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29 August-4 September 1985

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Vol 4 No 35

PERSONAL
COMPUTER
WORLD
SHOW
PREVIEW

Sinclair slashes QL price in half

SINCLAIR has slashed the price of its QL micro down from £399 to £199.95.

The new price comes into effect from September 2.

Jane Boothroyd, Sinclair's

UK sales and marketing manager, said, "We have reduced the price of the QL to consumers in line with reduced manufacturing costs. We will achieve major savings from our substantially increased manufacturing volume, based on sales commitments received to date and more in the pipeline."

The QL price reduction comes just two days after Amstrad formally unveiled its disc-based 6128 and PCW

8256 machines at £399 and £489, respectively. Following the QL price drop the combined price of the QL and 3½ inch disc add-on comes down to £488.95.

The move not only re-establishes Sinclair's claim that the QL is a true low-cost business machine, but could also pave the way for a new QL-based model (see *Popular Computing Weekly*, August 22).

Since its launch in January

continued on page 4 ▶

CPC 664 is now "truly dead"

AMSTRAD has now officially announced it is to drop its CPC 664 disc-based micro.

With the 128K version—the CPC 6128—already in the shops, and the new PCW 8256 launched last week (see *Popular Computing Weekly*, August 22) Alan Sugar, Amstrad's chairman and

managing director, said "The 664 is now well and truly dead."

"It was a natural progression from the 464, but it suffered from a leap in micro technology."

As the 6128 is to sell for £399 (colour) and £299 (monochrome) the prices of the 464

model have been cut to match. The colour monitor version of the 464 comes down from £349 to £299 and the monochrome monitor version comes down from £239 to £199.

The new desk-top word processing mod-

cont on page 4 ▶

NEW AMSTRAD 8256 EXPOSED



All-in-one: micro, disc, monitor and printer



NIGHTSHADE, Ultimate's long awaited Spectrum title has now been released. It features 'Filmation 2', said to be an enhancement of the 3D system featured in *Knight Lore* and *Alien 8*.

Played in a background of tudor houses, archways and other buildings the game involves finding four special weapons and using them to kill four specific monsters. The game - very much in the arcade mould - is priced at £9.95.

INSIDE ▶ WARLORD - A CELTIC SKIRMISH IN PICK OF THE WEEK ▶



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EDITORIAL

This time next week the 1985 *Personal Computer World* Show will be in full swing. Over the last eight years the show has emerged to become the number one showcase for the industry's new products.

In fact most companies have been working round the clock to get previews and demo versions ready of the new hardware and software intended for sale at Christmas.

It is strange – given the prevailing climate of doom and gloom in some quarters of the micro world – but this year's show promises to be the most exciting in four years.

In contrast with last year's show it looks very unpredictable with possibly more than nine new micros being shown for the first time.

The biggest question marks will be hanging over the Sinclair stand. The company has in recent weeks struggled through a severe cash crisis to emerge perhaps bearing not one but two new computers. From Sinclair's point of view the PCW Show will give the first indications of whether the new products – expected to be new Spectrum and QL

derived machines – will capture the imagination of the public the way the Spectrum did in 1982. Sinclair needs to make a big success of the show.

Other stars expected to be shown include Atari's strong contender the 260 STD – for the first time in public. And Amstrad will show its price-busting PCW 8256 – also for the first time – together with the 6128.

It's not just the micros that will be there that are interesting. There may be a number of significant omissions. It seems doubtful that Acorn, for example, will launch its successor for the BBC micro at the show. And strangely, Commodore seems to be pinning all its hopes for this year on the now rather overpriced C128 when the machine everyone wants to see is the Amiga. The Amiga launched in a blaze of publicity in the US last month, is apparently not being shown in public for fear it would overshadow the C128. A wise decision – it would.

This PCW Show is the most important for five years – it will show the direction that all the major manufacturers will be taking over the next crucial eighteen months. Success or failure.

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Computer Trade Association Magazine of the Year

Acorn claims world first for new chip

ACORN is claiming a world first with the announcement of the first production models of a revolutionary 32-bit microprocessor.

Acorn has beaten a number of major chip companies to be the first to produce what is termed an RISC processor chip.

RISC stands for Reduced Instruction Set Computer technology—as opposed to CISC (Complex Instruction Set) which most chips up until now have been based on. Making the chip's instruction simpler increases the speed at which it can operate. Prototypes of the Acorn RISC device can handle up to 3m instructions per second.

"RISC is nothing new as a theory," explained Mark Carrington, marketing analyst at Acorn's Business division. "Research into RISC architecture has been going on at Stanford and Berkeley Universities and also IBM's Yorktown Heights research centre in the US."

Acorn however is the first company to put such a chip into production. Development was completed by a team of VLSI (very large scale integration) technology engi-

neers who joined Acorn shortly after its first reshuffle in February this year.

Acorn's 32-bit RISC chip will now be developed further internally, before being used in machines. It would theoretically be suitable for implementation in the recently launched Cambridge Workstation, but Mark Carrington would not comment on whether such a move was planned.

Spectrum Elite has novel protection

FIREBIRD'S version of *Elite* for the Spectrum – now scheduled for late September – will be the first commercial product to use Lenslok, a new anti-piracy device.

Each copy of *Elite* will be packaged with a special Lenslok lens, which acts as an on-screen 'unscrambler'.

Before playing a game of *Elite*, the program will randomly generate two figures the matrix of which has been scrambled. The user will only be able to see the two characters by looking at the screen through the Lenslok lens, which alters the refraction from the screen. The user must then type in the two characters, and only if they are correct will the game proceed.

Tony Rainbird of Firebird said, "We are also planning to use Lenslok on *Booty* for the QL. It seems particularly important to protect QL programs in this way, since you need to make a back-up

cps (characters per second), and takes both single sheet and continuous feed paper.

The printer will also operate with any micro which uses a standard Centronics parallel interface. It will be available in October and costs £159.95.

Ex-Quicksilver chief to launch new label in September

ROD COUSENS, ex-managing director of Quicksilver, and former vice-chairman of the Guild of Software Houses, has set up his own new software company.

Called Electric Dreams Software, three programs will initially be released, to be previewed at the *Personal Computer World Show* and on sale in October.

The first three are *Riddlers Den*, an arcade strategy game for the Spectrum, which will be priced at £7.95, *I of the*

Mask for the Spectrum (£9.95), which is being written by *Ant Attack* author Sandy White, and features advanced 3D graphics, and a sports simulation for Spectrum and Amstrad at £9.95.

"We have been set up as a division of Activision," Rod explained, "but we are based



Rod Cousens



Sandy White

in Southampton, and will be quite autonomous, doing our own marketing and so on. It is possible we may be able to export our programs to the States through Activision US.

"There are some Commodore titles also in development, and we plan to respond closely to the market – so we may not necessarily be just a games house."

QL cuts

continued from page 1

1984 sales of the QL have been disappointing. Early teething problems did little to help the machine and so far world-wide sales have only reached around 60,000.

Recently the machine has suffered heavy discounting in some stores to clear stocks.

Sinclair continued discussions with its major creditors throughout last week, although so far, the terms of repayment to creditors remain unchanged.

The major creditors are Thorn-EMI, Timex, AB Electronics, Barclays Bank and Citibank.

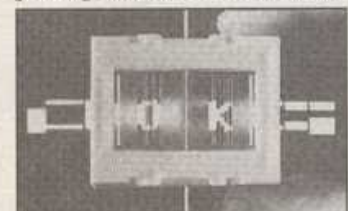
The talks, which are expected to reach a conclusion within the next two weeks, were described as an "on-going confidence building exercise," by a Sinclair spokesman.

ning of next year, the PCW 8256 will be available in other high street stores. By then Amstrad will be able to produce enough PCW machines to keep up with demand.

Amstrad claims to have sold 200,000 computers in 1984 worldwide, and is aiming for 600,000 in 1985.

microdrive so any device which prevents audio copies is no good.

"However, we haven't committed ourselves to putting Lenslok on all our ti-



Lenslok

ties – we'll see how *Elite* on the Spectrum goes first."

The manufacturer of Lenslok, ASAP Developments, has also had discussions with Ocean, US Gold, Ultimate and Acornsoft.

PCW 8256

continued from page 1

el, the PCW 8256 will be available in Dixon's and a large number of independent stores in September, at £458.85. It will also be available then through office equipment distributors, directly to companies.

Up until the end of December, Dixons will have "an element of exclusivity", according to Alan Sugar, being the only high street chain to stock the machine. From the begin-

New printer for Amstrad

AMSTRAD has announced a new printer to be used with both the 464, 664, and the new 6128 micro.

The new dot-matrix model – the DMP 2000 – prints at 105



Showing off

Christina Erskine looks at what's likely to be on offer at next week's PCW show

This year's *Personal Computer World Show* — the eighth, which runs from September 4-8 at Olympia in West London, promises to be very exciting.

Most of the home orientated companies will have stands in the National Hall, Olympia, with business firms generally in Olympia 2.

Sinclair Research is widely expected to show some new products, and to put on a convincing display that its troubles of the last months are over. It seems likely that an expanded memory version of the Spectrum will be shown, possibly a 512K version of the QL, and maybe even a glimpse of Pandora, the Spectrum portable. A QL mouse is in the offing, too.

Sinclair is keeping quiet about its plans for the show and will only confirm that all its existing products will be there, plus the latest software

strongly on one side and the new C128 on the other.

Music software on show includes *Music Maker 64*, and the new *Music Maker 128*, *Sound Sampler*, *Sound Expander* — which gives the C64 eleven voices — and the full range of Playalong albums, all from Music Sales.

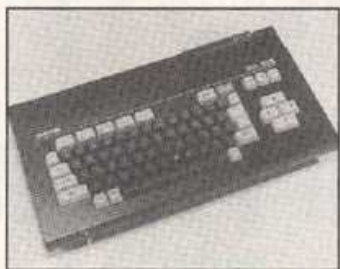
The C128 will be shown with software running — from Commodore itself comes a word processor (a modified version of Precision's *SuperScript*), *Microclerk*, an accounting package, *Personal Money Management*, and two games, *Mandroids* and *Pazzazz*.

Some CP/M software should also be up and running on the C128, and Commodore is also, like Atari, giving space to third party companies. CP/M distributors Softworld, utility house Viasoft, educationalists ASK, and again Music Sales will all be there.

All the new peripherals running with the C128 will be shown: the 80-column monitor, the 1571 disc drive and the mouse controller.

For reasons best known to itself, however, Commodore has decided not to show the exciting new Amiga model in public. Commodore seems to be worried that it would overshadow the C128.

Commodore claims that the conversion from the US TV standard NTSC to PAL means the Amiga cannot be released over here until January. The



Toshiba's HX-22 MSX

machine may however be shown to a select audience of retailers and commentators.

The MSX manufacturers will all be represented on one MSX stand. A number of enhanced MSX machines featuring 128K video Ram, with a

up its sleeve, although interestingly, only 128K models will be shown. A new colour monitor will be shown for the first time, as will the Enterprise mouse, commissioned from Aztec Software at £49.95. The main emphasis will be on its disc controller (£99).

"This will connect any 3½ inch or 5¼ inch drive to the Enterprise. It will also give file compatibility with MS-DOS and full CP/M compatibility," said product manager Steven Gandy.

The company is also hoping to be able to show 60 software titles, including an original Enterprise adventure, *The Seventh Seal*, which runs on the 128K machine.

Acorn is fully expected to unveil the Communicator, its answer to ICL's One Per Desk, with built-in telephone / modem and software.

The Cambridge Workstation, 32016 second processor for the BBC and the BBC B Plus will also be exhibited. It is unlikely, though, that it will be ready to preview its BBC B Plus successor in time.

The PCW Show is the time when many software houses reveal their Christmas releases, whether in prototype or finished form.

