Forth standards on micros) called *White Lightning*. I do not propose to mention much about the package, since it has been reviewed elsewhere, but it is much like most other Forths in that it uses 'screens' to store its program listing.

A Forth screen is simply a work area consisting of 16 lines of 64 characters, on to which Forth words are placed in meaningful order. The lines are numbered from 0 to 15. If you consider a Basic program listing, divide it into groups of 16 lines (making sure that no line is longer than 64 characters), then you have just envisaged what a Forth screen looks like. Each screen has a number from 1 to an upper limit; for *White Lightning* this is 12 screens for the tape-based version (which must keep all screens in memory), and 88 screens for the disc-based version.

In most versions of Forth, screens being used are stored in memory buffers called Blocks. These are 1024 characters long (16 × 64!), and in theory equate to disc storage. In other words, whenever any disc access is made by the Forth system, it is always in the basic unit of the block - you can only read or write whole blocks. However, because most micro-computers do not have discs with sectors that can hold more than 256 characters, Fig-Forth defines a variable called *B/Scr*. This is the number of disc blocks (or sectors) that make up on 1024 character screen.

So, what relevance does this have to 1541 disc drive owners? Simply that each Forth screen consists of four blocks of 256 characters, which are exactly equivalent to disc sectors. The program given in this article is intended to let users access Forth screens using normal Basic. However, since the principle involved is simply to read sectors and display them

character by character, it should be apparent how easy it is to modify the program to consider individual sectors, and display their contents in a more useful form; for example, examining the contents of the directory track (track 18).

As it stands, the program will list four blocks at a time, since that is how each Forth screen is made up. Forth screens can only consist of printable ASCII characters, so there is no problem with 'funny' control codes. However, if you did indeed wish to alter the program to portray such codes, it is simply a matter of adding code after line 1430 to replace non-printable characters by (say) a '!' symbol. For further information on this, see the program notes.

In order to understand the program, it is necessary to look at how the 1541 works to allow random accessing of disc sectors. The 1541 has a small amount of workspace Ram (about 2K) used for system variables and also a number of 256 byte buffers used for transferring data to and from the computer. Any reading or writing of sectors is performed by copying the entire contents of the sector to or from one of these buffers. At the same time, a counter is kept of exactly how many bytes within the buffer are valid data. When the user attempts to read beyond this value, an end-of-file error occurs, which sets the Basic variable *ST(atus)* to 64.

In order to access individual sectors, we must have two channels of information flow from computer to disc. The first is the command channel, which is number 15 as usual. The second channel is to access the data from one of the 256 byte buffers. To show that we wish to access one of these buffers, we use a filename of "#" (see Line 1130). The drive will automatically assign one of the buffers to this channel. We can then use the command channel to instruct the drive to read-into or write-from this buffer.

To read data from a sector, we use the command channel to send the command: "BLOCK-READ:";channel;drive;track;sector. We can now access the data channel just as if it was a normal sequential file, but a maximum of 256 characters long. The counter stored along with the sector will prevent us from reading too much data.

However, there may be occasions when we wish to read *all* the characters in a sector. We can do this by sending a command: "U1:";channel;drive;track;sector. This behaves in exactly the same way as the Block-Read, but having copied the sector into the buffer, it then forces the byte counter to indicate that *all* bytes

within the buffer are valid. We can then read every byte without hitting an end-of-file error.

### Program Notes

#### Line No

**1000-1100-** These lines set up the screen to make it easier to read. Some constants are defined to make it easier to read the program listing. The program will pause until *Return* is pressed when it will be allowed to access the drive.

**1120-1130-** Open the command channel to drive, and a data channel to any one of the data buffers. The order of the open commands is important, since if the data channel is opened before the command channel, the act of opening the command channel will deallocate the data channel, and any attempt to access the data channel would then result in a "No Channel" error message.

**1150-1190-** This program is a utility to list sectors to the screen or the printer. These lines inquire whether the printer is required. The peculiar expression in Line 1180 simply means that *PR* will be true if the printer is needed (ie, if the user replied 'Yes'), and false otherwise. If the printer is required, an output file is opened to device four. If you have another device (eg, plotter) or a parallel printer connected, you may need to alter this line slightly.

**1220-1270-** This program is written to access *White Lightning* Forth screens, which are labelled in the range 1 to 88 inclusive. These lines inquire which screens are to be displayed.

**1300-** The main program loop to print out each screen in turn.

**1310-1320-** Print out a heading of the screen to follow. If the printer is selected, the same message will appear there.

**1330-** As mentioned above, each Forth screen line is numbered from 0 to 15. *RNUM%* is an integer variable which will keep track of the line number currently being output.

**1340-1360-** The 256 character size of 1541 disc sectors means that four sectors or blocks make up one screen. These lines perform two conversions. The first is the loop in Line 1340 which calculates the physical blocks which make up screen *Scr*. For example, screen number one uses disc blocks 1\*4=4 to 1\*4+3=7 inclusive; similarly screen 25 would use blocks 25\*4=100 to 25\*4+3=103 inclusive. The second conversion is to take this block number and convert it into the correct track and sector numbers. By some quick arithmetic, you should see that the screen 88 will use block 355 as its final block, and by coincidence, this corresponds to the last sector of track 17. Tracks one to 17 inclusive each have 21



sectors on them, and so the conversion to track and sector is performed by simple integer divisions in Lines 1350 and 1360. To make this program more general, the indexing method to blocks may need to be generalised.

**1380-** This reads in the sector on *Trk%* and *Sec%*. Because the 'U1:' command was used, the byte counter is set to maximum.

**1390-** Each disc sector can hold 256/64=4 Forth screen lines. This line will force a loop of four times to read in each of the four screen lines.

**1400-1460-** These lines will read in each of the Forth screen lines. *Line\$* holds each of the characters to be printed, and is built up as each character is read from

the buffer. *Last%* keeps track of the last non-space character on the line. This is to keep the string output as short as possible. Since each screen line is 64 characters wide, this exceeds the width of the 64 screen, and so will cause a wrap around. By trimming the string, this effect is reduced. Note how the data channel is read (Line 1430) in an identical fashion to an ordinary sequential file. *Get#* is used rather than *Input#* because it is more general purpose; and although it is slower, it will successfully read characters such as a ',' or ':', unlike *Input#*.

**1480-1510-** These lines will print out the trimmed string of characters read from the disc sector, prefixed with the line number stored in *Rnum%*. The program then repeats for the next 'row' of the block.

**1520-** Having finished this block, go and read the next block of the screen.

**1540-** If the printer is being used for output, a few blank lines are added to make the listing clearer.

**1550-** One complete Forth screen of four blocks has been output. If there are more to get, go and do so.

**1580-1600-** The output is completed now, so close the various files in the reverse order to which they were opened. It is important to note that the command channel should always be the first to be opened, and the last to be closed. Failing to do this (especially with writing sequential files) could result in premature (and so incorrect) closure of files - leading to big problems later.

```

1000 rem forth screen read.
1010 :
1020 poke 53280,0
1030 poke 53281,0
1040 cr$=chr$(13)
1050 cs$=chr$(147)
1060 print cs$;chr$(14);chr$(30)
1070 print "Ensure that the Source
Disk is in"
1080 print "Drive 0 and press
<RETURN>."
1090 get rep$
1100 if rep$<>cr$ then goto 1090
1110 :
1120 open 15,8,15,"i0"
1130 open 2,8,2,"#"
1140 :
1150 print cr$;"To Printer? (Y/N)"
1160 get rep$
1170 if (rep$<>"y") and (rep$<>"n")
then goto 1160
1180 pr=(rep$="y")
1190 if pr then open 4,4
1200 :
1210 :
1220 print cs$
1230 input "From which screen";s1%
1240 if (s1%<1) or (s1%>88) then
goto 1220
1250 print cs$;"From screen:";s1%
1260 input " To screen";s2%
1270 if (s2%<1) or (s2%>88) then
goto 1250
1280 :
1290 :
1300 for scr=s1% to s2%
1310 print cs$;"Screen";str$(scr);
".";cr$
1320 if pr then print#4,"Screen";
str$(scr);".";cr$
1330 rnum%=0
1340 for blks=scr*4 to scr*4+3
1350 trk%=int(blks/21)+1
1360 sec%=blks-int(blks/21)*21
1370 :
1380 print#15,"u1:";2;0;trk%;sec%
1390 for row=1 to 4
1400 lin$=
1410 last%=0
1420 for col=0 to 63
1430 get#2,sym$
1440 lin$=lin$+sym$
1450 if sym$<>" " then last%=col
1460 next col
1470 :
1480 print right$(str$(rnum%),2);
" ";left$(lin$,last%+1)
1490 if pr then print#4,right$
(str$(rnum%),2);" ";chr$(93);lin$;
chr$(91)
1500 rnum%=rnum%+1
1510 next row
1520 next blks
1530 :
1540 if pr then print#4,cr$;cr$;cr$
1550 next scr
1560 :
1570 :
1580 if pr then close 4
1590 close 2
1600 close 15
1610 :
1620 print cs$;"Job Done."
1630 end

```



# Arcade Avenue



## Fast Nasty

I'm pleased to be getting more letters from Dragon owners these days and here is one from Neil Kenny of Crewe that I'm sure many people will find invaluable. "I picked this tip up off the Software Projects stand at the 6809 show. *Cloadm Manic Miner* as usual and press *Enter* to start, press *P* for pause and if you now type the word PENGUIN a boot should appear at the bottom right of the screen. To get onto any screen press break then any letter A-V, the letters correspond to one of the screens in order, screen *T* being the Final Barrier, *U* being the Dragon User's bonus and *V* being The End. To speed up your journey in Eugene's Lair you can get the key below the one at top right of the screen by following this routine from the screen start - jump over loo, jump over gap, jump over bush, get top key, walk onto conveyor belt, jump right back on to platform. You will pick up the second key on the return jump so there is no need to take the long route on the bottom of the screen.

"At the show I purchased *Jetset Willy* and mapped it the next day as having 73 screens rather than the Spectrum's 60 plus three entrance to Hades caverns."

Neil continues, "To get everlasting lives on *Bug Diver* by Mastertronic follow loading instructions until it displays the playing rules. Press *Break* (the game is a mixture of Basic and machine code) and delete line 17. Run the game.

"Here are my high scores - *Time Bandit* 29170, *Speed Racer* 3 tracks, *Chuckie Egg* 163210, *Ice Castles* 537793, *The King* 89720, *Hungry Horace* 3126519 and six lives remaining, *Racer Ball* 161219, *Manic Miner* 29560, *Backtrack* (test 1) 59 seconds. I can recommend all the above games, especially JSW."

Sticking with the same game for a while I've had a couple of letters about the Amstrad version. A mysterious inhabitant of Durham called P. F. The Tetrarch has sent me a map of the 109 rooms found to date and wants to know whether anyone has a poke routine for immunity from falling and what the switch does in 'The Trip Switch'. The answer comes from Murray Pope who has used our infinite lives poke to produce a similar map, although once again it isn't of all the rooms. He provides some tips on how to complete some of the trickier problems including Decapiture. "To pass Decapiture you must get past the doohickey on the left, if you don't make this the chances are you will keep on dying. Then you must fall down between the pillars on the guillotine and keep to the left until it's safe to jump to the right. Clear? Oh well.