Beyond has promised that *Superman* will fly for the first time in this country at the show, and *Eye of the Moon* and *Enigmaforce* (*ShadowFire II*). *Nexus* and *Iron Heroes* should also be making their debut.

Ocean will be previewing its version of fun-loving Sylvester Stallone's *Rambo: First Blood Part II*, *Transformers* and *Knight Rider*.

US Gold is planning to link its booth up with Ocean's to create one mega-stand, and show for the first time in Britain a prototype of Epyx's *Winter Games*, Datasoft's movie tie-up *Goonies* and the licensed Disney titles. *Summer Games II* will also be a sure-fire crowd puller.

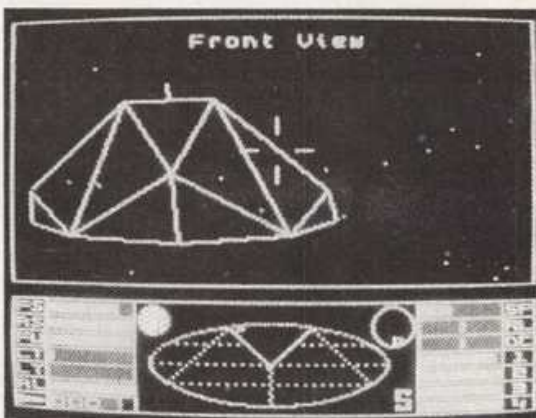
Also bound to be attracting

the crowds is Melbourne House, with the first part of *Lord of the Rings*, which

Mega-stand

should reach the shops this autumn. Three separate *Lord of the Rings* adventures will eventually be released, corresponding to the parts of Tolkien's trilogy. *Terrormolinos* — the package holiday spoof from the authors of *Hampstead* — is also being launched.

Firebird has found space on its stand to allow British Telecom's implementation of MUD to run throughout the show, while Firebird itself will be showing *Elite* on the Spectrum for the first time.



Spectrum Elite

Level 9 has a new adventure to preview — *Worm in Paradise*. Not an 'easy' one like *Red Moon* or *Emerald Isle*, this completes the *Snowball/Return to Eden* trilogy, will cost £9.95, and will be available for most micros.

Metacomco will launch a C implementation for the QL to round up its highly acclaimed language range for that machine, and also show an Assembler/Editor for the Atari 520ST. Sadly, Metacomco will not be displaying its Amiga software.

Mirrorsoft will have its *Spitfire 40* conversion for the Spectrum on show, and also *Ninja*, a martial arts arcade title.

Psion, whose name has been linked with so many quality Sinclair products at PCW Shows past, is concentrating far more on its Organsier pocket micro this year, and showing *Xchange*, its suite for business machines. There is still no sign of *Flight*, its long running flight simulation project for the QL.

520 ST - at last

for the QL.

Atari will be taking a large stand to accommodate around 50 third-party software houses showing ST programs. The show will mark the first public showing of the 520ST in this country, and Atari has also promised the first view of the 260STD with built-in disc drive and its compact disc Rom data storage system.

The show should mark the beginning of genuine availability of the 520ST in the shops, as Atari builds up its production capacity. The 260STD is still expected to reach the shops before the end of the year and Atari is hoping the CD Rom Player — a first for a home system — will be out by Christmas.

Amstrad will be showing its full complement of micros. The new PCW 8256 will get its first public showing, and Amstrad will also be highlighting the business capabilities of the 6128. The 664, though it will be there, will be taking very much a back seat.

Commodore is dividing its stand in two — music featured

Speculative

Congratulations on a fair review of the 6128; on the whole this was very good, except for one or two small inaccuracies.

I am sure the comment about the spare ULA socket is going to fuel quite an amount of speculation. Unfortunately it is nowhere near as exciting as the review may have suggested. In production, we use two different manufacturers ULA chips, each of which have slightly different external clock circuitry and driver chips - for this reason, two ULA sockets are provided on the board.

The new CP/M on the machine is Plus (3.0), not 3.1.

Pip has not been re-written in any way - it is absolutely standard.

The facility that allows the single drive to be treated as both A: and B: is buried deep within the BIOS, so that any application program that would usually require two drives may be used (though there may be a lot of tedious disc changes). For example,

try typing *Dir B:* on a single drive system.

Cliff Lawson
Software Engineer
Amsoft
Brentwood House
169 Kings Road
Brentwood

Just a joke

How dare you say in your review of *Beatles Quest* that the Beatles were nearly as famous as Duran Duran!

Duran Duran have been



"Is it RISC capital that Olivetti's injecting into it, Dad?"

making records for about six years. During that time the Beatles: 1) sold over 150m records; 2) had 10 consecutive No 1 hit singles; 3) eight consecutive No 1 LPs; 4) made three feature films. Has Duran Duran ever done any of this? The answer is no.

Your reviewer should crawl back into the slime-pit from which he came. You've just lost one of your readers. I would rather read *Woman's Own*.

KJ Walker
103 Ribble Road
Blackpool

It was a joke . . . honest. What we meant to say was that the Beatles were almost as famous as Haircut 100.

User group

I am interested in contacting users of ACT computers, particularly the Apricot/F1/Portable range, with a view to starting a national user group. The idea would be to cover the full range of computing with things of in-

terest to business, home and educational users.

If anyone would like further details please write to me enclosing an sae.

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Walkabout line

Whatever happened to Line F860 in Simon Nichols' ZX Basic Code. Vol 4 No 33 ends with F858, yet Vol 4 No 34 starts with F868! What is the meaning of this... the public have a right to know!

A Hall
Bethnal Green
London E2

I'm afraid that line inadvertently went walkabout between weeks. It has now been recaptured, and we can reveal its contents: F860 29 F8 CD 58 F8 2A 0E 5C = D2. Our apologies to all frustrated Spectrum users.

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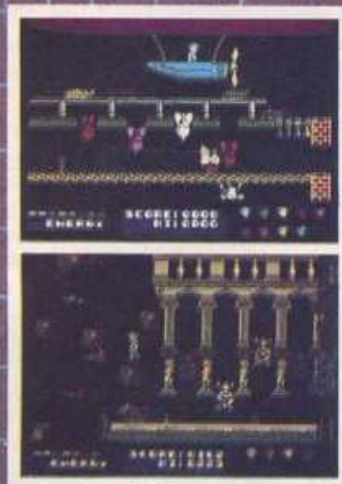
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And the word was Amstrad

Amstrad means business with the launch of the PCW 8256.
John Cook investigates the bumper bundle

Last April, Amstrad Consumer Electronics – headed by Brentwood's answer to Jack Tramiel, Alan Sugar – entered the home computer marketplace with a product called the CPC 464.

Fifteen months and a claimed 200,000 units later, even the harshest of critics would have to grudgingly admit that Amstrad is doing well.

The reasons for that success are simple: the simplicity of everything-in-one-box and competitive pricing achieved by overseas manufacture.

Having now made its mark in the home computer market Amstrad has moved on to try its hand in the lucrative business and office systems market.

Last week it announced the Personal Computer Wordprocessor (PCW) 8256. What you get in the package is a green-screen monitor with built-in disc drive, a professional keyboard, 256K of Ram, software, and a printer – all for £459. When Amstrad's Chairman suggests that this machine will "blow the lid off the personal computer and word processing market", he might not be wrong.

Hardware

The monitor provided is green screened, displaying 90 columns on 32 text lines. The display is crisp and clear, as you might expect, and a brightness control is situated flush under the right-hand side of the console. Built in to the upper right of the unit mounted vertically is the disc drive. Amstrad have re-

late November, this would be fitted by a dealer – for the sum of £159.

The main circuit board, about the size of an A5 sheet of paper, sits between the television tube and the disc drive towards the rear of the unit. The Z80A processor lies at its heart, with 256K of Ram, 112K of which is used as a Ram disc when running software under CP/M. There is virtually no on-board Rom, as one Amsoft employee explained, "There's just a short bootstrap and that's it. It's a totally clean machine." On the same board are the disc and printer controllers and some interfacing circuitry, plus a novel gate array.

The whole monitor/driver unit (which includes the power supply/transformer as in the other Amstrad machines) sits on a small pedestal, slightly reducing its footprint.

The 82-key keyboard has a normal Qwerty layout to the left, and a selection of function keys on the right, which can double as a numerical keypad. It has a nice feel to it – light but responsive – and shouldn't give too many problems to the touch typists it is primarily aimed at. The whole thing is connected to the monitor via a single spiral-cord connection.

Non-standard characters (such as those used in continental languages and scientific notation) can be obtained by simultaneously pressing *Alt* or *Extra*, plus the appropriate key – a useful feature.

The printer is manufactured by the established manufacturer Seikosha. It is dot-matrix and seems to perform well. In its letter quality mode (probably a fair

description – especially with a good ribbon) it prints at 20 characters per second, increasing to 90 cps in draft quality.

When running under CP/M it emulates an Epson, and supports both single sheet and tractor feed operation. You won't be able to use it with your existing computers however. The printer is just a printer mechanism, with the

printer driver hardware located on the main board. It connects to the main computer/display unit via two cables – one power, the other ribbon.

That's the basic set up. As well as the disc upgrade mentioned, a combined serial and parallel interface should be

Over 3000 software packages have been written to run under CP/M. The following is a selection of key packages which are available for the Amstrad:

Utilities

Devpac 80	£39.95
DiscDoctor	£12.95
ED80 (Screen Editor)	£29.95
Microsoft Macro Assembler	£225

Languages

Mallard Basic	£99.00
Nevada Basic	£39.95
Nevada Fortran	£39.95
Nevada Pascal	£47.00
Pascal80	£39.95
Nevada Cobol	£39.95
Nevada Pilot	£39.95

Graphics

Viewsprint (Saxon)	£29.95
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Financial Modelling

Microspread II	£49.00
Cracker (Software Technology)	£49.00
Supercalc 2	£49.95

Word Processing

NewWord (with Spell Plus)	£149.00
Wordstar	£295.00

Database Management Systems

Cambase Plus	£39.95
DBase II	£395.00

Training Software

Hisoft CP/M Tutorial	£12.95
Touch 'n' Go	£56.00

available by late September, costing £69. This would allow access, via a modem, to the main electronic mail and information systems, such as BT Gold, plus facilitating the use of serial printers. This will be bundled with the suitable operating software.

Memory upgrades are technically possible, but Amstrad has no plans to explore that avenue at present.

Software

Any machine that calls itself a wordprocessor must surely rise or fall on the quality of the wordprocessing software supplied with it. The PCW 8256 comes with *LocoScript*, a new package written specially for the machine by Locomotive Software. Members of the Locomotive development team are no strangers to writing wordprocessors – a number previously had a hand in developing the Diamond system, very much a top-flight machine.

The system is genuinely easy to use. On booting up (this is just done by turning the machine on and inserting the correct disc), you are presented with the disc management screen (a detailed directory). From there on, documents are

Continued over the page



The complete PCW 8256 system

tained the 3-inch floppy format, giving about 180K of storage on each side after formatting. There is space on the lower right of the monitor unit for a second disc drive to be fitted, a 1 Megabyte 3-inch floppy, which should provide an extra 720K of formatted storage. Available by

Amstrad PCW 8256 Specification

Processor: Z80A
 Ram: 256K (32K available to Basic)
 Rom: Bootstrap loader only
 Disc (built in): Hitachi Format 3 inch
 Disc operating system: CP/M Plus
 Disc software included: *LocoScript*, CP/M,
 Dr Logo, DR GSX, Mallard Basic
 Display: 90 columns by 32 lines
 Colour: None
 Sound: None
 Printer: Dot-matrix 90 cps (20 cps in near-letter quality mode)
 Price: £459

created or edited by using single key-strokes and cursor controls. Extensive use is made of window menus, backed up by excellent documentation. Within a few minutes it is possible to produce recognisable results – a major advance on my attempts with other wordprocessing systems.

At first glance the *LocoScript* system seems to provide most major facilities you would expect from a professional wordprocessor in an extremely accessible manner.