"On 'The Hole With No Name' the exit on the right is difficult to find but can be seen as an irregular patch of red-on-yellow, two thirds of the way up the right hand wall. You must go through this exit and along the 'secret passage' to collect the three objects on the left of the screen. Don't go down 'T' Pit - you will never get out. Be prepared for a shock if you climb the 'Cold Store' rope - the sewer above has a very fast nasty flying around. 'The Trip Switch' makes the 'Cartography Room' possible. Beware of 'Loony Jet Set' - strange things happen here. Don't be too frightened by all the monsters in 'Eggoids' the

screen is really quite easy to pass.

Unlike the Spectrum version it is (I think) possible to go back down the 'East Wall' from the 'Emergency Generator'. On the 'Yacht' follow the saw very closely and turn back the instant you collect the object, otherwise the mega-death. The simplest way to get from right to left through the 'Kitchen' and 'West Kitchen' is to just hit the left button and keep walking; - the timing allows you through without stopping. Don't die in the 'Forgotten Abbey' - it is notorious for multiple deaths. On 'Main Lift 2' and 'Main Lift 1' keep as far right on the lift as you can and you'll escape the arrows... just!" Thanks for that, Murray - we can add it to the growing pile of invaluable tips you have sent.

I've got a lot of letters here that for some reason or another did not get put into the pokes special issue, which I trust you all enjoyed, and over the next few weeks I will try to fit them all in the column. However, I have to repeat the point made that we had so many replies it has been physically impossible to check each one.

Another old friend of the column is Kenneth Devlin of Inverkip in Scotland who is single handedly responsible for most of the pokes we get for the Commodore - here is a crop of excellent routines from him. "One reason for the lack of Pokes for the Commodore 64 is that most programs are turbo loaded to get around the slow cassette interface. This makes the whole business of entering a single

poke for infinite lives that much harder.

"A system I use a lot when hacking is to touch pins 6 and 2 of the serial port together - this resets the machine without affecting the machine code, but be careful as getting it wrong could damage the machine.

"*Falcon Patrol* - you can poke the lives location (16705) with a number greater than three but when you play each time you crash your score is reset to zero. To get round this I have set lives to '2' and disabled the code that subtracts the life. When playing the first time after loading the first plane explodes following fueling - don't worry, it shouldn't happen again. To obtain infinite lives - Load ""',1,1 / Load ""',1,1 / Poke 16764,234 / Poke 16765,234 / Poke 16705,2 / SYS 16640 /

"*Kokotini Wilf* - Load ""',1,1 / 30 FOR B=0 TO 12:Read A: Poke (694+B),A: Next B: SYS 680 / 40 Data 169, 234, 162, 3, 157, 11, 67, 202, 208, 250, 76, 180, 195 / Run /

"*Automania* - Load ""',1,1 / Poke 2212,194 / Poke 2213,8 / Poke 2242,169 / Poke 2243,236 / Poke 2244, 141 / Poke 2245,137 / Poke 2246,87 / Poke 2247,76 / Poke 2248,241 / Poke 249,9 / Run /

"*Beamrider* (ignore load error for second part) - Load ""',1,1 / Load ""',1,1 / Poke 4226,234 / Poke 4227,234 / Poke 4228,234 / Poke 35909,89 / Poke 35910,242 / Poke 35911,26 / Run /

"*Fred* - load as normal and reset machine - Poke 28209,234 / Poke 28210,234 / Poke 30400, X (x-no. of bullets eg, 99) / Sys 30483 /"

Tony Kendle

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Between now and September Tony Kendle will be keeping you up to date on the *Arcade Avenue* page with just who has the scores to beat. Then, in September, the top three scorers on each machine will battle it out for a place in the final and the chance to be the first to play our 'top secret' games.

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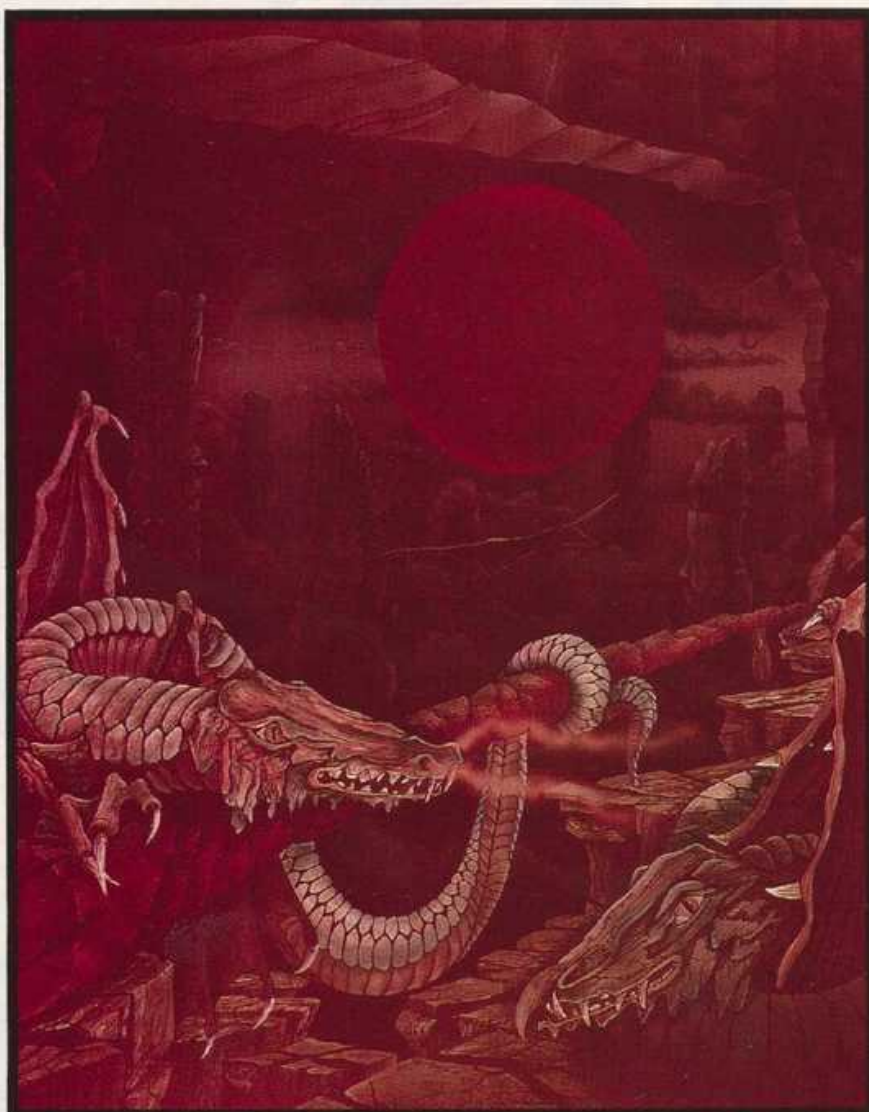
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# Tony Bridge's Adventure Corner



## Join the club

I'm always saying that adventures are becoming a major pastime for computer gamers, and nowhere is this more evident than in the number of helplines and help columns around at the moment.

Adventure helplines have had a chequered past - Ken Matthews's phone-in service is excellent (and free - call him on Gravesend (0474) 334008) - he also runs a retail outlet and mail-order facility. Ken knows more about adventures than just about anyone else, and always comes up with some witty comment. Quite sickening! Another good one is Henry Mueller's Adventurer's Club Limited, which also runs a phone-in Helpline, restricted to members of the club. But then, they also have an excellent, very useful, monthly newsletter, as well as a £10,000 competition under way for the Master Adventurer of the year, plus smaller prizes for the best solutions and maps. Call them on 01-794 1261.

Unfortunately, others have not been so good, and many people, I believe, have sent off money and received nothing in return. I've said it before and I'll repeat it now - because you read about these clubs and helplines in this column does not mean that I personally endorse or encourage them. I merely pass on the details that they have sent me. After that, it's up to you.

Dave Linsley writes to me from Newcastle and his letter is representative of many others I've received, complaining about a certain adventure club/helpline which was advertising some months ago.

Thankfully, it seems to have disappeared, but many people apparently sent off their £5 in good faith, only to hear nothing more. The directors, as you would expect, explained that they had been snowed under with requests for membership, and that I can believe, but I have yet to hear of anyone receiving the promised goods.

Here is news of other clubs opening up:

**The Adventurer's Guide:** Red Brae, Beverly, Harrogate, North Yorkshire HG3 5JE. Paul Hawksworth, who runs the Guide, says: "We will not get snowed under, as we have workers and helpers all around the British Isles. The membership fee of £3 includes membership card, monthly magazine, 15-25% off games, write or phone-in Helpline. We will also, response permitting, be running competitions."

**The Quest Line:** 41, Fernhill Road, Bedbrooke, Oxford OX5 1RR (Tel: 08675 6670). Tony Treadwell, the brains behind this one, says: "I send out a newsletter every two weeks, consisting of hints and tips for many adventures. The members can swap completed adventures. The Quest Line was set up purely as a hobby, and so is completely free."

**Adventureline:** 52 Micawber Way, Newlands Spring, Chelmsford, Essex. I've mentioned this one before, and Roger Garrett, el supremo, says: "The response has been tremendous, and we can now offer help on many new adventures."

**Gary Smart**, who has contributed to adventure columns in other magazines, runs a phone-in Helpline on Andover (0264) 59489, and has several helpers on phone numbers around the British Isles, thus helping to keep down your phone bill.

**Orcsban:** 84, Kendal Road, Hillsborough, Sheffield, Yorkshire S6 4QH. This is run by Nick Walkland, whose name has been whispered in hushed tones in this Corner. *Orcsban* is actually a bi-monthly (or so) fanzine for computer adventure gamers, which contains hints'n'tips, reviews, news and so on. The first one is out this month at 50p, which also covers postage. Nick says: "It

won't be as serious as some adventure columns, but it will have a chatty light-hearted approach. I will give more information if your readers enclose an SAE - they won't have to send any money without knowing what it is all about." Nick can offer help in a vast range of adventures, including the Zorks, Mysterious, Level 9s, Artics and all the popular new releases. "Please ask your readers to send any adventure-related articles, artwork or reviews in exchange for free copies, and general help and their address in order to build up a large helpline base."

The best way to ensure that these clubs work is, first of all, for the organisers to make very sure they are set up to handle the mass of enquiries that they will certainly get. Particularly if money is involved, the set-up must be capable of keeping tabs on a large membership, and keeping everyone happy. The second requisite is participation on the part of the members - if you want help in an adventure, send details of another game that you have completed, with maps where possible, or even details of your progress so far.