Also bundled with the machine comes the software that accompanies the 6128 – CP/M Plus, DR Logo, GSX, DR's graphics extension package with the addition of Mallard Basic, once again by Locomotive Software.

It should be noted that there is no Basic resident within the machine. Mallard Basic must be soft loaded. The precursor of Locomotive Basic, it offers better filing commands and fewer graphics commands (the 8256 has neither colour nor sound).

CP/M Plus opens up a vast library of software to the potential user – some rather pricy (like *dBase II* weighing in at

available on their 3 inch format, and have tried to negotiate cheaper versions of 'classic' business packages such as *Supercalc*.

The version of Basic supplied, Mallard Basic, runs under CP/M and is generally business orientated. Its advanced file handling facilities offer sequential, random access and keyed random access, and it is broadly compatible with the

most common version of Microsoft Basic. When loaded in there is only 32K available for your own Basic programs.

The documentation supplied with the software runs to two volumes, totalling around 700 pages ... but do not be daunted. These are some of the best written manuals I have ever read in terms of clarity and logical progression. Recommended reading for future manual authors.

Conclusion

So there you have it. Amstrad have taken the basic principles that took the home computer market by storm and applied them to the business sector.



The new keyboard layout

A no-nonsense, well presented package, which although it is being put forward as a dedicated wordprocessor, is certainly capable of very much more than that.

And the price! We are talking about a monitor / keyboard / printer / software bundle ... for only a little more than the price of a QLi!

Make no mistake, this micro could revolutionise the office and home business computer market. The PCW 8256 is, after all, cheaper than a good electronic typewriter.

And the multinational business micro giants like IBM and Wang stand a chance of being hit where it hurts most – right in the profit margins. At £450 nothing else comes close.

Mallard Basic Keywords

Abs, Addkey, Addrec, All, And, As, Asc, Atn, Auto
 Base, Buffers
 Call, Cdbl, Chain, Chr\$, Cint, Clear, Close, Common, Consolidate, Cont, Cos, Create, Csnq, Cvd, Cvi, Cvki, Cvs, Cvuk
 Data, Dec\$, Def, Defdbl, Defint, Def Seg, Defsng, Defstr, Delete, Delkey, Dim, Dir, Display
 Edit, Else, End, Eof, Eqv, Era, Erase, Eri, Err, Error, Exp
 Fetchkey\$, Fetchrank, Fetchrec, Field, Files, Find\$, Fix, Fn, For, Fre
 Get, Gosub, Goto
 Hex\$, Himem
 If, Imp, Inkey\$, Inp, Input, Input #, Input\$, Inpw, Instre, Int
 Kill
 Left\$, Len, Let, Line, List, Llist, Load, Loc, Lock, Lof, Log, Log10, Lower\$, Lpos, Lprint, Lset
 Max, Memory, merge, Mid\$, Min, Mkd\$, Mki\$, Mkik\$, Mks\$, Mkuk\$, Mod
 Name, Next, New, Not
 Oct\$, On, On Error Goto 0, Open, Option, Or, Oserr, Out, Outw
 Peek, Poke, Pos, Print, Print #, Put
 Randomize, Rankspec, Read, Rem, Ren, Renum, Reset, Restore, Resume, Resume 0,
 Return, Right\$, Rnd, Round, Rset, Run
 Save, Seekkey, Seeknext, Seekprev, Seekrank, Seekrec, Seekset, Sgn, Sin, Space\$, Spc,
 Sqr, Step, Stop, Str\$, String\$, Strip\$, Swap, System
 Tab, Tan, Then, To, Troff, Tron, Type
 Unt, Upper\$, Using, Usr
 Val, Varptr, Version
 Wait, Waitw, Wend, While, Width, Write, Write #
 Xor
 Zone



LocoScript

a cool £450), others public domain, available from the CP/M User Group. When running under CP/M, the printer automatically defaults to Epson control codes, and the screen emulates a DEC VT52. This makes software installation very easy. Amstrad have set up deals with various companies to ensure that there is a good supply of CP/M software

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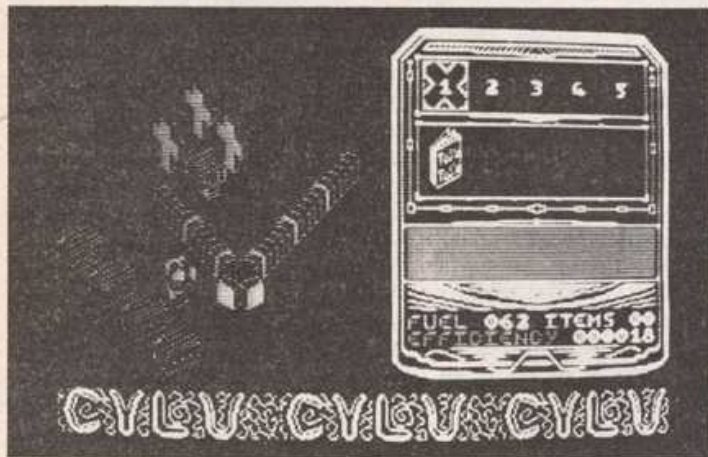
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Cheap thrill

Program Cylu Micro Commodore 64 **Price** £2.50 **Supplier** Firebird, Wellington House, Upper St Martin's Lane, London WC2H 9DL

Cylu has to be Firebird's finest budget hour. Beyond the single complaint that graphically



it owes rather a lot to Ultimate's *Knight Lore* and *Alien 8*, I can think of nothing else bad to say about it.

Using a similar 3D vantage point to *Alien 8*, it depicts a large maze through which, you, an up-ended silicon chip, must trundle your way.

Within the maze are a host of useful (and useless) objects which you may collect and use at a later date. The task is to find 24 objects and take them to the Master Computer.

Some sections of the maze are only made available via teleports found in the com-

puter section other sections can only be reached once forcefields have been disabled - again it's a matter of

many advanced management techniques become accessible to the home user. But to apply these well, a good grasp of the principles and theory is needed.

Accordingly, *QL Project Planner* contains a textbook and interactive teaching programs. As you may expect from Triptych both are very good. The package can safely be recommended to complete beginners, both to computers and CPA. That's user friendly!

You tell the program the activities that comprise the project, tell it what needs to happen before what, and the time each activity will need. From this the program produces a chart which highlights the critical activities (whose delay would delay the whole project), and indicates where dawdling can be tolerated. Most usefully, activities can be modified, deleted or added while you watch the chart. This means you can experiment with 'what if' questions until you are sure your schedule is robust and can cope with the

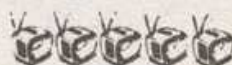
finding the right objects and taking them to the computer. There is one other major difficulty to the game, you must continuously search for fuel - each supply lasts about two minutes so you really don't have time to get things wrong. The graphics, though Ultimatesque, are also abstract, a strange mixture of basic geometrical shapes, crosses, cubes, etc, and odd objects like books, silicon chips and dice. Between these objects there are a number of pathways; it is

mappable but not easy.

The only thing the game rather lacks is sound. What there is seems a little odd. When Cylu walks around you hear the distinctive thud of jackboots rather than the electronic swish you might expect.

Despite having the depressing experience of playing the game nearly 20 times without accomplishing anything other than running out of fuel, I was hooked.

Graham Taylor



List aid

Program Silas Micro BBC B **Price** £12.95 **Supplier** Astral Software, 152 Melton Road, Stanton-on-the-Wolds, Nottingham

L program listings - either on screen or as a print-out - can be hard to decipher.

The BBC micro has inbuilt aids to arranging program lists more legibly but they cannot cope well with multi-statement lines. *Silas* - Super Intelligent List Augmenting System - can.

On screen it breaks up lines into sections, colours keywords and star (*) commands, indents *For-next* loops and inserts spaces where appropriate to help readability. When used with an Epson-style printer it prints out these features with

different type-styles to create the same effect and suppresses teletext codes which upset printers.

Silas limits its indents on-screen to sensible levels but on paper you can expect it to stretch right over 80 columns.

Silas is a machine-code program that loads "transparently" from tape or disc into rarely-used sections of Ram.

Press a function key and *List* your program to see it in *Silas*-scope. Then *List* for an ordinary peep.

Silas keeps out of the way until you want it.

A sensible and mercifully brief handbook explains the minor limitations of the utility.

This is one of those practical aids that really does make life easier and is warmly recommended.

Jan Watterson



unexpected.

Other reports show the timetabling of the events, both in true date terms and in terms of the time elapsed since the start of the project. The true or calendar dates are especially useful for lengthy projects where weekends, bank holidays, and other breaks must be taken into account. The early and late start and finish dates are shown for each part of the project together. The program will print all reports to an Epson FX or RX printer.

The facility for milestone is essential for serious use. Milestones can be used to indicate activities which cannot start until some external

event has happened. They can also be used to split up your project should you need to specify more than 60 different activities.

Versions of *Decision Maker* have been produced for the BBC, Commodore 64 and Amstrad CPC's. The QL version uses an 80 column display, programmes holidays and gives actual calendar dates.

This impressive program with an established record makes 'real', 'business' CPA available to a potentially huge market on a relatively cheap micro.

John Tucker

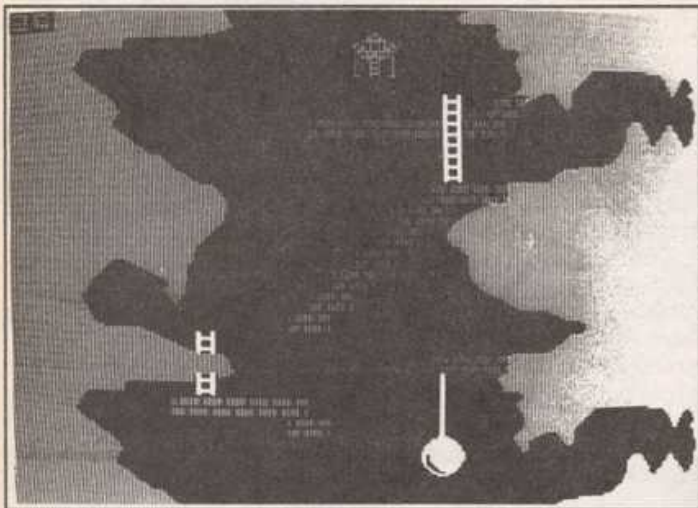


Plan ahead

Program Project Planner Micro QL **Price** £39.95 **Supplier** Sinclair Research, 25 Willis Road, Cambridge CB1 2AQ

Any kind of manager, whether organising flower shows or building houses, will tend to use a technique called Critical Path Analysis - even if they couldn't put a name to it. Whatever you're trying to organise, there are likely to be things that can proceed in parallel, and other events which must be completed before a following vital stage can start. Critical Path Analysis (CPA) is the name for a simple, yet sophisticated, technique for planning the schedule for any project, however complex.

Trouble is, although the basic concepts can be understood and appreciated quite readily, a lot of arithmetic is involved in using CPA effectively. This is where a micro can come in. With a micro



Deft descent

Program *Devil's Descent*
Micro Spectrum 48K **Price** £0.95 **Supplier** Central Solutions, 500 Chesham House, 150 Regent Street, London W1R 5FA

You have to hand it to Pocket Money Software, its name is one hundred per cent accurate.

This amount, just a bit under a pound, was pocket money even when I was a lad (and in those days...). But what about the game? After all, a pound spent is a pound wasted if the product is unplayable.

Well, *Devil's Descent* is far from that. Admittedly it's rather basic, but you didn't really expect *Frankie* did you? If instead you expected an arcade game, a sort of *Lunar*

Lander, in fact you won't be disappointed. You have a fleet of eight craft to guide left and right as they descent through forty screens of caverns, avoiding ledges, plant-life, lasers and suspended skeletons.

There are three speeds of sideways drift and you have to be pretty nifty in changing direction. A knowledge of the screen to come helps too as you want to be in position when you enter it.

It's extremely simple to describe but tricky to play and it proved surprisingly addictive. There's always the hope that next time - just next time, you'll do it.

Even if you only play it a handful of times it will have cost less than a dozen goes on an arcade machine. Astounding value.

John Minson



Word power

Program *Dictionary Use* **Micro** Commodore 64 **Price** £7.95 **Supplier** McGraw Hill, Shoppenhangers Road, Maidenhead, Berks SL6 2QL

Dictionary Use is an educational package in the "Ladders to Learning" series. An unusual subject for a computer program, but I think it's handled rather well.

Turning back the clock and trying to imagine myself as an eight-10 years old, I fished out my dictionary and loaded the program. Gee! Wow! It even has a loading screen.

The first couple of screens explain what dictionaries are and what they're used for. Then it is down to the real stuff - how to find a word.



After sections on phonetic spelling, how dictionaries are set out, using dictionaries to find out how a word is spelt, etc, etc, there is a final test to see if you've learnt anything

Spelt out

Program *Braxx Bluff Micro*
CPC 464 **Price** £8.95 **Supplier** Amsoft, 169 Brentwood House, 169 Kings Road, Brentwood, Essex CM14 4EF

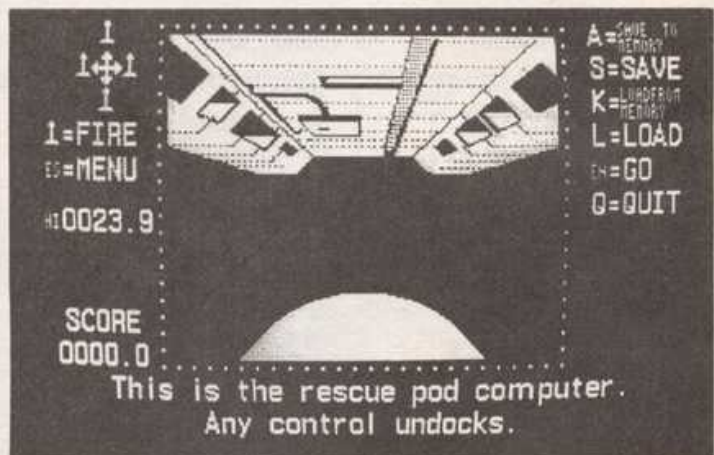
Centuries from now, man has begun to explore unimaginably distant worlds in search of resources and knowledge" it says on the inlay. Presumably when man finds the knowledge he will learn how to spell resources. This game is converted from Micromega's Spectrum original and since their star programmer Derek Brewster has a thriving second career as a journalist we must assume that it is the Amsoft copyrighters who are responsible for such illiterate drivel as "creatures in there (sic) many forms have feed (sic) on the rovers (sic) energy banks". Perhaps the creatures in there many forms have feed on the writer's higher brain centres as well.

Micromega's 3D range which included such gems as *Deathchase*.

The scenario is reasonable enough - you are a sort of space ambulanceman who must find and rescue the people being 'feeded on' by the creatures (in their many forms). You must land a spaceship, walk on wasteland, drive the rover over a marsh, a ruined city and an acid sea to get back to the base ship, all before the crewmen die. It is a race against time made more difficult by the need for coordination and the aforementioned creatures.

Unfortunately playing it boils down to just steering things up and down, left and right and switching to the gun which fires up, down, left and right, etc.

Perhaps I'm being a bit harsh - Micromega never released anything really dreadful - but the whole thing somehow just lacks any spark, and the 3D looks dated and tired against the standards set by the likes of *Knightlore* and *Gyron* today.



Once you have thrown away the box it is somewhat of a disappointment to find that perhaps the game should have gone with it. *Braxx Bluff* was the last in the series of

Not really worth £9 unless you are desperate for a break from platform games.

Tony Kendle



in the last hour.

Anything a youngster could want to know about dictionaries is here, along with useful advice "if this doesn't work, go and ask Mum and Dad".

The thing I liked about *Dictionary Use* is the way that it made the user actually participate in what's going on - you don't just sit watching the computer, learning nothing.

This is achieved by the use of small tests after each section, which encourages the child to use his/her dictionary. It is also pretty user-friendly - no reprimands if you get a question wrong. There's not much point in using the program twice, though. Still, it's well-thought-out and presented.

Tom Hussey



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- Beginning Machine Code on the C64
- Commodore Disc Companion
- The Working Commodore C16

PD365

Micro Mania

Save the program in this game for Spectrum 48K by Simon Johnson

Thousands of bugs have been let loose within a program. It is up to you to save it from crashing by collecting all 12 of the registers used by the programmer before the bugs catch you.

Full instructions are given within the program. Good luck!

Program Notes

Line No

4-43	Title screen
46-97	Initialisation of variables and presentation of screen
100-300	Mainframe loop
400-420	Clear playing section of screen
700-745	Death routine & game over

routine

750-1660	Instructions
8000-9060	Define graphics and initialise machine code sound.

Note: the underlined capital letters in the listing should be entered in graphic mode.




```

4 GO SUB 9000: LET h$="SIMON
JOHNSON": LET hc=5000
5 BORDER 0: PAPER 0: INK 5: C
LS
6 PLOT 0,172: DRAW INK 2;255
.0
7 REM intro screen
10 PRINT AT 0,7; BRIGHT 1;" DE
ADLY ERRORS "
20 LET sc=0: LET le=1: LET to=
0
30 PRINT "'CONTROLS...'" "Q
... UP      A ... DOWN" "N ...
LEFT      M ... RIGHT"
32 PRINT " INK 6;"HIGH SCORE
:"" h$;" "hc
34 PRINT INK 4;"PRESS '1'
FOR INSTRUCTIONS" "PRESS '2' TO
START GAME"
36 LET u=1: LET i=1: LET y1=2
0: LET y2=1: LET x1=1: LET x2=5:
LET iu=-1: LET ui=1: PRINT AT y
1,x1: INK 5;"A": AT y2,x2: INK 6;
"B"
37 PRINT AT y1,x1: OVER 1;"A":
LET y1=y1+iu: LET x1=x1+ui: IF
y1>20 OR y1<2 THEN LET iu=i*-1
38 IF x1>30 OR x1<1 THEN LET
ui=ui*-1
39 PRINT AT y1,x1: OVER 1: INK
5;"A"
40 PRINT AT y2,x2: OVER 1;"B":
LET y2=y2+u: LET x2=x2+i: IF y2
>20 OR y2<2 THEN LET u=u*-1
41 IF x2>30 OR x2<1 THEN LET
i=i*-1
42 PRINT AT y2,x2: INK 6; OVER
1;"B"
43 GO TO 37+12*(INKEY$="2")+14
63*(INKEY$="1")
46 REM initialize variables
49 CLS
50 INK 4: LET a=10: LET b=15:
LET c=10: LET d=0
90 INK 6: PLOT 0,39: DRAW 255,
0: PLOT 0,136: DRAW 255,0: PLOT
0,20: DRAW 255,0
92 PLOT 0,155: DRAW 255,0: PLO
T 70,40: DRAW -70,-30: PLOT 110,
40: DRAW -40,-40: PLOT 150,40: D
RAW 40,-40: PLOT 190,40: DRAW 65
,-30
94 PLOT 70,135: DRAW -70,30: P
LOT 110,135: DRAW -40,40: PLOT 1
50,135: DRAW 40,40: PLOT 190,135
: DRAW 65,30
95 GO SUB 600: GO SUB 400: PRI
NT AT 0,11: INK 2;"SCORE ":sc
96 FOR t=1 TO (24-le): PRINT A
T 5+RND*11,RND*31: INK 3; BRIGHT
1;"C": NEXT t
97 FOR t=1 TO 20: PRINT AT 5+R
ND*11,RND*31: INK 2; BRIGHT 1;"D
": NEXT t
99 REM mainframe
100 PRINT AT a,b;" "
110 LET a=a+(INKEY$="a" AND a<1
6)-(INKEY$="q" AND a>5): LET b=b

```

```

+(INKEY$="m" AND b<31)-(INKEY$="
n" AND b>0)
112 IF ATTR (a,b)=66 THEN LET
sc=sc+100+(le*10): LET to=to+1:
GO SUB 350: POKE 23307,80: LET 1
=USR 23300
114 IF ATTR (a,b)=67 THEN GO T
O 700
120 PRINT AT a,b: INK 5;"A"
140 PRINT AT c,d;" "
150 IF c<a THEN IF ATTR (c+1,d
)<>66 THEN LET c=c+1
160 IF c>a THEN IF ATTR (c-1,d
)<>66 THEN LET c=c-1
170 IF d>b THEN IF ATTR (c,d-1
)<>66 THEN LET d=d-1
180 IF d<b THEN IF ATTR (c,d+1
)<>66 THEN LET d=d+1
190 IF c=a AND d=b THEN GO TO
700
195 IF ATTR (c,d)=67 THEN LET
c=5+INT (RND*10): LET d=0: POKE
23307,10: LET 1=USR 23300
200 PRINT AT c,d: INK 6;"B"
300 GO TO 100
340 REM print score
350 PRINT AT 0,17: INK 4;sc
351 IF to=12 THEN FOR q=1 TO 1
8: PRINT AT 8,7: INK 4+RND*3;"LE
VEL ";le;" COMPLETE": POKE 23307
,90: LET 1=USR 23300: POKE 23307
,120: LET 1=USR 23300: NEXT q: L
ET to=0: LET le=le+1: GO TO 50
360 RETURN
370 REM clear screen
400 LET k$=""
410 FOR y=5 TO 16: PRINT AT y,0
: PAPER RND*7+1;k$: NEXT y
420 FOR y=5 TO 16: PRINT AT y,0
: PAPER 0;k$: PAUSE 1: NEXT y: R
ETURN
599 REM Prepare for next level
600 PRINT AT 10,5: INK 4; BRIGH
T 1;"PREPARE FOR LEVEL ";le: BEE
P .1,20: FOR y=1 TO 50: NEXT y:
BEEP .1,20: FOR y=1 TO 50: NEXT
y: BEEP .1,20: FOR y=1 TO 50: NE
XT y: RETURN
700 REM Death Routine
710 FOR x=1 TO 30
720 PRINT AT a,b;"A": PRINT AT
a,b: OVER 1: INK RND*4+3;CHR$ (7
0+RND*20)
730 POKE 23307,x: LET 1=USR 233
00: POKE 23307,x+5: LET 1=USR 23
300: NEXT x
740 IF sc>hc THEN LET hc=sc: G
O TO 750
745 GO TO 5
750 CLS: PRINT " INK 7;"CONGRA
TULATIONS" " INK 6;"YOU HAVE AC
HIEVED" " INK 5;"THE HIGHEST SC
ORE" " INK 4;"PLEASE ENTER YOUR
NAME" " INK 3;"BETWEEN 1 TO 20
LETTERS"
760 INPUT h$: IF LEN h$>20 THEN
LET h$=h$( TO 20)