A regular correspondent to the Corner is Hugh Walker, of Guildford. You will probably recognise his name if you are a regular reader, and I should have mentioned his sterling cartographic abilities in the piece on *Lords of Time* a little while ago. This time he says: "Us 'mere mortals' (see the Corner of 20-26 June) are the equal of Beebers in deviousness. We too can take a peek at the dictionary of Level 9 games (prior to *Erik the Viking*, after which the games are Break protected). Here's how:

Break and List the program, then type Print F: Print C and note the values. Now enter the following lines:

```
1 For F = 27000 To 35000 : Let C = Peek F : Print F : If C < 16 or C < 23 Then Print Chr$C
```

```
2 Print Tab 26;C: Next F : Stop
```

"If you don't find the dictionary in there, try other limits for Loop F. When finished, restore F and C to original values, if any were found, and Goto 100 to restart."

Ron Mackenzie also strikes up for the Spectrum adventurers: "Here is a program that will list vocabulary. It won't work with *Sherlock*, but with *Eureka!*, and others such as the Artic series, should work fine. Save the program before you run it by typing Goto 90.

```
10 Clear Val "24201"
20 Load "" Code Val "24201"
30 For F = Val "24201" To Val "65367"
40 If Peek F < Val "32" Then Goto Val "70"
50 If Peek F > Val "127" Then Goto Val "70"
60 Print Chr$Peek F;
70 Next F
80 Stop
90 Save "CHEAT"
```

To use the program, Load "", Run and then play the adventure into it."

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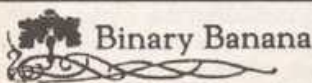


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PHIL ROGERS 'Peek & Poke'  
"POPULAR COMPUTING WEEKLY"  
January 1985 (Vol IV No 1).

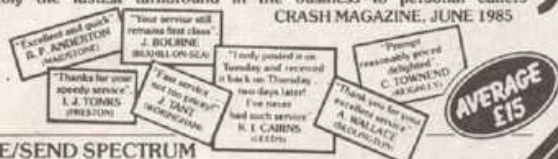
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DIGEST Vol 1, No. 11

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CRASH MAGAZINE, JUNE 1985



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**AMSTRAD CPC464 PROTEK MODEM**, unused. Includes software for it to run on. Cost £109 from catalogue, £70 ono. Tel: 310 5701 after 4pm.

**TI 99/4A JOYSTICKS**, £5. Early reading module, £1.50. Hunt the Wumpus, £4. Number Majic, £4. Early Learning Fun, £4. All new modules. Thorpe, 32 Glenshesk Park, Dunmurry, Belfast BT17 9BA. Tel: 0232 623001.

**TRS-80 MODEL IV**, 128K, twin disks, tech manual, carry case; £850. Line printer VI for above 13.5", Centronics, £200 or both for £1,000. Offers please to Time Steele. Tel: 05645 78218.

**SINCLAIR QL + JOYSTICK** + books + QL User magazines + 3-D Chess. Little used. Cost over £450, offers around £300. Brother M-1009 Epson compatible printer. Hardly used. Offers around, £120. Sener Tel: 254 5952 after 5pm.

**MODULATOR MP-1 AMSTRAD**, unused, brand new, £18. Repeated present. Tel: 061-707 2373.

**QL**, brand new, boxed and updated S/W plus eight spare microdrive cartridges, £320 ono. Tel: 01-941 4876.

**CURSOR** clip-on joystick for sale. For Spectrum. Offers. Tel: 0763 61392.

**MODEL RADIO-CONTROLLED** racing car, very good condition. Original box including transmitter. Will sell for £25 or swap for ZX81 or Vic ect. Will post if required free! Tel: 0244 675717.

**TI 99/4A** ext Basic, Alpinar, Munchman, Wumpus, Minus Mission, Grammar, tapes, games, books, manuals. Joystick, leads, cassette recorder as new boxed £110. Would split. Tel: 0202 692894.

**SINCLAIR** flat face TV. Brand new, unwanted gift. 12 months g/tee £80 ono. Tel: 0302 49475. Tim.

**SHARP M2-80A** built in green monitor and cassette deck. Plenty of software including Arcade and Adventure games, Hisoft, Pascal and assembler. Mint condition £250 ono. Tel: Leeds (0532) 504431.

**TI 99/4A** pair joysticks new £5. Joystick interface Atari. New £2.50. Selection software. See for list. Wanted extended Basic module. Tel: 0232 623001. 32 Glenshesk Park, Dunmurry, Belfast BT17 9BA.

**ORIC-1** 48K with various software including Arcade games, Adventure games, Word Processor and Assembler. All in original packs. Offers around £40 considered. Tel: 0462 730067 (Herts-Beds).

**CARTRIDGE**, editor, and assembler with Zen book for Tandy colour comp or Dragon 32. Cost £45. Sell for £20. Tel: 872844 (Notts).

**AMSTRAD CPC-464** (colour) excellent condition £295 ono. RSX Cyclone, Sorcery, Electro Freddy, Masterchess, Codenamemat £5.50 ono. Knightlore, Snowball £7 ono. Hobbit, Screen Designer £10 ono. Devapac £15 ono. Tel: Simon after 6pm (0242) 45764.

**BASE 2** matrix printer I4EEE RS232 Centronics parallel tractor friction feed £100 or swap for Amstrad FD1 disc drive. Tel: 0582 38439.

**ORIC-1** 48K plus tape deck plus leads £120. Software (inc Zorgons, Revenge etc). Some books and magazines. Accept £85. Tel: 01-304 6460 after 6pm. Ask for Iain.

**MEMOTECH MTX512**, word processor, Pascal and Communications software on ROM, RS232 board, printer and £150 of software. Worth over £900 sell for £550 ono. Send see to Mr A. E. Fisher, 15 Alford Avenue, Prestwick KA9 2JU.

**PRISM** modem with Prestel Micronet, ROM. Only three months old £55 ono. Tel: 061-370 9686.

**AMSTRAD** disc drive including interface under guarantee. Complete with manual, CP/M disc and leads £160 ono. For more details telephone (0377) 42803 after 6pm except Thursdays.

**LYNX** 48K, as new £50 ono. Also parallel interface £20, software £8, word processor £5, Moder-80 £3, Numerons £2. Tel: York 51130.

**VIX** 5000 modem for Sinclair Spectrum brand new unused only £40 ono. Tel: 021-476 6251.

**AMSTRAD CPC 464** with colour monitor and over £100 worth software. Boxed as new. Over 10 months original guarantee. Must sell so only £270 ono. Tel: 0372 (Leatherhead) 373331 after 5pm.

**SHARP MX80K 48K** monitor Datacorder. Some software, £110 ono. Sord C9LM5 Falc BasicF graphics designer, £40 ono, buyer collects. Tel: 0480 74551 after 6pm.

**AMSTRAD CPC464** mono for sale. Guaranteed. Includes manuals plus S/W. For further details and you offers. Tel: 0377 42803 after 6pm.

## Spectrum for Sale

**BARGAIN**. Spectrum add-on. Fuller keyboard £24. Currah speech and slot £20. Very reliable data recorder, guaranteed £17. Ram turbo, joystick interface and joysticks £16. Darren. Tel: 01-393 3909.

**48K SPECTRUM**, Kempston Pro 5000, joystick and Kempston joystick/Rom cartridge interface. All still boxed, good as new and some original games. Bargain at £100. Tel: Maidstone (0622) 45891 evenings.

**SINCLAIR 48K** Spectrum, loads of programs. Pascal book, M/C books. Monitor lead. Insanity Adventure £80 ono. Tel: 0392 881545.

**ZX SPECTRUM**, wafer drive, 22 wafer cartridges, Currah speech, Currah slot, parallel Centronics printer interface, Pro joystick interface, Kempston Formula 1, £700 of software all original. Will sell for £550 ono. Tel: 01-361 1933 after 7pm.

**48K SPECTRUM** interface 1 and microdrive, 40 cartridges with software, manuals, leads in original boxes £215 ono. Would swap for Amstrad and monitor or will separate. Bill. Tel: 01-572 2917.

**48K SPECTRUM**, joystick, interfaces, TV, radio cassette recorder plus over £100 of software with magazines only £220 ono (all games are originals). Tel: 051-526 5820 after 5pm.

**SPECTRUM**, microdrive, interface 1, DK Tronics keyboard, Fox programmable joystick interface, Tac 2 joystick, Trigg Command joystick, cassette recorder, cartridges, books and software. All in mint condition £200. Mick. Tel: 0203 346848 after 6pm.

**16K SPECTRUM ZX** printer for sale £80 ono or exchange DM A4 printer or Acorn Electron. Tel: 01-979 5047 daytime, ask for Chris.

**SPECTRUM 48K** Kempston interface, Quickshot I over £200 top games including Underwurdle, Knight Lore, 4 books, lots of magazines worth over £350 only £150 ono. Tel: Cannock (05435) 3389 ask for Simon.

**SPECTRUM** Currah micro speech, tape recorder, printer and 12 rolls of paper, Fuller box, Kempston interface, 16 games, books, 100 plus magazines. Cost £240 sell £80 ono. Tel: Hornchurch 57487 after 6pm.

**SPECTRUM 16K** Plus 32K Cheetah rampack and fitted DK Tronics keyboard, almost new £70. Tel: 051-625 5805.

**48K SPECTRUM**, Alphacom 32 printer, paper, £200 worth of games, Spy Hunter, etc. Crash magazines. All in excellent condition. Sell for only £200. Tel: 01-449 1571 after 5pm.

**48K SPECTRUM**, reset switch, interface 2, 1 cartridge, Quickshot I, joystick, Kempston interface. Original s/w £500. Sharp cassette recorder and leads. Sell £170. Tel: 0223 359920.

**SPECTRUM 48K III** Quickshot II joystick, interface, data recorder, 11 games. Bargain £130. Tel: Bolton (0204) 46972.

**SPECTRUM 48K**, W. H. Smith recorder, £80. Tel 529 221 (Crayford) day only, Helen.

**SPECTRUM** Plus, inc speech (Cheetah) £200 of original s/w, joystick, interface, all new s/w inc Ultimate, cheapest price £100, 2 months old, leads etc. Tel: 0734 787 442.

**48K SPECTRUM**, interface 1, microdrive, 11 cartridges, Cheetah keyboard, Kempston joystick, lightpen, speech synthesiser, Tasword, Pascal, Logo, Devpac, 16 books, many games, very good value at £250. Graham Hopkins. Tel: 0322 20880.

**SPECTRUM 48K** for sale with lo-profile keyboard, Currah speech synthesiser, DK Tronics lightpen, tape recorder, £300 of software, worth £550 sell for £200. Single sale preferred. Tel: 0968 72009 evenings.

**SPECTRUM** Plus microdrive and interface 1, 6 microdrive cartridges, interface 2, and Rom cartridge and joystick, tape recorder and £200 of new games and utilities inc Ms-Pac, Moon Cresta £250 ono or swap for 64K Enterprise. Russell. Tel: 0278 455747 now! Also Atari VCS and cartridges £25 ono.

**SPECTRUM 48K** perfect condition plus 28 assorted software titles inc Midnight, Knight Lore, Sherlock etc. Original packaging, as new £200 ono. Tel: Barnsley 0226 243071.

**ZX SPECTRUM** model III, interface II, Ram, turbo interface, 10 books, many mags, over £150 s/w titles (Psytran etc, two Rom cartridges). All £190 ono. Richard. Tel: Wrexham (0798) 757817.

**SPECTRUM 48K** for sale with joystick interface, cassette recorder and well over £200 worth of software including Alien 8, Boulderdash, Dark Star, Pyjamarama, Avalon and Underworld. Only £159 ono. Tel: 0243 692128.

**SPECTRUM 48K** with printer, 5 rolls of paper, DK Tronics lightpen, Kempston interface, Quickshot II joystick, carry case, 36 original games and other software, immaculate condition. Sell for £280. Tel: 0708 44332.

**POPULAR COMPUTING WEEKLY** robot trolley for Spectrum. Fully assembled (not kit) with taped program, ready to run £15. Tel: 0428 713019.

**SPECTRUM 48K** + printer, boxed, paper, Kempston interface, Quickshot 2 Joystick, mags + games. £110. Tel: 0702 546 649.

**SPECTRUM 48K** + Kempston Joystick, £200 of original s/w, £100. Tel: Preston 731 853, eves.

**48K SPECTRUM**, light pen, DK Tronics Board, Hi-Soft Pascal, DES pack, Bks, etc, £150. Or swap for BBC + cash. Tel: Harlow 0279 415078.

**SPECTRUM** 48K, tape recorder, Kempston Joystick Interface, £110 of original s/w, still boxed, £135. Tel: Andover 0264 65679.

## COMPUTER SWAP

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send to Computer Swap, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP or telephone 01-437 4343.

All software offered through computer swap must be in original condition and for private sale only.

It cannot be swapped.  
**Warning:** It is illegal to advertise pirated software.

## COMPUTER SWAP

Please write your copy in capital letters on the lines below.


Name .....

Address .....

Telephone .....



**ZX SPECTRUM**, £300 of original s/w, joystick interface, Speech unit, Stack Light Rifle, Interface 2 with cartridge, £100. Tel: 01-904 1382 (Alex) after 6pm.

**48K ZX SPECTRUM**, Saga keyboard, Interface, Microdrive, 9 cartridges, Interface 2, 2 rom cartridges, lots of software, books, magazines, worth over £400, accept £230 ono. Tel: Blackpool 700629 or 51544.

**SPECTRUM 48K**, tape recorder and over £60 of software, leads PSU etc. All in good condition, three months guarantee. Only £80 or £90 if posted. Tel: Andy on Leeds (0532) 657038.

**48K SPECTRUM**, data recorder, 36 original games inc Chess, Atic Atac, Scrabble, etc, 20 C15s, 4 books, lots of magazines, worth £300+ sell for only £200 ono. Tel: Leeds 824856.

**SPECTRUM 48K Plus** with Microdrive still under guarantee (9 months) also insured 3 years. Lots of software including RTTY, Morse Transceiver and some Ham radio. Swap FT290. Cash £200. Len, 021-453 9762.

**48K SPECTRUM**, leads, manual, mags, software worth £50 inc Quill, Brian Bloodaxe, all originals, just £80. Tel: 0223 842871 (evenings).

**FOR SALE 48K Spectrum**, cassette £300 s/w, Currah speech, books, joystick i/face etc. Will sell for £300 ono. Tel: 0226 382497 ono. Ask for Rick.

## Wanted

**SWAP ROTRONICS Wafadrive** + 22 Wafas, 1200 modem for the ZX Spectrum, Kempston Pro Formula 1, Currah Speech + Slot. Swap for the Epson FX-80 Printer or will sell for £225. Tel: after 7.00pm 01-361 1933. Philip.

**WANTED BBC SOFTWARE** tape or disc. Tel: 0423 883483 (Harrogate) evenings only.

**WANTED ATARI 810** disc drive also 48K Atari computer. Not working considered. For sale Spectrum tape controller/copier also books. Tel: 061-432 4538 evening or weekends.

**ORIC ATMOS MANUAL** urgently wanted, will pay up to £5.00 (any condition). Please ring John on Witney 2557 or on Ramsden 249 (after 6).

**WANTED FOR YOUNG GIRL**. Atari computer, also disc drive. Not working considered if cheap. Tel: 061 432 4538 evenings or weekends.

**SWAP 48K SPECTRUM** + ZX81 with all leads manuals with over 100 games including Air Wolf for BBC B + leads + manuals and games, peripherals if possible or sell for £460 ono (worth £800 +). Tel: Ruabon 821133 after 6pm.

**I WOULD LIKE TO HEAR** from anybody who have built the buggy for the Amstrad with good results, as I have not. Mr Stan Fowell, 5 Woodward Road, Dagenham, Essex RM9 4SH.

**WANTED Expansion Unit** for M280K. Tel: Melton Mowbray 812246.

**WANTED expansion unit** for M280K. Tel: Melton Mowbray 8122346.

**EXCHANGE KORG SAS20**, keyboard, cost £450. Swap for complete system. Tel: 01-908 1460.

**SPECTRUM 48K PLUS**, 2 joysticks, interface, cassette recorder, swap CBM 64. Tel: Chesterfield 204 794.

**TRS80 Colour Computer**, s/w and accessories wanted. Anything appreciated. Good prices paid. Details to Mr Paytj, 23 Arundel Drive, Orpington, Kent.

**SWAP your CBM64**, C2N recorder for 48K Spectrum with FDS keyboard, Sound AMP, joystick & speed controller interface. Tel: Potters Bar (0707) 50345 (evenings).

**SWAP Commodore 64** for 2 Spectrum plus. Tel: 01-640 5809.

**WANTED** New titles for ZX Spectrum offers. Tel: David 2673 Radlette.

**BBC B**, Graphics Rom, Disc Doctor Rom, joystick, BKS, mags, cover, s/w. Swap for CBM 64, C2N player, 1341 disc drive etc. Tel: 01-647 9658.

**SWAP 48K Spectrum**, printer, 3 channel sound unit, programmable joystick, echo sound box, s/w. Swap for media drums machine or expander or 4 track tape recorder. Tel: 01-599 6655.

**SWAP audio 9 CB** + antenna + power pack for CBM printer. NOT printer plotter. Sell £95. Tel: Kevin (Dartford) 79745.

**WANTED modem** for BBC. Tel: Sunderland 40856.

**WANTED disc drive** or disc interface for BBC monitor. Tel: Sunderland 40856.

**SWAP MZ700**, 2 data recorders, joystick, RGB cable, nine games, two "10 game's pack", for Atari 800XL plus 1010 recorder with 5 months guarantee. Tel: Gosport 522737.

**ATARI 400** or 800 wanted for spares, any condition, more than 16K. Also wanted ZX printer or Atari printer plotter, any condition. I have ZX81 sound board + games in exchange for ZX printer or will buy. Write to Gareth Rollinson, 15 Stirling Rd, Bolton BL1 6RQ.

**WANTED** Star Wars cartridge by Parker Bros for C64. Will pay £10. Phone: Hornchurch 45284.

**WANTED disc drive** and/or interface for Oric Atmos. Phone: Singer Sheffield (0742) 554782.

**VECTREX** games cartridges wanted to buy, also Vectrex lightpen and Vectrex joystick wanted. Phone Russ on Coventry 594017.

**AIRGUN** - Target Rifle, IJ-38, -177 with Diopter sight and several 100 pellets. Swap for Spectrum 48K or Metacompo Pascal for QL. Tel: 0325 312417.

**WANTED CBM 64** disc drive in good condition pay reasonable price. Also wanted adventure programmes, Emerald Isle, Valkyrie, 17 originals please tel: 021-328 2984 anytime. Unavailable leave tel number.

**SWAP BBC B**, Opus Odos, DS100 disk drive, cassette recorder, joystick, software £200: For Amstrad CPC 464 + colour monitor + software or sell £400-450. Write Mr MacLeod, 2 Bridgend, Gillock by Wick, Caithness, Scotland, KW1 5JT.

**WANTED URGENTLY**, Wico joystick, straight lever, not red ball, £10 offered. Richard. Tel: 051-733 0090.

**ATARI 1050** disc drive and 800XC. Plus large amount of original S/W. Rare American titles. To swap for any good BBC outfit. Call any time. Tel: 01-989 743.

**EXCHANGE Sharp QT 90** stereo radio cassette for CBM 64 and C2N cassette for details. Matt. Tel: 0602 630 391.

**WANTED SORD/CGL M5 32K** Ram extension and SORD FDS floppy disk system. Ipswich 213755.

**WANTED modem** for Oric Atmos 48K, must be complete. John. Tel 0482 857345 after 6pm.

**WANTED SPECTRUM 48K** (not Issue One) and tape deck. All offers consid-

ered. Tel: 01-207 1774, ask for Mark.

**WANTED ALPHACOM 32** printer for ZX Spectrum in exchange for original ZX Spectrum keyboard and dust cover + £20. Douglas. Tel: 01-907 1204 (Ansafo).

**COMMODORE 1541 DISK DRIVE** wanted with or without software. Will pay up to £120. also ZX Spectrum lightpen with interface, £10 + P&P. Tel: Ruthin 4078 after 4pm.

**WANTED ALPHACOM 32 PRINTER** for £20. Also crash issue No 1 wanted for £1.50. Tel: Pontefract 0977 704020 evenings.

**WANTED ANY PRINTER** compatible with CBM64 in good working order. Reasonable price paid apply Sid. Tel: 021 328 2984 any time. If not available leave number, will ring back.

**SINCLAIR SPECTRUM INTERFACE I** and microdrive, Kempston joystick interface and joystick, ZX interface II over £200 of original S/W. Cassette reader. Swap for CBM 64. Tel: 362596 (Baldon) after 6pm.

**SWAP Spectrum 48K**, S/W, joystick interface B&M programmable cords. For Atari 800XL 1010 recorder or sell for £120. Tel: 031-661 3411 after 8pm.

**SWAP £350** (S/H value) of photographic and darkroom equipment for good computer such as Sharp MX80A Einstein, Amstrad CPC 464 with colour monitor, BBC B complete with disc drive or colour monitor and software. Mr J. H. Todd 98 Hallcroft, Birch Green, Skelmersdale, Lancs WN8 6QD.

**MCP40 COLOUR PRINTER** for Dragon. With three rolls of paper and pens. All boxed. Swap for Brother HR-5 for Dragon. Tel: 0706 31239.

**48K SPECTRUM INTERFACES 1 & 2**, microdrive, printer, Kempston, Currah speech, box printer paper, ten cartridges, about seventy boxed original games, ten books, etc. Swap SLR camera/extras. Tel: 08864 588 (Worcs).

**WANTED: Atari 600XL 48K** Ram expansion board. Tel: 0524 410438 and ask for Simon.

**WANTED: Adventure scenario writers**. Experienced programmer requires good plots, ideas etc, with view to commercial product. Any offers write to W. Forster, Trowstree Farm, Talwrn Green Malpas, Cheshire SY14 7NA.

**SWAP Sinclair DM235** digital multimeter, excellent condition with leather case and leads for Lo Profile or DK Tronics keyboard. Tel: 041-774 6311 and ask for Alastair.

**SWAP TAMIYA R/C** electric F-1 racing car complete with radio gear. Ready to race for DK Tronics speech synth/stereo amp for CPC 464. Keith Payne 17 Rawdon Road, Ramsgate, Kent CT11 0DZ.