```

```

770 GO TO 5
1400 REM instructions
1500 CLS: INK 5: PRINT AT 0,7;"
INSTRUCTIONS": PRINT "'DEEP INSI
DE THE CIRCUITS OF A COMPUTER
A DATA PULSE GLEEFULLY GLIDES AC
ROSS THE CONTROL LINES ON ITS WA
Y TO AN ADDRESS      DESTINATI
ON."
1510 PRINT "BUT WAIT! OH NO - A
BUG - , DUE TO A PROGRAMMING ERR
OR THOUSANDS OF BUGS HAVE BEEN LE
T LOOSE AND ARE NOW ON THE RAMPAG
E."
1520 PRINT "YOUR ONLY HOPE OF SU
RVIVOL IS TO COLLECT ALL THE REGI
STERS THAT THE PROGRAMMER HAS U
SED (12 IN ALL) BEFORE THE BUGS
DESTROY YOU"
1530 PRINT "THE BUGS ARE FAST BU
T WILL ACT LIKE HOMING MISSILES
AND FOLLOW YOUR EVERY MOVE SO Y
OU MUST TRY AND GUIDE THEM INTO
A DEADLY INTERRUPT FLAG BEFORE
THEY REACH YOU."
1540 PRINT AT 21,7;"PRESS ANY KE
Y"
1550 IF INKEY$="" THEN GO TO 15
50
1560 CLS: PRINT AT 0,6;"INSTRUC
TIONS"
1570 PRINT "'IF YOU GUIDE A BUG
INTO AN INTERRUPT FLAG IT WI
LL BE DESTROYED."
1580 PRINT "YOU WILL ALSO DIE IF
YOU TOUCH AFLAG"
1590 PRINT "EACH LEVEL WILL GET
SLIGHTLY HARDER THAN THE LAST
."
1600 PRINT "CHARACTERS..." " IN
K 5;"A ... DATA PULSE"
1610 PRINT " INK 6;"B": INK 5;"
... BUG"
1620 PRINT " INK 2;"D": INK 5;"
... REGISTER"
1630 PRINT " INK 3;"C": INK 5;"
... INTERRUPT FLAG"
1640 PRINT AT 21,6;"PRESS ANY KE
Y"
1650 IF INKEY$="" THEN GO TO 16
50
1660 GO TO 5
8000 REM graphics and m/c sound
9000 FOR a=USR "A" TO USR "D"+7:
READ s: POKE a,s: NEXT a
9010 DATA 60,90,165,219,219,165,
90,60
9020 DATA 126,153,153,90,60,60,6
6,165
9030 DATA 1,2,3,4,5,6,7,8
9040 DATA 0,0,58,84,171,84,58,19
9
9050 FOR s=0 TO 19: READ z: POKE
23300+s,z: NEXT s: RETURN
9060 DATA 33,10,0,17,2,0,6,90,35
,229,197,205,181,3,193,225,35,16
,246,201

```


Manic mutants

The final helping of Pandemonia code written for the BBC
by Jeffrey Cooke

A nuclear power plant has just exploded and in the ensuing "pandemonia" you attempt, in your already mutated form, to reach the reactor by ascending its waste pipe. You

must attempt to stop dangerous particles reaching the sea as you progress through increasingly radioactive levels.

Mutated piranha fish attempt to eat you and various pieces of machinery as well

as anti-matter block your path. As an air breathing creature, you must complete each level before your oxygen is exhausted, safe nuclear particles add to your score. Only you can save the sea from contamination.

To avoid 'spots before the eyes' syndrome, Jeffrey Cooke is making available copies of the game on tape. Write to him, enclosing £2.50, at 152 Galliagh Park, Derry, N. Ireland BT48 8DF.

```

2660DATA 0CA57C8D0E0C60A57CF0
2670DATA 1320C022A57CF00C2002
2680DATA 22208C2220E224C8B22
2690DATA 20302360A57A8570A57B
2700DATA 8571A907857A9048576
2710DATA A9928577A92F8578205D
2720DATA 2560A57A8570A57B8571
2730DATA A907857A90485762041
2740DATA 27A900857C60A57A8570
2750DATA A57B8571A9048572A907
2760DATA 8573202827A94420C526
2770DATA F00320AB226020002920
2780DATA 062320A82260A57A8570
2790DATA A57B8571A9048572A907
2800DATA 8573202827A90420C526
2810DATA F00320DE2260A9128570
2820DATA A9008571A9038572A900
2830DATA 8573A9C8857A9008575
2840DATA A901857A9008577A270
2850DATA A000A90720F1FF60A9FF
2860DATA 20A128C9A0D00320AE28
2870DATA 60A908858BA900858AA9
2880DATA 008589A48AA6898360C
2890DATA 957AEBC8E006D0F52075
2900DATA 23A9008589A48AA689B5
2910DATA 7A99360CE8CE006D0F5
2920DATA 84BAC68BD0D160A57CF0
2930DATA 1DA901857CA57F495585
2940DATA 7F20C823A57CF00C2002
2950DATA 2220172520E9234C9C23
2960DATA A57FF0DFC67F6020EA28
2970DATA 20332520A72360A57A85
2980DATA 70A57B8571A9088575A9
2990DATA 048576204127A57D857A
3000DATA A57E857BA900857CA9FF
3010DATA 857F60A57A8570A57B85
3020DATA 71A9048572A908857320
3030DATA 2B27A94420C526F00320
3040DATA A72360A57A8570A57B85
3050DATA 71A9048572A908857320
3060DATA 2B27A90420C526F00320
3070DATA 9D2360A908858BA90085
3080DATA 8AA9008589A48AA689B9
3090DATA 900C957AEBC8E006D0F5
3100DATA 203F24A9008589A48AA6
3110DATA 89857A99900CE8CE006
3120DATA D0F5848AC68BD0D160A5
3130DATA 7CF01DA901857CA57F49
3140DATA D0857F209524A57CF00C
3150DATA 20022220D1242083244C
3160DATA 6624A57FF0DFC67F6020
3170DATA F52820ED2420712460A5
3180DATA 7A8570A57B8571A90585
3190DATA 75A9038576204127A57D
3200DATA 857AA57E857BA900857C
3210DATA A9FFB57F60A57A8570A5
3220DATA 788571A9038572A90585
3230DATA 73202827A94420C526F0
3240DATA 0320712460A57A8570A5
3250DATA 788571A9038572A90585
3260DATA 73202827A90420C526F0
3270DATA 0320672460A57A8570A5
3280DATA 788571A9058575A90385
3290DATA 76A9568577A92F857820
3300DATA 5D2560A9138570A90085
3310DATA 71A9148572A9008573A9
3320DATA 328574A9008575A90185
3330DATA 76A9008577A270A000A9
3340DATA 0720F1FF60A57A8570A5
3350DATA 788571A9088575A90485
3360DATA 76A9368577A92F857820
3370DATA 5D2560A9138570A90085
3380DATA 71A9048572A9008573A9
3390DATA 968574A9008575A90185
3400DATA 76A9008577A270A000A9
3410DATA 0720F1FF60E675A57585
3420DATA 79A9008574A5708572A5
3430DATA 718573A5798575A474B1
3440DATA 77A0009172A572290FC9
3450DATA 0FF014C907F010A57218
3460DATA 69018572A57369008573
3470DATA 4CA425A5721869798572
3480DATA A57369028573C675F005
3490DATA E6744C7325A570186908
3500DATA 8570A57169008571C676
3510DATA D0A960A570290FC900F0
3520DATA 14C908F010A57038E901
3530DATA 8570A571E90085714CEB
3540DATA 25A57038E9798570A571
3550DATA E902857160A570290FC9
3560DATA 07F014C90FF010A57018
3570DATA 69018570A57169008571
3580DATA 4C1226A5701869798570
3590DATA A5716902857160A572C9
3600DATA 00F007A90085724C3126
3610DATA A57038E9088570A571E9
3620DATA 008571A9018572A90085
3630DATA 7360A572C901F007A901
3640DATA 85724C5426A570186908
3650DATA 8570A57169008571A900
3660DATA 8572A901857360A57038
3670DATA E9088570A571E9008571
3680DATA 60A5701869088570A571
3690DATA 69008571608570A90FA2
3700DATA 0120F4FFA0FFA670A9B1
3710DATA 20FAFF9860208F252059
3720DATA 266020BF25A672206726
3730DATA CAE000D0F860E6722059
3740DATA 26A67220E925CAE000D0
3750DATA F860E673A672206726CA
3760DATA E000D0F860E67320E925CA
3770DATA E000D0F860E672A000B1
3780DATA 7029558573B17029AA6A
3790DATA 8574A572C573F009C574
3800DATA F005A9004CE726A9FF60
3810DATA 20BF25A572186A18AA20
3820DATA 6726CAE000D0F8602059
3830DATA 26205926A572186A18AA
3840DATA 20E925CAE000D0F860A5
3850DATA 72186A18AA206726CAE0
3860DATA 00D0F86A7320E925CAE0
3870DATA 00D0F860A573186A18AA
3880DATA 20E925CAE000D0F86A72
3890DATA 206726CAE000D0F860E6
3900DATA 75A5758579A9008574A5
3910DATA 798575A5708572A57185
3920DATA 73A900A0009172A57229
3930DATA 0FC90FF014C907F010A5
3940DATA 721869018572A5736900
3950DATA 85734C8627A572186979
3960DATA 8572A57369028573C675
3970DATA F005E6744C5727A57018
3980DATA 69088570A57169008571
3990DATA C676D0AB60A98020B927
4000DATA A90FA20120F4FF20E0FF
4010DATA 20E429A9FF20B92760AA
4020DATA A0FFB8C000D0F8CAE000
4030DATA D0F460203619A200BD00
4040DATA 0A20EEFF8E0CDD0F520
4050DATA 452920882920212A6020
4060DATA B32FE688A588DF70CA5
4070DATA 87C90AB0034CF927A902
4080DATA 8DF70C60A91320EEFFA9
4090DATA 0220EEFFA90720EEFFA9
4100DATA 0020EEFFA90020EEFFA9
4110DATA 0020EEFF60A91320EEFF
4120DATA A90220EEFFA90120EEFF
4130DATA A90020EEFFA90020EEFF
4140DATA A90020EEFF60A91320EE
4150DATA FFA90220EEFFA90220EE
4160DATA FFA90020EEFFA90020EE
4170DATA FFA90020EEFF60200929
4180DATA A20020FA2720542A2019
4190DATA 2820542ACAE000D0EF20
4200DATA 3828A9008585C68460A0
4210DATA 0818ADFF0C100FA202BD
4220DATA FC0C5DF80C9DFC0CCA10
4230DATA F4382EFC0C2EFD0C2EFE
4240DATA 0C2EFF0C8BD0DCADFF0C
4250DATA 608570207728C5709003
4260DATA 4CA32860A91520A12818
4270DATA 0AAABD0AE2F857AEBDAE
4280DATA 2F857BA901857C200222
4290DATA A90820A1288572A57A18
4300DATA 6572857AA57B6900857B
4310DATA A57A186908857AA57B69
4320DATA 00857B60E687A9102033
4330DATA 2920452960E687A92020
4340DATA 332920452960A9502033
4350DATA 2920452960A9108570A9
4360DATA 008571A9018572A90085
4370DATA 73A9328574A9008575A9
4380DATA 018576A9008577A270A0
4390DATA 00A90720F1FF608570F8
4400DATA A58E186570858EA58F69
4410DATA 00858FDB60A91F20EEFF
4420DATA A90F20EEFFA91D20EEFF
4430DATA A58F29F04A4A4A4A1869
4440DATA 3020EEFFA58F290F1869
4450DATA 3020EEFFA58E29F04A4A
4460DATA 4A4A18693020EEFFA58E
4470DATA 290F18693020EEFF60A5
4480DATA BD20332960A91F20EEFF
4490DATA A90F20EEFFA91E20EEFF
4500DATA A58D29F04A4A4A4A1869
4510DATA 3020EEFFA58D290F1869
4520DATA 3020EEFF60A58C186901
4530DATA B58CC940D025A900858C
4540DATA A58DF016F838E901858D
4550DATA D8A58DC904B003205C2A
4560DATA 208B294CE329A9018585
4570DATA 208B2960A900857BA903
4580DATA B57A9F18572A9FF8573
4590DATA A900857185758577A57B
4600DATA 182AABDF008574E8BD
4610DATA F00B8576A270A000A907
4620DATA 20F1FFA578186901857B
4630DATA C907D0C60A91720EEFF
4640DATA A90020EEFFA90A20EEFF
4650DATA A92020EEFFA90020EEFF
4660DATA A90020EEFFA90020EEFF
4670DATA A90020EEFFA90020EEFF
4680DATA A90020EEFF60A04088C0
4690DATA 00D0F860A9028570A900
4700DATA 8571A9F18572A9FF8573
4710DATA A9FF8574A9008575A901
4720DATA 8576A9008577A270A000
4730DATA A90720F1FF60A588186A
4740DATA 8003202A1E602C052D00
4750DATA 9220292268A8A52A9102
4760DATA C8A52B9102C898482031
4770DATA 922097BAC92CF0D5C929

```


4780DATA	F0034C27916885156885	5390DATA	00000C0C0C0C0C080C0C	5880DATA	00005500004000000080	6370DATA	0088488885000885085
4790DATA	3FA9008540203692A000	5400DATA	0C0C0C08000808000000	5890DATA	40FF4080000000AAAAEA	6380DATA	885500885545885A0088
4800DATA	A5159102652A852A9002	5410DATA	08080800000000000000	5900DATA	FFAAAAA0000408000FF	6390DATA	5ACFB85F00885FFD8864
4810DATA	E62BA5038538A5028537	5420DATA	00000000000000000000	5910DATA	00804000000000000000	6400DATA	008864A188690088692E
4820DATA	18652A8A52B6503B034	5430DATA	00000000000000000000	5920DATA	00000000050000000001	6410DATA	886E00886E7300000000
4830DATA	AAC404E505B02D840286	5440DATA	00000000000000000000	5930DATA	03070301000000020702	6420DATA	00000000000000000000
4840DATA	03A5376515A8A9008537	5450DATA	00000000143D3C143C14	5940DATA	0000003A803C003F8041	6430DATA	00000000000000000000
4850DATA	9002E6389137C8D00000	5460DATA	00000000383C3C3C3C3C	5950DATA	004480460049804B004E	6440DATA	883C00883C5C88410088
4860		5470DATA	00000030303C3C3C3030	5960DATA	8050005380550058805A	6450DATA	41E6884600884617884B
4870		5480DATA	10000020303C3C3C3C20	5970DATA	005D805F006280640067	6460DATA	0088488885000885085
5000DATA	00000000000000000000	5490DATA	00000000203C3C3C2800	5980DATA	8069006C806E00710000	6470DATA	885500885545885A0088
5010DATA	0000000000000000040C	5500DATA	00000000003C3C3C0000	5990DATA	00000000000000000000	6480DATA	5ACFB85F00885FFD8864
5020DATA	0C0C0400040404040400	5510DATA	00000014383030303814	6000DATA	00000000000000000000	6490DATA	008864A188690088692E
5030DATA	00000000000C0C0C0C0C	5520DATA	00000000000000000000	6010DATA	00000000000000000000	6500DATA	886E00886E7300000000
5040DATA	0C0C0C0C0C0C0C040404	5530DATA	00000000000000000000	6020DATA	00000000F00000000000	6510DATA	00000000000000000000
5050DATA	00000C3F2B0C0C080C0C	5540DATA	00000028343030303428	6030		6520DATA	00000000000000000000
5060DATA	0C0C0C0C0C08080C000000	5550DATA	00000000003C3C3C0000	6040DATA	16021200091309050000	6530DATA	10101010101065037503
5070DATA	00000C0C000008080808	5560DATA	00000000103C3C3C1400	6050DATA	00190400009E001905FF	6540DATA	65037903650381059508
5080DATA	00000800000000000000	5570DATA	00000010303C3C3C3C10	6060DATA	049E0019040000800319	6550DATA	1010004100010000406C
5090DATA	00000000000000000000	5580DATA	00000030303C3C3C3030	6070DATA	05FF0480031904000096	6560DATA	00010000085D00000000
5100DATA	00000000000000000000	5590DATA	20000000343C3C3C3C3C	6080DATA	001905FF049600190400	6570DATA	305401000000F0630100
5110DATA	00000000000000000000	5600DATA	00000000283E3C283C28	6090DATA	0088031905FF04880319	6580DATA	0000004201000000006B
5120DATA	00040404000000000000	5610DATA	00000000000000000000	6100DATA	04C80096001905C80088	6590DATA	00000000A04600000000
5130DATA	000000000000000C0C0C	5620DATA	00000000000000000000	6110DATA	0019055E01880019055E	6600DATA	885500000000883C0088
5140DATA	0C0C040C0C0C0C0C0400	5630DATA	0000000000141001400	6120DATA	0196001904C800880319	6610DATA	3C5C8841008841E68846
5150DATA	040400000C1D1D0C0C0C	5640DATA	000000003C3E3C3C3C3C	6130DATA	05C800960319055E0196	6620DATA	00884617884B0088488A
5160DATA	0C0C0C0C0C0C0C0C0800	5650DATA	00000010303C3C3C3838	6140DATA	0319055E01880319049D	6630DATA	88500088508588550088
5170DATA	00082A020C0C00080C0C	5660DATA	00000030303C3C3C3430	6150DATA	03960019059D03880019	6640DATA	5545885A00885ACFB85F
5180DATA	0C0C0800080C00000000	5670DATA	20000000303C3C3C3C00	6160DATA	05330488001905330496	6650DATA	00885FFD8864008864A1
5190DATA	00080800000000000000	5680DATA	00000000003C3C3C0000	6170DATA	0019049D03880319059D	6660DATA	88690088692E886E0088
5200DATA	00080000000000000000	5690DATA	00000000143838381400	6180DATA	03960319053304960319	6670DATA	6E730000000000000000
5210DATA	00000000000000000000	5700DATA	00000028202020202028	6190DATA	05330488031F04001102	6680DATA	00000000000000000000
5220DATA	00000000000000000000	5710DATA	00000000000000000000	6200DATA	2050414E44454D4F4E49	6690DATA	00000000000883C0088
5230DATA	00000000000000000000	5720DATA	00000000000000000000	6210DATA	412012000A130A000000	6700DATA	3C5C8841008841E68846
5240DATA	00000C0C000004040404	5730DATA	00000014101010101014	6220DATA	00190400009E00190500	6710DATA	00884617884B0088488A
5250DATA	0000040000000C3F170C	5740DATA	00000000283434342800	6230DATA	0080031904FF049E0019	6720DATA	88500088508588550088
5260DATA	0C040C0C0C0C0C0C0404	5750DATA	00000000003C3C3C0000	6240DATA	05FF0480030000000000	6730DATA	5545885A00885ACFB85F
5270DATA	0C00000C0C0C0C0C0C0C	5760DATA	00000000303C3C3C3C00	6250DATA	00000000000000000000	6740DATA	00885FFD8864008864A1
5280DATA	0C0C0C0C0C0808080000	5770DATA	00000030303C3C3C3830	6260DATA	00000000000000000000	6750DATA	88690088692E886E0088
5290DATA	080C0C0C080008080808	5780DATA	10000020303C3C3C3434	6270DATA	00000000000000000000	6760DATA	6E730000000000000000
5300DATA	08000000000000000000	5790DATA	000000003C3B3C3C3C3C	6280DATA	00000000000000000000	6770DATA	00000000000000000000
5310DATA	00000000000000000000	5800DATA	00000000002828002800	6290DATA	0000000000000410000	6780DATA	00000000000000000000
5320DATA	00000000000000000000	5810DATA	00000000000000000000	6300DATA	0000406C00010000085D	6790DATA	00000000000000000000
5330DATA	00000000000000000000	5820DATA	00000000000000000000	6310DATA	00000000305401000000	6800DATA	00000000000000000000
5340DATA	00000000040400000000	5830DATA	00000102030100000003	6320DATA	F0630100000000420100	6810DATA	00000000000000000000
5350DATA	00000000040000000415	5840DATA	03010303030000000203	6330DATA	0000006B00000000A046	6820DATA	00000000000000000000
5360DATA	010C0C00040C0C0C0C04	5850DATA	03020000000000000000	6340DATA	00000000885500000000	6830DATA	00000000000000000000
5370DATA	00040C00000C2E2E0C0C	5860DATA	11221100002233220000	6350DATA	883C00883C5C88410088	6840DATA	00000000000000000000
5380DATA	0C0C0C0C0C0C0C0C0C04	5870DATA	00000000000000000040	6360DATA	41E6884600884617884B		

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The plot continues

Part Two of a graph plotting routine for the QL written by John Cochrane

Space does not permit me to present a full line-by-line description of the program and its workings. The following should give you a general idea of what's going on though and will give you sufficient clues to work through the details by yourself.

Program notes

Lines 150 to 290 control the running of the program. I have not attempted to be too clever in terms of program layout, I needed the thing to be simple to follow rather than fast or compact. Also, I have not made the program fully foolproof, put in silly data and it's your own fault if you get rubbish out. The program waits for you to press a key (Line 260) to end.

Procedures *Start-Up* and *Read-Data* set up the input data and initialise certain variables which specify the display special mention. 'line-type()' determines the type of curve fit; zero for no curve, one to four for a polynomial of order one to four, and five for a line joining each data point (data is sorted by increasing x-value). Don't use over-long titles, the main title can be up to 29 characters long, the axis titles up to around 20 characters each, and the key-descriptions up to around 12 characters.

Procedure *Find-Fit* contains the least-squares curve-fitting algorithms. Don't ask me to explain this lot, if you really want to get into this sort of thing then I suggest you read a book by Terry E. Shoup called *Numerical Methods for the Personal Computer* (Prentice-Hall). There are other ways to fit curves to data, spline-functions for example, which you may like to add here.

Automatic scaling is provided by procedures *Find-Scale* and *Get-Scale*. Different people like to scale their graphs in different ways. The most important factors are set in Lines 1990 to 2090. These set the permissible intervals between graph grids. The various "complications" in lines 2030-2080 are there to try and set sensible values for the axis end-points, if possible, *Get-Scale* sets zero at the plot origin.

A blank graph is plotted by procedures *Draw-Graph* and *Draw-Axes*, which make use of the plotting routines *Move-To-xy* and *Plot-To-xy*. The plotting routines are set up as separate routines because I wanted to be able to easily convert the program to output to a plotter or plotting-printer. This wastes a little space but increases versatility. If you want to dispense with this feature then you should be able to replace most of the *Plot-To-xy* calls with *Line-R* and also dump the variables 'old-x' and 'old-y' at the same time.

The data itself is plotted by proce-

dures *Plot-Data*, *Mark*, *Plot-Cross*, and *Plot-Poly*. In extreme cases you may find that the curve goes off the graph area. The only easy thing to do in this eventuality is to try to fit a lower order curve to the data.

Finally, a key is displayed at the bottom of the screen (by *Print-Key*) to show what is what. The procedure *Get-Mum* is used to define four-character strings for the numbers to be used when annotating the axes.