**WANTED T199/4A**, cassettes and cartridges or equipment and mags etc. Offers. Tel: 01-427 7396.

# DIARY

Event	Dates	Venue	Admission	Organisers
Computer Show	July 20 10.30am-5.30pm	Old Vic Hotel Lichfield Rd Wolverhampton	50p	CJS/Northleach 04516 609
Third Official Acorn User Exhibition	July 25 Trade: 10.00am-1.00pm July 26-28	Barbican Centre London EC2	£3 adults £2 children	Computer Marketplace (Exhibitions) Ltd 01-930 1812
Computer Show	July 27 10.30am-5.00pm	Cornbow Hall Hagley St Halesowen	50p	CJS/Northleach 04516 609
The Micro Trend 85	Aug 11	Burnley General Hospital	60p adults 30p children	Patons Computer Services 0282 53241
Small Business and Home Computer Exhibition	Aug 19-20 10.00am-9.00pm	"Goldiggers" Timber St Chippenham Wiltshire	£1.50 adults £1.00 children	Kevin Angell/ Simon Main 0249 656444
Personal Computer World Show	September 4-8	Olympia London	£2.00	Montbuild 01-486 1951

## ADVENTURE

## HELPLINE

**Erik the Viking on BBC B**. How do you open the door next to the rug over the pit? K Crouch, 24 Bellamy Road, Cheshunt, Herts EN8 9JT.

**Eureka! (Roman Britain) on Spectrum**. Where is then golden eagle, where is the leper's skull, how do you get an invitation? Richard Rudkin, 28 Broom Close, Stanley, Co Durham DH9 0UU.

**Rakatu on TRS 80 Color**. How do you open the door next to the rug over the pit? K Crouch, 24 Bellamy Road, Cheshunt, Herts EN8 9JT.

**Eureka! (prehistoric) on Spectrum**. What do you do in the sacred caves. I'm stuck at 70% - any help appreciated. Richard Rudkin, 25 Broom Close, Stanley, Co Durham DH9 0UU.

**Rendezvous with Rama on C64**. How to get to the south pole and any other help. J H Pickford, 5 Poplar Grove, Bollington, Macclesfield, Cheshire.

**Macbeth (1) on C64**. I've got as far as the beach, but now I'm stuck. Plus help for other three adventures. Simon D Cholerton, 3 Green Cross, Dronfield, Sheffield S18 6LH.

**Castle of Chantie on Spectrum**. How do you get past the bear and enter the town of Senavie? Stephen Richmond, 6 Pulborough Way, Flansham, Middleton-on-Sea, W Sussex.

**Castle of Terror on Commodore 64**. I can't find the wooden stake to kill the count. P J Fox, 54 SU, RAF, BFPO 23.

**Hampstead on Spectrum**. How do I get the manual on how to do Hampstead in the toy department? What do I do at the bank? Adrian Bold, 19 Towersey Drive, Thame, Oxon.

**Return to Eden on Spectrum**. How do I cross the lake? What is the brick egg for? How do I get off the island without falling? Bob Foster, 66 Glenfield Way, Glenhold Park, Plymouth.

**Eureka and Sherlock on Spectrum**. I need a dictionary of words used. S J Vince, 34 Chichele Road, Oxted, Surrey.

**Message From Andromeda on Amstrad**. How do I get to use the crystal rod (ultrasonic key), knife, detonator and any other items? Mike Gaiger, 50 Armour Way, Lesmurdie, Western Australia 6078.

**Twin Kingdom Valley on Electron**. How do I get the master key from the dragon? Of what significance is the wooden rod? Peter Quinn, 44 Glenhuntly Terrace, Port Glasgow, Renfrewshire, Scotland.



## Amstrad

1	(2)	Knight Lore	(Ultimate)	£9.95
2	(1)	Alien 8	(Ultimate)	£9.95
3	(4)	Beachhead	(Access/US Gold)	£9.95
4	(-)	Rocky Horror Show	(Access/US Gold)	£9.95
5	(6)	Dun Darach	(Gargoyle)	£9.95
6	(3)	Minder	(DK Tronics)	£9.95
7	(5)	Ghostbusters	(Activision)	£10.99
8	(-)	Fighter Pilot	(Digital Integration)	£8.95
9	(7)	Ghettoblaster	(Virgin)	£8.95
10	(8)	Sorcery	(Virgin)	£9.95

### Bubblers:

Morden's Quest	(Melbourne House)	£6.95
Combat Lynx	(Durrell)	£8.95

## Atari

1	(2)	Archon	(Ariolasoft)	£11.99
2	(1)	Decathlon	(Activision)	£9.99
3	(3)	Miner 2049'er	(Big 5)	£9.95
4	(6)	Colour Space	(Llamasoft)	£7.50
5	(7)	Drop Zone	(Microprose/US Gold)	£9.95
6	(5)	Ghostbusters	(Activision)	£14.99
7	(-)	Mule	(Ariolasoft)	£14.95
8	(4)	Kissing Cousins	(English Software)	£6.95
9	(8)	Bruce Lee	(Datasoft/US Gold)	£7.95
10	(9)	Beachhead	(Access/US Gold)	£14.95

### Bubblers:

Hard Hat Mack	(Ariolasoft)	£9.95
Smash Hits 3	(English Software)	£14.95

## BBC

1	(1)	Revs	(Acornsoft)	£14.95
2	(2)	Alien 8	(Ultimate)	£9.95
3	(4)	Atic Atac	(Ultimate)	£7.95
4	(3)	Repton	(Superior)	£9.95
5	(5)	Knight Lore	(Ultimate)	£9.95
6	(-)	Confuzion	(Incentive)	£8.95
7	(7)	Magic Mushrooms	(Acornsoft)	£12.95
8	(9)	Wizardore	(Micropower)	£7.95
9	(-)	Lode Runner	(Software Projects)	£9.95
10	(8)	Combat Lynx	(Durrell)	£9.95

### Bubblers:

Thunderball	(Mastertronic)	£1.99
Brian Jack's Superstar	(Software Communications)	£7.95

## Commodore 64

1	(1)	Way of the Exploding Fist	(Melbourne House)	£9.95
2	(2)	Elite	(Firebird)	£14.95
3	(3)	Dambusters	(Sydney/US Gold)	£9.95
4	(4)	Shadowfire	(Beyond)	£9.95
5	(5)	View to a Kill	(Domark)	£10.99
6	(10)	Drop Zone	(Microprose/US Gold)	£9.95
7	(6)	Soft Aid	(Various Artists)	£4.99
8	(7)	Pistop II	(Epyx/US Gold)	£9.95
9	(-)	Graham Gooch's Cricket	(Audiogenic)	£9.95
10	(-)	International Tennis	(Commodore)	£5.99

### Bubblers:

The 4th Protocol	(Hutchinson)	£14.95
Music Studio	(Activision)	£14.95

## Spectrum

1	(9)	Hypersports	(Imagine)	£7.95
2	(1)	Jet Set Willy 2	(Software Projects)	£7.95
3	(7)	Rocco	(Gremlin Graphics)	£7.95
4	(3)	Soft Aid	(Various Artists)	£4.99
5	(6)	Spy vs Spy	(Beyond)	£9.95
6	(2)	Shadowfire	(Beyond)	£9.95
7	(3)	Dun Darach	(Gargoyle Games)	£9.95
8	(4)	View to a Kill	(Domark)	£10.99
9	(8)	Nodes of Yesod	(Odin)	£9.95
10	(5)	Cauldron	(Palace)	£7.99

### Bubblers:

Buck Rogers	(Sega/US Gold)	£7.95
Dynamite Dan	(Mirrorsoft)	£6.95

All figures compiled by Ram/C

## Top Twenty

1	(1)	Elite (BBC/Electron/C64)	Firebird/Acornsoft
2	(2)	Way of the Exploding Fist (C64)	Melbourne House
3	(3)	Soft Aid (Spectrum/C64)	Various Artists
4	(16)	Hypersports (Spectrum)	Imagine
5	(4)	Jet Set Willy 2 (Spectrum/C64)	Software Projects
6	(5)	View to a Kill (Spectrum/C64)	Domark
7	(8)	Dun Darach (Spectrum/Amstrad)	Gargoyle Games
8	(17)	Rocco (Spectrum)	Gremlin Graphics
9	(6)	Dambusters (C64)	Sydney/US Gold
10	(9)	Spy vs Spy (Spectrum/C64)	Beyond
11	(7)	Cauldron (Spectrum/C64)	Palace
12	(11)	Shadowfire (Spectrum/C64)	Beyond
13	(14)	Revs (BBC/Electron)	Acornsoft
14	(15)	Nodes of Yesod (Spectrum)	Odin
15	(10)	Alien 8 (Spectrum/BBC/Amstrad)	Ultimate
16	(13)	Herbert's Dummy Run (Spectrum/C64/Amstrad)	Mikro-Gen
17	(12)	Knight Lore (Spectrum/BBC/Amstrad)	Ultimate
18	(-)	Rocky Horror Show (Spectrum/C64/Amstrad)	CRL
19	(-)	Drop Zone (C64/Atari)	Microprose/US Gold
20	(18)	Minder (Spectrum/C64/Amstrad/Memotech)	DK Tronics

Figures compiled by Ram/C

## Readers' Chart No 33

1	(1)	Elite (C64/BBC/Electron)	Firebird/Acornsoft
2	(2)	Soft Aid (Spectrum/C64)	Various Artists
3	(4)	Knight Lore (Spectrum/BBC/Amstrad)	Ultimate
4	(7)	Shadowfire (Spectrum/C64)	Beyond
5	(-)	Way of the Exploding Fist (C64)	Melbourne House
6	(9)	Alien 8 (Spectrum/BBC/Amstrad)	Ultimate
7	(10)	Dun Darach (Spectrum/Amstrad)	Gargoyle
8	(10)	Starion (Spectrum)	Melbourne House
9	(6)	Rocky Horror Show (Spectrum/C64/Amstrad)	CRL
10	(3)	Confuzion (Spectrum/Amstrad)	Incentive

Winning phrase No 33: "Gin kills the editor" from M Valentine, of Shrewsbury who receives £25. Others who came close include: "I need to fight a troll" from C Barlett of Warwick and "Thank God for Elite" from J Brook, of Leslie.

## Now voting on week 35 - £25 to win

Each week *Popular* is compiling its own special software top ten chart - compiled by YOU.

And each week we will send £25 to the person who sends in, with their chart votes, the most original (witty, neat or clever - but never rude) phrase or sentence made up from the letters (you don't have to use them all) in the titles of the top three programs in this week's chart, published above.

You can still vote in the chart without making up a slogan - but you won't be in with a chance of winning the prize.

All you have to do is fill in the form below (or copy it out if you don't want to damage your magazine) and send it off to: Top 10, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP.

Voting for Week 35 closes at 2pm on Wednesday July 24 1985. Entries received after that time will not be eligible for inclusion in that week's voting. The judges decision is final. Only one entry per individual per week will be allowed.

Name .....	My top 3: Voting Week 35
Address .....	1.....
.....	2.....
.....	3.....
My phrase is: .....	