I hope that most of the variable-names are self-explanatory and that you will be able to follow most of the program's workings. Drop me a line through *Popular* if you want more information.

```

1730     END FOR K
1740     IF temp_1=0 THEN N=data_points(n_line)
1750     END FOR N
1760     IF x_min>x(n_line,1) THEN x_min=x(n_line,1)
1770     IF x_max<x(n_line,data_points(n_line)) THEN
1780       x_max=x(n_line,data_points(n_line))
1790     END IF
1800     FOR K=1 TO data_points(n_line)
1810       IF y_min>y(n_line,K) THEN y_min=y(n_line,K)
1820       IF y_max<y(n_line,K) THEN y_max=y(n_line,K)
1830     END FOR K
1840   END FOR n_line
1850   REMark Scale axes.....
1860   qen_min=x_min;qen_max=x_max
1870   GET_SCALE
1880   xs_min=scale_min;xs_max=scale_max
1890   x_ivl=scale_interval;x_power=scale_power
1900   qen_min=y_min;qen_max=y_max
1910   GET_SCALE
1920   ys_min=scale_min;ys_max=scale_max
1930   y_ivl=scale_interval;y_power=scale_power
1940   END DEFINE FIND_SCALE
1950 :
1960   DEFINE PROCEDURE GET_SCALE
1970     absolute_max=ABS(qen_max)
1980     IF absolute_max<ABS(qen_min) THEN absolute_max=ABS(qen_min)
1990     absolute_ivl=(qen_max-qen_min)/10
2000     IF absolute_ivl<(absolute_max/20) THEN absolute_ivl=absolute_max/20
2010     scale_power=INT(LOG10(absolute_ivl)+LOG10(2))
2020     IF absolute_ivl=.5*10^scale_power THEN scale_power=scale_power-1
2030     temp_1=absolute_ivl/(10^scale_power)
2040     temp_2=1
2050     IF temp_1>1 THEN temp_2=2
2060     IF temp_1>2 THEN temp_2=2.5
2070     IF temp_1>2.5 THEN temp_2=5
2080     scale_interval=temp_2*10^scale_power
2090     scale_min=scale_interval*INT(qen_min/scale_interval)
2100     temp_1=10-INT((qen_max-scale_min)/scale_interval)
2110     temp_2=scale_min-scale_interval*temp_1
2120     IF scale_min=0 AND temp_2<0 THEN scale_min=0
2130     IF scale_min<0 THEN scale_min=scale_min-scale_interval*INT(temp_1/2)
2140     scale_max=scale_min+10*scale_interval
2150   END DEFINE GET_SCALE
2160 :
2170   DEFINE PROCEDURE DRAW_GRAPH
2180     REMark Set up blank graph etc.....
2190     CLS #1
2200     INK #1,7:PAPER #1,2:CSIZE #1,3,0
2210     CLS #1,3
2220     temp_1=INT((14.5-LEN(title#))/2)
2230     IF temp_1<0 THEN temp_1=0
2240     AT 0,temp_1:PRINT title#
2250     PAPER #1,0:CSIZE #1,0,0
2260     temp_1=INT((12-LEN(y_title#))/2)
2270     IF temp_1<0 THEN temp_1=0
2280     AT temp_1,0
2290     FOR K=1 TO LEN(y_title#)
2300       PRINT y_title#(K)
2310     END FOR K
2320     temp_1=INT((39-LEN(x_title#))/2)
2330     IF temp_1<0 THEN temp_1=0
2340     AT 22,temp_1:PRINT x_title#;
2350     CSIZE #1,0,0
2360     IF y_power<0 OR y_power>1
2370       AT 1,0:PRINT "(*;10^y_power;)"
2380     END IF

```



```

2390 GET_NUM ys_max,y_power
2400 AT 2,1:PRINT number$
2410 GET_NUM (ys_min+ys_max)/2,y_power
2420 AT 11,1:PRINT number$
2430 GET_NUM ys_min,y_power
2440 AT 20,1:PRINT number$
2450 GET_NUM xs_min,x_power
2460 AT 21,3:PRINT number$
2470 GET_NUM (xs_min+xs_max)/2,x_power
2480 AT 21,37:PRINT number$
2490 GET_NUM xs_max,x_power
2500 AT 21,71:PRINT number$;
2510 IF x_power(0 OR x_power)1
2520 AT 22,65:PRINT "(*;10^x_power;)*"
2530 END IF
2540 DRAW_AXES
2550 END DEFINE DRAW_GRAPH
2560 :
2570 DEFINE PROCEDURE DRAW_AXES
2580 REMARK Plot axes.....
2590 x_scale=x_axis_length/(xs_max-xs_min)
2600 y_scale=y_axis_length/(ys_max-ys_min)
2610 new_x=-2*tick_x:new_y=0:MOVE_TO_XY
2620 new_x=old_x+2*tick_x:PLOT_TO_XY
2630 FOR L=1 TO 10
2640 new_x=old_x+x_axis_length/10:PLOT_TO_XY
2650 new_y=old_y-tick_y
2660 IF L=5 OR L=10 THEN new_y=new_y-tick_y---
2670 PLOT_TO_XY
2680 new_y=old_y+tick_y
2690 IF L=5 OR L=10 THEN new_y=new_y+tick_y
2700 MOVE_TO_XY
2710 END FOR L
2720 new_x=0:new_y=-2*tick_y:MOVE_TO_XY
2730 new_y=old_y+2*tick_y:PLOT_TO_XY
2740 FOR L=1 TO 10
2750 new_y=old_y+y_axis_length/10:PLOT_TO_XY
2760 new_x=old_x-tick_x
2770 IF L=5 OR L=10 THEN new_x=new_x-tick_x
2780 PLOT_TO_XY
2790 new_x=old_x+tick_x
2800 IF L=5 OR L=10 THEN new_x=new_x+tick_x
2810 MOVE_TO_XY
2820 END FOR L
2830 REMARK Plot zero axes if req'd.....
2840 IF xs_min(0 AND xs_max)0 THEN
2850 new_x=x_scale*ABS(xs_min):new_y=0:MOVE_TO_XY
2860 new_y=old_y+y_axis_length:PLOT_TO_XY
2870 END IF
2880 IF ys_min(0 AND ys_max)0 THEN
2890 new_x=0:new_y=y_scale*ABS(ys_min):MOVE_TO_XY
2900 new_x=old_x+x_axis_length:PLOT_TO_XY
2910 END IF
2920 END DEFINE DRAW_AXES
2930 :
2940 DEFINE PROCEDURE MOVE_TO_XY
2950 old_x=new_x:old_y=new_y
2960 END DEFINE MOVE_TO_XY

2970 :
2980 DEFINE PROCEDURE PLOT_TO_XY
2990 LINE #1,old_x,old_y TO new_x,new_y
3000 old_x=new_x:old_y=new_y
3010 END DEFINE PLOT_TO_XY
3020 :
3030 DEFINE PROCEDURE PLOT_DATA
3040 REMARK Plot the points.
3050 new_x=x_scale*(x(n_line,1)-xs_min)
3060 new_y=y_scale*(y(n_line,1)-ys_min)
3070 MOVE_TO_XY
3080 FOR L=1 TO data_points(n_line)
3090 new_x=x_scale*(x(n_line,L)-xs_min)
3100 new_y=y_scale*(y(n_line,L)-ys_min)
3110 IF line_type(n_line)=6 THEN
3120 PLOT_TO_XY:ELSE MOVE_TO_XY
3130 MARK
3140 END FOR L
3150 type_of_line=line_type(n_line)
3160 SELECT ON type_of_line
3170 =1 TO 4
3180 PLOT_POLY
3190 END SELECT
3200 END DEFINE PLOT_DATA
3210 :
3220 DEFINE PROCEDURE MARK
3230 SELECT ON n_line
3240 =1
3250 =2
3260 PLOT_SQUARE
3270 =3
3280 CIRCLE old_x,old_y,tick_x
3290 END SELECT
3300 END DEFINE MARK
3310 :
3320 DEFINE PROCEDURE PLOT_CROSS
3330 new_x=old_x-tick_x:new_y=old_y-tick_y:MOVE_TO_XY
3340 new_x=old_x+2*tick_x:new_y=old_y+2*tick_y:PLOT_TO_XY
3350 new_y=old_y-2*tick_y:MOVE_TO_XY
3360 new_x=old_x-2*tick_x:new_y=old_y+2*tick_y:PLOT_TO_XY
3370 new_x=old_x+tick_x:new_y=old_y-tick_y:MOVE_TO_XY
3380 END DEFINE PLOT_CROSS
3390 :
3400 DEFINE PROCEDURE PLOT_SQUARE
3410 new_x=old_x-tick_x:new_y=old_y-tick_y:MOVE_TO_XY
3420 new_x=old_x+2*tick_x:PLOT_TO_XY
3430 new_y=old_y+2*tick_y:PLOT_TO_XY
3440 new_x=old_x-2*tick_x:PLOT_TO_XY
3450 new_y=old_y-2*tick_y:PLOT_TO_XY
3460 new_x=old_x+tick_x:new_y=old_y+tick_y:MOVE_TO_XY
3470 END DEFINE PLOT_SQUARE
3480 :
3490 DEFINE PROCEDURE PLOT_POLY
3500 x_coord=x(n_line,1):new_x=x_scale*(x_coord-xs_min)
3510 y_coord=B(1)+B(2)*x_coord+B(3)*x_coord^2+B(4)*x_coord^3+B(5)*x_coord^4
3520 new_y=y_scale*(y_coord-ys_min)
3530 MOVE_TO_XY
3540 FOR L=x(n_line,1) TO x(n_line,data_points(n_line))+x_ivl/8 STEP x_ivl/4
3550 x_coord=Line#x=x_scale*(x_coord-xs_min)
3560 y_coord=B(1)+B(2)*x_coord+B(3)*x_coord^2+B(4)*x_coord^3+B(5)*x_coord^4
3570 new_y=y_scale*(y_coord-ys_min)
3580 PLOT_TO_XY
3590 END FOR L
3600 END DEFINE PLOT_POLY
3610 :
3620 DEFINE PROCEDURE PRINT_KEY
3630 IF number_of_lines(2) THEN RETURN
3640 IF line_type(n_line)0 THEN line_type(n_line)=6
3650 data_points(n_line)=2
3660 x(n_line,1)=xs_min+(n_line-1)*3.5*(xs_max-xs_min)/10
3670 y(n_line,1)=ys_min-(ys_max-ys_min)/5
3680 x(n_line,2)=x(n_line,1)+(xs_max-xs_min)/10
3690 y(n_line,2)=y(n_line,1)
3700 PLOT_DATA
3710 AT 23,16+(n_line-1)*23:PRINT key$(n_line)
3720 END DEFINE PRINT_KEY
3730 :
3740 DEFINE PROCEDURE GET_NUM (number,power)
3750 SELECT ON power
3760 =0 TO 1
3770 number$=" *&INT(number+.5):number$=number$(LEN(number$)-4 TO)
3780 =REMAINDER
3790 temp_1=1E-2*INT(100*number/(10^power)+.5)
3800 number$=" *&temp_1:number$=number$(LEN(number$)-4 TO)
3810 END SELECT
3820 END DEFINE GET_NUM

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PD133

Colour swapping

Animate your figures by colour swapping on the 464 -
from J W Constable

Colour swapping is a technique possible on machines such as the Amstrad and BBC that allows the colour of 'pens' that have been used to print or draw to be changed. On the Amstrad the technique works like this.

Pens one to 15 are used to draw - for instance - 15 adjacent, parallel lines. Then all Pens are filled with *Ink* the same colour as the *Paper* which in this case will be set to zero (let us say that this background is black). This means that all the coloured lines effectively disappear as far as the eye is concerned. However, they are actually still there but coloured black.

Now if the *Ink* in each Pen in turn is changed to, let us say, blue and then back to black again, a single line appears to move across the screen. If this process is now extended to pictures or various stages of a rotating shape then the result is very fast animation.

The Lissajous Figures program is one which uses this colour swapping technique. The plotting can be speeded up by increasing the *Step* rate in Line 140, but the larger it gets the more the lines start to break up. The animation can be speeded up or slowed down by altering the 'wait' loops in Lines 230 and 270.

For this particular plot, as half of the pattern repeats itself going in the opposite direction it is possible to draw twice the amount of positions of the figure in half a cycle, and then step backwards through the colours in the animation section as well as forwards to complete the second half of the rotation. To see what I mean delete Lines 250 to 280 to see just half the cycle.

Line 150 may be altered and experimented with to produce different Lissajous figures or plots of other functions, but the associated lines and *For/Next* loops must be changed to customise the program to produce the best effect for the new function, as they were with this example.

When using the technique two main things must be remembered. Firstly, whatever is plotted must only have 15 stages (although the Lissajous Figures program effectively has 30 because half of it is repeated). This is because 15 is the maximum number of Pens allowed in *Mode 0* excluding one Pen for the *Paper* or background.

Secondly, if one part of a plotted shape is superimposed on another part of a previous shape in the previous Pen, then that part of the previous shape will be overwritten and lost, so try to avoid this. You can see what I mean from the early stages of the Figures program. The problem is more pronounced in *Mode 0*

where the pixels are bigger and more likely to overlap, so if the thing that you are animating can be done with a total of four Pens (including one background or *Paper Pen*) then use *Mode 1*.

The *On Break Gosub* statements in

Line 60 and 300 are to prevent the program from being stopped and leaving the user with an unusable set of *Inks* - a common problem when breaking out of a program that uses colour swapping. The *Call &BBFF* resets the Pen *Inks* to default values. I found the *Mode 1* command necessary because the machine code call appears to corrupt *Mode 0* by mixing it with *Mode 1*. Delete the *Mode 1* in Line 300 to see what I mean.

I leave you with the second program which I think is more impressive.