# New Releases

## EXCESSIVE

*Thing On A Spring* has the best bouncy music I've ever heard on a computer. It is so excessive, crass and music hall, chock full of tin whistles and rude noises - it reminds me of a Carry On film. It's very nearly a good enough reason in itself to buy the program.

The actual game is a high speed affair in which your little frog/zebedee character bounces around from platform to platform, collecting the usual goodies and passing the usual impassable obstacles.

The animation is very smooth and Thing - hardly an appropriate name for a super hero - actually seems to have a character, albeit a somewhat hysterical one.

Other graphics are big and clear; just the thing for younger arcade addicts just beginning the process of brain decay.

**Program** *Thing on a Spring*  
**Price** £7.95  
**Micro** Commodore 64  
**Supplier** Gremlin Graphics  
Alpha House  
10 Carver Street  
Sheffield S1 4FS

## FREE KICK

Anirog's *Five-A-Side* is another football simulation for the Commodore 64, distinguished mainly by the fact that there are only five players on each side.

The game works in the same way as other football games with joystick control of the man closest to the ball, and an option to play against



the computer. The computer plays surprisingly well even on the easiest level - you may find this off-putting.

Graphically, this is a fairly poor game with small sprites for the players and annoying things like the way the ball sprite looks like it's in front of the goalie when, in fact, it's in the back of the net. Going some way to redeem the graphics is the software speech - just before kick-off the computer does an impersonation of several thousand people singing 'Ere we go ere we go ere we go' in a suitably Neanderthal voice. It's stunning in a horrible kind of way.

Actually, the game is a lot of fun, you get used to the graphics after a point and simply enjoy the pace of the action.

Commodore's *International Soccer* is still the one to buy if you want the best football game on the Commodore, but this one is a definite maybe for absolute addicts of computer football.

**Program** *Five A Side*  
**Price** £5.95  
**Micro** Commodore 64  
**Supplier** Anirog  
29 West Hill  
Dartford  
Kent  
DA1 2EL

## DETAILED

*Nonterraqueous* is not, I think, a great name for a computer game. On the other hand the alternative might very likely have been something like *Bouncing Bobby* so perhaps I'd better not whinge excessively.

It's a very entertaining game though - another one of those Mastertronic efforts at £1.99 where £5.95 wouldn't have been too bad.

The plot has you controlling a mechanical sphere through 1,000 screens seeking the means of the destruction of yet another set of alien baddies. The game has a reaction element - dodge the wandering thingies and watch out for the sudden photon blasts - and a tactical reasoning element - there are things to collect and problems to be faced. For example, at one point you need to activate a rocket but to do so

must have retrieved some fuel and so on.

No more or less original than most new games but beautifully programmed with very smooth richly detailed sprites and a lot of care - all this for £1.99. A definite.

**Program** *Nonterraqueous*  
**Price** £1.99  
**Micro** Spectrum  
**Supplier** Mastertronic  
Park Lorne  
111 Park Road  
London NW8

## BOB-A-JOB



*The Scout Steps Out* is an Amsoft computer title based around the everyday adventures of a boy scout. It features such universally significant challenges as cleaning windows, gathering mushrooms (?) and diving for sea life.

In fact it's one of the most bizarre looking games I've seen in a long while. All the graphics are drawn in line only 3D, more commonly associated with games like *Battlezone* - here the graphics are static and look faintly ethereal and insubstantial. Curious.

The game, though, is basically several varieties of platforms and ladders with appropriately scouty elements like pack leaders who chase you and flags to collect. To begin with you have only one life and the game seems impossible - in fact the cornflakes prove the solution to this problem.

Hard to come to a strong conclusion about this one - the music is good, some of the

graphics are clever and in some ways the strange 3D line effect is successful - in other ways it looks confused and makes it difficult to judge exactly where you are. Worth a look anyway.

**Program** *The Scout Steps Out*  
**Price** £7.95  
**Micro** Amstrad  
**Supplier** Amsoft  
Brentwood House  
169 Kings Road  
Brentwood  
Essex  
CM14 4EF

## GAME POINT

*Super Brat* is almost certainly the cheapest of the many tennis simulations around at the moment - it costs £1.99.

For the money it's really very good, the graphics are not up to *Match Point* standards, but they are clear enough to see what's going on, and way beyond matchstick figures.

Controls have been reduced cleverly to three key presses left and right and a mixture of those and 'fire' determines the speed of the ball. When fire is pressed in relation to the bat swing determines the direction.

The title is actually fairly meaningless as so far the computer opponent hasn't questioned an umpire's decision or walked off the court.

A very good value game.



**Program** *Super Brat*  
**Price** £1.99  
**Micro** Spectrum  
**Supplier** Atlantis  
19 Prebend Street  
London  
N1 8PF



# New Releases

## SHADED

*Red Moon* is the latest Level 9 Computing adventure and as ever it comes on around 300 different micros with graphics on some of them. It is an adventure in the classic tradition, which means it's chock full of magic, moon towers and crystals of power. The quest is to get the Red Moon Crystal returned to the Moon Tower where it can once more shine out over the kingdom of Baskalos, which sounds to me like a Portugese fishing village.

Aside from the usual extensive range of commands, the adventure adds a number of spells that may be created and used for specific purposes using the syntax Cast . . . (name of spell).

The graphics, on the Spectrum version, were rather good, drawn quickly but with a lot of detail and shading. I died around 20 times in half an hour usually by plummeting down some abyss through not being able to see where I was going. This

proves either that I am a masochist or that this adventure is pretty addictive.

**Program** *Red Moon*  
**Price** £6.95  
**Micro** Spectrum  
**Supplier** Level 9 Computing  
PO Box 39  
Weston-super-Mare  
Avon  
BS24 9UR

## SPIN-OFF

*Alex Higgins World Snooker* is a simulation for the Amstrad of TV's favourite sport. Don't be deceived by the Alex Higgins part; his only appearance in the game is on the loading screen. This is a shame, in a way I'd have liked to see a computer opponent programmed to play like Higgins, but I don't suppose a Z80 is a fast enough processor.

There isn't in fact a play computer option at all - this is logical really since it would be possible to make it play infallibly, thereby removing any point in challenging it. Conversely it could only be made to miss shots by some fairly artificial 'fudging' of its logic routines which would equally remove any real sense of competition.

Still, unlike many sports simulations, it is a game that can be played alone. The thrill of planning and potting shots is enough without competition. Visually it looks neat, big graphics for the balls and a clever system for force, direction and spin which means all can be fixed using a joystick. The only problem is that this means it is impossible to

Pick of the week

## PLEASURE DOME

Were Barbara Cartland to appear as a drug-taking go-go dancer in *Miami Vice*, I couldn't be more shocked. *Frankie* - the computer game tie-in with everybody's favourite popsters Frankie Goes To Hollywood and "obviously it must be a merchandising boring old guide the little Frankie sprite through the 900 caverns collecting records still we should ship thousands before anybody notices and the reviews come out deal" - is staggeringly good.

It mixes original playing ideas with foot-tapping playability in even measures.

It isn't a guide the sprite through the caverns job at all. Rather, it's a sort of subversive *Dun Darach* where you guide a strange central figure towards pleasure and enlightenment - the first stage of this enlightenment being to discover what you're supposed to be doing there at all.

It works like this: you control a central figure who moves from house to house in a suburban street, looking through the various rooms and moving through hallways. The screen displays each new room as you move it through a door in a previous room.

This figure can raise an arm with which to examine objects like fridges and cupboards. Should these contain any useful items, an icon screen appears and the objects may be picked up using

the ever popular cursor-controlled hand.

The houses are chock full of objects from pleasure pills to keys to fish to videos and floppy discs. Many are important - for example, if you have a video and place it in a video recorder you get a screen of what looks like a portion of screen, providing some sort of clue. There is also a cat which may want milk, and plaster ducks on the wall which sometimes take flight.

At some point I came across a dead body and enigmatic messages started to appear - my best guess is that they form some kind of logic test but who knows.

Visually, the game is superbly detailed and the sound wonderful. Whilst loading you get a surprisingly effective arrangement on three channels of *Relax* and whilst playing you get some throbbing music of the kind usually found around halfway through a *Frankie 12"*.

The atmosphere has a strangeness and surrealness seldom found in computer games and the game is very addictive.

Put it this way, I just put it on for a quick play and two hours disappeared. It's out next week.

**Program** *Frankie*  
**Price** £9.95  
**Micro** Commodore  
**Supplier** Ocean  
6 Central Street  
Manchester



## This Week

Program	Type	Micro	Price	Supplier	Program	Type	Micro	Price	Supplier
North Sea Bullion	Ad	Amstrad	£3.95	Kuma	Red Moon	Arc	Commodore 64	£6.95	Level 9
Red Moon	Ad	Amstrad	£6.95	Level 9	Games Aid	Ut	Commodore 64	£4.00	Sigma Soft
Shadow of the Bear	Ad	Amstrad	£3.95	Kuma	Confuzion	Arc	Electron	£6.95	Incentive
Everyone's a Wally	Arc	Amstrad	£9.95	Mikro Gen	Cuthbert in Space	Arc	QL	£19.95	Microdeal
Jump Jet	Arc	Amstrad	£9.95	Anirog	Hopper	Arc	QL	£19.95	Microdeal
Red Moon	Ad	BBC	£6.95	Level 9	Lands of Havoc	Arc	QL	£19.95	Microdeal
Confuzion	Arc	BBC	£6.95	Incentive	Crystal Frog	Ad	Spectrum	£2.99	Sentient
Music Master	Ut	C16	£14.95	Supersoft	Malice in Wonderland	Ad	Spectrum	£2.99	Sentient
Word Perfect	Ut	C16	£12.95	Supersoft	Red Moon	Ad	Spectrum	£6.95	Level 9
55	Arc	Commodore 64	£4.99	PSS	Scoop	Ad	Spectrum	£2.99	Sentient
Confuzion	Arc	Commodore 64	£6.95	Incentive	The Amulet	Ad	Spectrum	£2.99	Sentient
Five-a-Side	Arc	Commodore 64	£9.95	Anirog	The Key to Time	Ad	Spectrum	£6.99	Sentient
Frankie	Arc	Commodore 64	£9.95	Ocean	55	Arc	Spectrum	£9.95	PSS
Out on a Limb	Arc	Commodore 64	£5.95	Anirog	Highway Encounter	Arc	Spectrum	£7.95	Vortex
					Nonterraqueous	Arc	Spectrum	£1.99	Mastertronic





express exact amounts for each parameter – you simply judge it by the length of a coloured line.

The scrolling is a little jerky, but not unacceptably so and despite the fact that it took me 20 shots to sink the first red, I recommend it as the best Amstrad snooker to date.

**Program** Alex Higgins  
World Snooker  
**Price** £7.95  
**Micro** Amstrad  
**Supplier** Amsoft  
169 Kings Road  
Brentwood  
Essex  
CM14 4EF

## WORD FIND

Word Perfect is a word processor for the C16 (which a few people have) and the Plus 4 (which even fewer people own). On the C16 the package leaves you with around two A4 pages worth of memory – enough for most purposes.

It's a very easy system to

use, having a 'what you see is what you get' approach with the exception of text width, which requires you to scroll left and right making the TV screen a 'window' on the copy.

It has all the basic facilities of automatic justification, tabs, moving and copying text and even a word find option, although it will not automatically replace words.

The manual is brief as the system is essentially very simple – there are very few commands to learn in order to get under way. It's nothing fancy but equally lacks nothing vital and at £12.95 on tape it's pretty cheap too.

**Program** Word Perfect  
**Price** £12.95  
**Micro** C16  
**Supplier** Supersoft  
Winchester House  
Canning Road  
Wealdstone  
Harrow  
Middlesex HA3 7SJ

## A CHALLENGE

Abu Simbel Profanation is a multi-screen game with Egyptian setting and theme.



You are Johnny Jones an intrepid explorer (does this ring any bells?) and have to escape from the mystic temple of Abu Simbel. This involves many left, right, jump in the classic tradition and some very nifty detailed graphics.

It has been produced by the same Spanish company that produced Rocco – the very well animated boxing game. The graphics actually lift what would be really a rather boring game into something fairly compulsive. For one thing the central hero seems to be a flexible green bubble with legs reminding me more of a Mr Man than a superhero.

The game is horribly difficult, the first screen takes ages to negotiate successfully and whilst you get several lives, you go straight back to the beginning of the screen each time you fail.

This is certainly one of the better Manic Miner style timing games. For addicts of that kind of game this is the hardest challenge you'll have faced in a long while.

**Program** Abu Simbel  
Profanation  
**Price** £7.95  
**Micro** Spectrum  
**Supplier** Gremlin Graphics  
Alpha House  
10 Carver Street  
Sheffield  
S1 4FS

## FUNCTIONAL

Games Aid is not a games designer but a collection of machine code routines, pokes and tips and a character set redesigner. It is de-



signed for the programmer experienced in Basic and moving to machine code.

The routines are fairly basic stuff – various kinds of screen scrolls, sound effects, special visual effects.

The character set designer is rudimentary but functional. I really only have two objections to the package. One is that at various points you have to note down addresses and poke figures from the screen, and then type them in. I can't help thinking this could have been done more elegantly.

The second objection is that all the stuff here has cropped up at one time or another in Popular (and indeed in other magazines) and you're really paying for the convenience of having them all together.

**Program** Games Aid  
**Price** £4.00  
**Micro** Commodore 64  
**Supplier** Sigma Soft  
8 Pine Dale  
Rainford  
Merseyside  
WA11 8DP

# This Week

That's the Spirit	Arc	Spectrum	£7.95	The Edge
Thing on a Spring	Arc	Spectrum	£7.95	Gremlin Graphic
Vegan attack	Arc	Spectrum	£1.99	Atlantis
Super Brat	S	Spectrum	£1.99	Atlantis
Blast	Ut	Spectrum	£24.95	Oxford Computer

**Key:** Ad – adventure S – strategy-simulation  
Arc – arcade Ut – Utility  
Ed – education

Anirog, Victoria Industrial Park, Victoria Road, Dartford, Kent DA1 5AJ. 0322 92513. Atlantis, 19 Prebend Street, London N1 8PF. 01-226 6703. Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS. 0742 753423. Incentive, 54 London Street, Reading RG1 4SQ. 0734 591678. Kuma, Kuma Computers, 12

Reading RG1 4SQ. 0734 591678. Kuma, Kuma Computers, 12 Horseshoe Park, Pangbourne RG8 7JW. 07357 4335. Level 9, 229 Hughenden Road, High Wycombe, Bucks HP13 5PG. 0494 26871. Mastertronic, Park Lorne, 111 Park Road, London NW8 7JL. 01-402 3316. Microdeal, 41 Truro Road, St Austell, Cornwall PL25 5JE. 0726 73456. Mikro-Gen, 44 The Broadway, Bracknell, Berks. 0344 427317. Ocean, 6 Central Street, Manchester M2 5NS. 061 832 6633. Oxford Computer, Hensington Road, Woodstock, Oxford OX7 1JR. PSS, 452 Stoney Stanton Road, Coventry CV6 5DG. 0203 667556. Sentient, Branch House, 18 Branch Road, Armley Leeds, West Yorkshire LS12 3AQ. 0532 791136. Supersoft, Winchester House, Canning Road, Wealdstone, Harrow Middlesex HA3 7SJ. 01-861 1166. The Edge, 31 Maiden Lane, Covent Garden, London WC2E 8LH. 01-240 1422. Vortex, 24 Kansas Avenue, Off South Langworthy Road, Salford M5 2GL. 061 872 4747.





## The IBM Crash of 1995

**I**f I predicted that within ten years, IBM, that mightiest of multi-nationals, would be finished as major force in computers, your reaction would probably be 'This man's a complete idiot'.

After all, we are now clearly at the beginning of the real computer age, with processing power and memory storage increasing in leaps and bounds at the same time as costs reduce just as quickly. Surely then, the largest, most successful, best equipped and best staffed company possessing vast financial resources, is best able to take advantage of such a situation?

Not in my opinion. I await developments over the next few years with interest, as the penny slowly drops, both within IBM and with its investors.

IBM has built itself up brilliantly over the past few decades. Having started by making a few computers at great cost which only governments and few of the most powerful corporations could afford, it gradually widened the base of its operations with machines that grew in capability and which steadily got cheaper, reaching down to middle-sized companies across the world.

Suddenly, in the late 1970s a revolution occurred and the micro arrived. Aimed at the home market, mainly used for games, and having only the faintest connection with the business mainframes made by IBM. After all, the micro was little more than a toy with interesting potential.

Since that time, though, the micro has been accelerating upwards in capability, taking on all kinds of sophisticated tasks, in some cases - such as spreadsheets for financial planning - using software that opened up new applications even ahead of mainstream computing. Other innovative software programs have turned micros into valuable business tools available to everyone, with word processing and database applications getting general acceptance.

At some time, not too far away, the point will be reached when micros will be capable of doing all

that mainframes in the lower and middle categories currently achieve. In the process satisfying the needs of probably over 60% of all businesses, all for a great deal less investment in equipment and skilled people than at present.

Widespread computer literacy, user friendly systems and advanced software will transform the computer scene, completely de-mystifying and wiping out all those company specialist departments filled with expensive computer professionals.

On the hardware side, the 32-bit micro (and its successor), with full multi-tasking and multi-user facilities, will come down still more in price. It will be backed up with cheap laser printers, have massive gigabyte Ram and Rom storage at trivial cost based on the laser-operated compact disc system.

At which point the whole emphasis and main profit areas in the industry will switch from hardware to software. As nearly every capable computer manufacturer would then be able to put together a state-of-the-art package tailored to an individual customer's need, using bought-in equipment from specialist producers, such as processors from Motorola, laser disc memory from Sony/Philips, and so on for laser printers, etc.

In such a situation IBM becomes the company least able to cope. Having grown by always being ahead of the field in technology, and able to select its own price structures with little interference from the market forces that apply to most other industries, it has gotten fat and pays salaries way above the norm.

Soon it will be faced with rat race competition from lean hungry companies having low overheads, at a time when success will be more determined by economic prices than technical advancement.

IBM's only possible direction under these pressures, will be to contract sharply and very painfully in size (paying out redundancy amounts that would cripple a small nation) and concentrate solely on super computers at the top end of the micro catches up again.

The present emphasis on compatibility with IBM by most other makers is, I believe, a passing phase based purely on the belief of contemporary purchasers in the myth of the IBM name. Greater computer literacy will quickly expose this to be an unnecessary and expensive consideration.

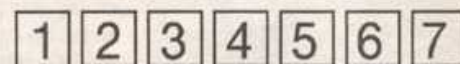
Indeed, the very first small sign that confirms my belief that IBM will be driven up-market from whence it came has already occurred, with the announcement of its departure from the home computer market in the USA by deciding to drop their PCjr model

Vic Lewis

## 11 - 1?

### Puzzle No 166

I have in front of me seven cards numbered with a digit from 1 to 7, no digit being repeated.



If I were to shuffle them up and deal them in a row, what is the probability that the seven-digit number so formed will be exactly divisible by 11?

At first sight, I would estimate the probability to be about one chance in 11 - but is this correct? Of course, such tricks as inverting the '6' to make a '9' are not allowed.

### Solution to Puzzle No 162

In the crossnumber, a, b, c, and d, are 39, 33, 37, and 97 respectively, and A, B, C, and D are 1521, 1089, 1369, and 9409.

```
10 FOR A=32 TO 99
20 FOR C=32 TO 99
30 AS=STR$(A):CS=STR$(C)
40 BS=LEFT$(AS,1)+LEFT$(CS,1)
50 DS=RIGHT$(AS,1)+RIGHT$(CS,1)
60 B=VAL(BS):D=VAL(DS)
70 SA=A+A:SB=B+B:SC=C+C:SD=D*D
80 IF SA<1000 OR SB<1000 OR SC<1000 OR SD<1000
90 THEN GOTO 110
90 SA=STR$(SA):SB=STR$(SB):SC=STR$(SC):
SD=STR$(SD)
100 IF MID$(SA,1,1)=MID$(SC,1,1) AND MID$(
SB,1,1)=MID$(SA,4,1) AND MID$(SC,4,1)=MID$(
SD,1,1) AND MID$(SD,4,1)=MID$(SB,4,1) THEN
PRINT A,C
110 NEXT C,A
```

As each number a, b, c, and d, has a four-digit square, they must be in the range 32 to 99 inclusive. The program tests samples for two of these variables (a and c) in the two For/Next loops. Once any two values have been assigned in this way, the remaining values for b and d are, of course, automatically determined. The squares of each of these values is then calculated, and these are tested to check that corresponding digits which interlock in the grid are alike

### Winner of Puzzle 162

The winner is R Evans of Bridgend, Mid Glamorgan, S. Wales, who receives £10.

### Rules

The closing date of Puzzle 166 is August 14.

## The Hackers







# ATARI ST

## 520ST

### POWER WITHOUT THE PRICE

#### ATARI 520ST SPECIFICATION

**MEMORY**  
512K RAM (256K on-chip)  
128K ROM expandable to 128K  
Runs on either 128K or 256K ROM cartridges  
300K TOS operating system

**GRAPHICS**  
Individually addressable 32K bit mapped screen with 3 screen graphics modes:  
- 320x200 pixels in 16 colours (low resolution)  
- 640x200 pixels in 4 colours (med resolution)  
- 640x400 pixels in monochrome (high res)  
10 shades of grey in low res mode  
512 colours available in low/medium res  
8 levels of each in med, high and blue

**ARCHITECTURE**  
4 custom designed chips:  
- 68000 CPU - MMU Memory Management Unit  
- DMA Controller - Graphics Processing Unit  
- 1020 bit Motorola 68000 processor at 8MHz  
- 8255 PPI bit data register  
- 8255 PPI bit data register  
- 18 bit data bus/256 address bus  
- 7 levels of interrupt/5 instructions  
- 14 addressing modes/5 data types

**DATA STORAGE**  
High speed hard disk interface  
Direct memory access - 133 Mbytes per second  
CD (Compact Disc) interface  
Built in cartridge access  
Dedicated floppy disk controller

**DISK DRIVE**  
500K formatted 5.25 inch floppy drive  
348K unformatted storage capacity

**SOUND AND MUSIC**  
Sound Generator  
Frequency control from 30Hz to above audible  
2 voices (channels) in wave shading sound in  
addition to a noise generator  
Separate frequency and volume controls  
Dynamic envelope controls  
ADSR (Attack, Decay, Sustain, Release)  
Music generator  
MIDI interface for external music synthesizers

**KEYBOARD**  
Separate keyboard microprocessor  
Standard QWERTY typewriter styling  
Ergonomic angle and height  
26 keys including 10 function keys  
Numeric keypad - 18 keys including ENTER  
One touch cursor control keypad

**MONITOR**  
12" screen - High res monochrome monitor  
640x400 monochrome resolution  
Note: Some of the above specifications are pre-release and may therefore be subject to change

#### MACINTOSH v F16 v 520ST

"Imagine a Mac - the 512K Apple Macintosh - but with a bigger screen, a far bigger keyboard with numeric keypad, cursor and function keys, and colour. That gives you some idea of what the Atari 520ST is like, except for two important things. First the Atari seems faster. Second the Atari system is about one third of the price!"  
June 1985 - Jack Schofield - PRACTICAL COMPUTING

FEATURES OF BASIC SYSTEM	APPLE MACINTOSH	APRICOT F16	ATARI 520ST
Price includes I/O Monitor	YES	NO - extra £200	YES
Keyboards size mm (L x D x H)	330 x 147 x 50	450 x 167 x 28	470 x 240 x 80
Keyboards size mm (L x D x H)	130 x 54 x 22	171 x 65 x 1	181 x 91 x 21
3 1/2" D Drive (Unformatted)	500K	500K	500K
3 1/2" D Drive (Formatted)	399K	315K	349K
WIMP (Window, Icon, Mouse...)	Apple	ACT - Activity	GEM
Real-time Clock	YES	YES	YES
Polyphonic Sound Generator	YES	NO	YES
RS232 Serial Port	YES	YES	YES
Compresses Parallel Printer Port	NO	YES	YES
Dedicated Floppy Disk Controller	NO	YES	YES
Hard Disk DMA Interface	NO	YES	YES
Full stroke keyboard	YES	YES	YES
Number of keys on keyboard	59	92	95
Numeric Keypad	NO	YES (16 Keys)	YES (18 keys)
Cursor Control Keypad	NO	YES	YES
Function keys	NO	10	10
16-bit processor	68000	Intel 8086	68000
Processor running speed	8MHz	4.77MHz	8MHz
RAM size	512K	256K	512K
Number of graphics modes	1	4	3
Number of colours	Monochrome	16	12
Max Screen Resolution (pixels)	512 x 342	640 x 356	640 x 400
Mouse included	Single Button	NO - extra £95	Two Button
Replaceable External Power Pack	NO	NO	YES
Cartridge Socket	NO	NO	YES
Joystick Ports	NO	NO	YES (two)
MIDI Synthesizer Interface	NO	NO	YES
Monitor Size	9"	9" - extra £200	12"
RGB Video Output	NO	YES	YES

System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive	Apple Macintosh	Apricot F16	Atari 520ST
Price of basic system (inc VAT)	£2399	£599	£633
+ Mouse	Included	£20	Included
+ Monochrome Monitor	Included	£200	Included
+ Expansion to 512K RAM	Included	£295	Included
Price of complete system (inc VAT)	£2599	£819	£633

**PRICE** rounded down including VAT  
**£2,984 £1,362 £749**

#### THE NEW ATARI 520ST

Under the new leadership of Jack Tramiel (former boss and founder of Commodore Business Machines), Atari Corporation have marked their entry into the world of business/personal computers with a machine which leaves the competition standing. Tramiel's slogan 'Power Without the Price' has been implemented in the manufacture of the new 512K Atari 520ST colour computer which offers the amazing high performance at an incredibly low price. Launched as a work station, this new system incorporates seven software packages as well as the 520ST computer with 512K RAM, mouse controller, high resolution monochrome monitor (640x400), 95 key keyboard (with 18 key numeric keypad), MIDI interface, GEM and a 500K 3 1/2 inch disk drive, all for the package price of only £633.30 (+VAT = £749). Dubbed the 'Mac beater' and the 'Jackintosh' (after Atari's Chief, Jack Tramiel), Atari's new machine has been directly compared with the Apple Macintosh RRP £2399 (+VAT = £2995) which offers similar features and capabilities but at a much higher price. Favourably reviewed by the UK's highly critical specialist computer press, the 520ST is likely to make a great impact in the country as a sophisticated alternative to an IBM PC, APRICOT or APPLE MACINTOSH. Unlike its overpriced competitors, the Atari 520ST can be linked up to a colour monitor to unleash a choice of up to 512 colours. The addition of colour brings out the full potential of graphics packages such as GEM.

#### USER FRIENDLY GEM OPERATING SYSTEM

The power of the ST is harnessed and made user friendly by the new operating system 'GEM' from Digital Research. GEM stands for Graphics Environment Manager and allows a user friendly colour or B/W graphics interface which closely resembles that of the Macintosh. This similarity extends to the use of movable resizable windows, icons to represent objects such as disks and disk drives, and the use of pull down menus and a mouse. The advantage of all this is that the computer becomes extremely easy to use. GEM has now been implemented for the Apricot, ACT, Atari, IBM, ICL, and Olivetti. Software written for GEM on one computer should also run under GEM on another computer. This will enable the market to quickly produce a large library of standard interchangeable software.

#### FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below:  
1) TOS - Tramiel Operating System based on CPM 86K.  
2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment.  
3) DR GEM Paint for creating graphics masterpieces.  
4) DR GEM Write for word processing.  
5) Logo learning language to enable you to write your own programs easily using little graphics.  
6) DR Personal Basic a powerful user friendly version of the Basic programming language.  
7) DOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3 1/2 inch disk drive, and a 19MB hard disk storage system as well as a mass storage compact disk (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

Silica Shop Price: £633.30 + £97.70 VAT = £749.00 This price includes:

- \* 512K RAM
- \* B/W MONITOR
- \* MOUSE
- \* 500K 3.5" DISK DRIVE
- \* GEM
- \* KEYBOARD (95 KEYS)

# £749

"Atari's new corporate image as an aggressive low cost computer maker is likely to mirror that of Commodore when Mr. Tramiel established the Atari Business War."  
August 21st 1985 - FINANCIAL TIMES

"This is the only personal computer I know of that comes with a real interface as standard."  
Peter Bright - March 1985 - PERSONAL COMPUTER WORLD

"The (GEM) version running on the Atari 520ST machine will have the additional advantage of leaving the PC version standing."  
April 8th 1985 - PERSONAL COMPUTER WORLD

"It would seem that GEM offers the ideal operating system."  
March 7th 1985 - POPULAR COMPUTING WEEKLY

"I found it (GEM) extremely easy to use and was very impressed with the way in which it displays the utility hardware and operating systems lurking under the surface."  
Peter Bright - Feb 1985 - PERSONAL COMPUTER WORLD

#### PRESS COMMENT

"The electronics in the machine are a work of art... The heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip... when the machine appears in the shops, it'll be at the front end of the queue to buy one."  
Peter Bright - June 1985 - PERSONAL COMPUTER WORLD

"This machine is significantly more powerful than an IBM PC... It's fit to compete to design a state-of-the-art machine, this is a 32-bit machine."  
May 19th 1985 - PERSONAL COMPUTER NEWS

"The use of GEM makes the new range of Atari computers as similar to the Macintosh (with the added attraction of colour), that they are already being called 'Jaco-macintoshes'."  
May 2nd 1985 - COMPUTING

"The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying - easy-to-use, compelling power without the price."  
March 1985 - ANALOGUE COMPUTING

"It (the ST) uses the most modern technology that is affordable, in a package that gives a professional impression."  
May 23rd 1985 - POPULAR COMPUTING WEEKLY

"The Atari ST is one of the most elegant designs I have seen... Atari has used an original and elegant method of memory management which should make the ST faster than any other PC on the market - in any price bracket... The 512K Atari ST is a real winner... it would be a pity to let it go and spend money for one? To which the only answer is 'Try and stop me!'"  
John Lambert - July 1985 - ELECTRONICS & COMPUTING

"The 520ST is technically excellent... The 520ST hardware is the new standard by which others will be judged."  
July 1985 - YOUR COMPUTER

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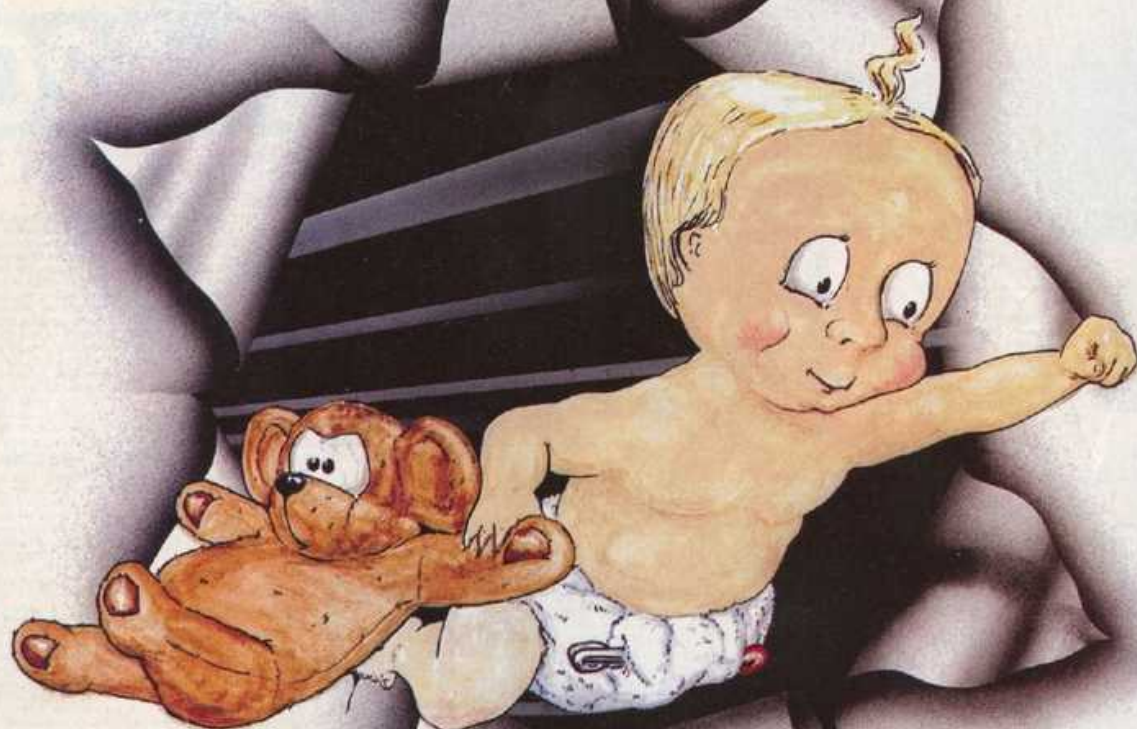
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