```
10 '=====
20 'Lissajous figures=
30 '= demonstration =
40 '=====
50 '
60 ON BREAK GOSUB 300
70 MODE 0
80 DEG
90 m=130
100 ORIGIN 320,200
110 b=0
120 FOR p=0 TO 180 STEP 180/14
130 b=b+1
140 FOR t=0 TO 360 STEP 1.5
150 PLOT SIN(t+p)*m,SIN(t)*m,b
160 NEXT t
170 NEXT p
180 FOR b=1 TO 15
190 INK b,1
200 NEXT b
210 FOR b=2 TO 15
220 INK b-1,1:INK b,23
230 FOR w=1 TO 20:NEXT w
240 NEXT b
250 FOR b=14 TO 1 STEP -1
260 INK b+1,1:INK b,23
270 FOR w=1 TO 20:NEXT w
280 NEXT b
290 GOTO 210
300 MODE 1: CALL &BBFF
```

```
10 '
20 '*****
30 '*
40 '* 3D ROTATING CUBE *
50 '*
60 '*****
70 '
80 MODE 0
90 ORIGIN 320,200
100 DIM x(50),y(50),z(50)
110 m=100
120 DEG
130 FOR i=1 TO 15:INK i,9:NEXT i
140 BORDER 0:PAPER 0:INK 0,0:CLS
150 FOR c=1 TO 17
160 READ x(c),y(c),z(c)
170 NEXT c
180 p=0
190 FOR t=1 TO 90 STEP 6
200 p=p+1:IF p=16 THEN p=1
210 MOVE ((x(1)*COS(t)-y(1)*SIN(t))
+z(1)/2)*m,((x(1)*SIN(t)+y(1)*COS(t)
+z(1)/2)*m
220 FOR c=1 TO 17
230 DRAW ((x(c)*COS(t)-y(c)*SIN(t))
+z(c)/2)*m,((x(c)*SIN(t)+y(c)*COS(t)
+z(c)/2)*m,p
240 NEXT c
250 NEXT t
260 FOR i=1 TO 15:INK i,0:NEXT i
270 FOR i=1 TO 15
280 INK i-1,0:INK i,9
290 FOR q=1 TO 50:NEXT q
300 NEXT i
310 INK 15,0
320 GOTO 270
330 DATA 1,1,1,1,1,1,-1,1,1,-1,1,-1,
1,1,-1,1,1,1,-1,1,-1,1,1,-1,
-1,1,-1,1,1,-1,1,1,-1,1,1,-1,
1,-1,-1,1,-1,-1,-1,1,-1,1,1
```


Numbered in full

Spoken numbers on the 64 (with the Currah Speech Unit)
courtesy of Chris Cattanaach

The Currah Speech Unit has developed a reputation as one of the more versatile speech units. Unlike units which have a limited "fixed" vocabulary, the Currah's speech chip allows one to build up any word one desires from a suitable combination of allophones.

One drawback of the speech, where numbers are concerned, is that all numbers greater than ten are read out as a single series of single digits. Thus 123 is spoken as one two three, instead of as one hundred and twenty three.

Developed on the Currah Commodore 64 speech unit, this program recti-

fies this situation, and allows numbers entered to be spoken correctly. The program caters for all numbers up to 999,999,999 (nine hundred and ninety-nine million, nine hundred and ninety-nine thousand, nine hundred and ninety-nine), which should be entered without the commas. Decimals are catered for up to two decimal places, but this could easily be extended if desired. It has only been limited to avoid the repetition of a large number of zero's.

Program Notes

The main program lies between Lines 8900 and 10020 and is accessed by a

Gosub command incorporated in Lines 1-23 at the beginning of the program. The program can thus be easily incorporated into one's own program, which can lie between Lines 30 and 8899.

When the program is Run, the number to be spoken is entered at Line 22. Lines 9000-9003 decide if the number is an integer or a decimal.

Lines 9070-9299 determine the length of the number entered, in order to allocate the necessary words used in speaking it. Some numbers are spoken in a unique way (eg, numbers 10 to 19, hundred, million, etc), and this is catered for in Lines 9304-9324 and 10000-10020. To get out of the counting program, one enters the double symbol ££.

If this program is used in conjunction with one's own program, certain constants should be avoided to avoid confusion. These are as follows: C1S-C9S, D1S-D9S, ES, E1S, E2S, G1S, RS, HNS, MLS, THS, F1, F2, E%, E3S, and Z1S.

```

1 REM"VOICED NUMBERS"
2 PRINT"VOICED NUMBERS BY C.J.CATTANACH"
3 POKE53281,7
5 INIT
20 GOSUB10000
22 GOSUB8900:GOSUB8902:GOSUB9430:F2=0:F1=0:
  INPUT E$
23 GOSUB9000
8900 GOTO22
8902 IFF1=1THEN9354
8903 IFF1=2THEN9358
8904 IFF1=3THEN9375
8905 IFF1=4THEN9389
8906 IFF1=5THEN9421
8907 IFF1=6THEN9378
8999 RETURN
9000 IF VAL(E$)-INT(VAL(E$))=0 THEN9005
9002 Z1$=STR$(INT(100*(VAL(E$)-INT(VAL(E$))
  ))/100):E$=STR$(INT(VAL(E$))):F2=9
9003 E9%=LEN(E$):E$=MID$(E$,2,E9%-1)
9005 E=VAL(E$):E9%=LEN(E$)
9010 IFE$="££"THEN9013
9011 GOTO9070
9013 KOFF
9014 STOP
9070 IFE9%=9THEN9420
9072 IFE9%=8THEN9387
9074 IFE9%=7THEN9369
9075 IFE9%=6THEN9357
9076 IFE9%=5THEN9352
9077 IFE9%=4ANDRIGHT$(E$,3)="000"THEN9338
9078 IFE9%=4ANDRIGHT$(E$,3)<>"000"THEN9341
9080 IFE9%=3ANDRIGHT$(E$,2)="00"THEN9330
9081 IFE9%=3ANDMID$(E$,2,1)="0"THEN9362
9082 IFE9%=3ANDRIGHT$(E$,2)<>"00"THEN9333
9084 IFE9%=2ANDVAL(E$)<20THEN9304
9085 IFE9%=2ANDRIGHT$(E$,1)="0"THEN9316
9086 IFE9%=2AND(RIGHT$(E$,1)<>"0")THEN9325
9090 IFE9%=1THEN9300
9299 STOP
9300 SAY E$
9301 GOTO9500
9304 IFE$="10"THENSAYD1$
9305 IFE$="11"THENSAYC1$
9306 IFE$="12"THENSAYC2$
9307 IFE$="13"THENSAYC3$
9308 IFE$="14"THENSAYC4$
9309 IFE$="15"THENSAYC5$
9310 IFE$="16"THENSAYC6$
9311 IFE$="17"THENSAYC7$
9312 IFE$="18"THENSAYC8$
9313 IFE$="19"THENSAYC9$
9314 GOTO9500
9316 IFE$="20"THENSAYD2$
9317 IFE$="30"THENSAYD3$
9318 IFE$="40"THENSAYD4$
9319 IFE$="50"THENSAYD5$
9320 IFE$="60"THENSAYD6$
9321 IFE$="70"THENSAYD7$
9322 IFE$="80"THENSAYD8$
9323 IFE$="90"THENSAYD9$
9324 GOTO9500
9325 R$=E$:R9%=E9$:E$=LEFT$(E$,1)+ "0":E9%=LEN(E$)
9326 GOSUB9316:E$=R$:E9%=R9%
9327 E$=RIGHT$(E$,1):SAY E$
9329 GOTO9500
9330 E1$=LEFT$(E$,1):SAY E1$
9331 SAY HN$
9332 GOTO9500
9333 R$=LEFT$(E$,1):GOSUB9332
9335 SAY"AND"
9336 E$=RIGHT$(E$,2)
9337 GOTO9005
9338 R$=LEFT$(E$,1):SAY R$
9339 SAY TH$
9340 GOTO9500
9341 R$=LEFT$(E$,1):SAY R$
9342 SAY TH$
9343 IFRIGHT$(E$,3)="000"THEN9500
9344 IF MID$(E$,2,2)="00"OR MID$(E$,2,1)="0"
  THEN9345
9345 E$=RIGHT$(E$,3):GOTO9005
9346 SAY"AND"
9347 IF MID$(E$,2,2)="00"THEN9349
9348 E$=RIGHT$(E$,2):GOTO9005
9349 IFRIGHT$(E$,1)="0"THEN9500
9350 R$=RIGHT$(E$,1):SAY R$
9351 GOTO9500
9352 G1$=RIGHT$(E$,3):F1=1:E$=LEFT$(E$,2):
  GOTO9005
9354 F1=0:SAY TH$
9355 E$=" "+G1$:GOTO9343

```



```

9357 G1$=RIGHT$(E$,3):E$=LEFT$(E$,3):F1=2:
GOTO9305
9358 SAYTH$
9359 F1=0:E$=01$:GOTO9355
9362 E1$=LEFT$(E$,1):SAVE1$
9363 SAYH$
9364 SAY"AND"
9365 E1$=RIGHT$(E$,1)
9366 SAVE1$
9367 GOTO9500
9369 E1$=LEFT$(E$,1):E2$=RIGHT$(E$,3):SAVE1$
9370 SAYML$
9371 IFVAL(MID$(E$,2,6))=0THENGOTO9500
9372 E$=MID$(E$,2,3)
9373 IFE$="000"THEN9381
9374 ILEFT$(E$,2)="00"ANDRIGHT$(E$,1)<"0"
THEN9380
9375 F1=0:IFVAL(LEFT$(E$,1))=0THEN9377
9376 E$=E$+E2$:GOTO9305
9377 E$=MID$(E$,2,2):F1=6:GOTO9305
9378 F1=0:SAYTH$
9379 E$=E2$:GOTO9373
9380 E$=MID$(E$,3,1)+E2$:GOTO9341
9381 E$=E2$:GOTO9305
9382 IFR$="0"THENRETURN
9383 SAYR$
9384 SAYH$
9385 RETURN
9386 E$=RIGHT$(E$,2)+E2$:GOTO9305
9387 E3$=RIGHT$(E$,6):E$=LEFT$(E$,2):
F1=4:GOTO9305
9389 SAYML$

```

```

9391 F1=0:E$=E3$:IFVAL(E$)=0THEN9500
9392 E2$=RIGHT$(E$,3):E$=LEFT$(E$,3)
9393 GOTO9394
9394 GOTO9373
9420 F1=5:E5$=RIGHT$(E$,6):E$=LEFT$(E$,3):
GOTO9305
9421 F1=0:SAYML$
9422 E$=E5$
9423 IFVAL(E$)=0THEN9500
9424 E2$=RIGHT$(E$,3):E$=LEFT$(E$,3)
9425 GOTO9373
9430 IFF2=9THEN9432
9431 RETURN
9432 SAYZ1$
9433 GOTO9500
9500 KOFF
9501 RETURN
9999 STOP
10000 C9$="NINETEEN":C8$="EIGHTEEN":C7$="
SEVENTEEN":C6$="SIXTEEN"
10003 C5$="FIFTEEN":C4$="FOURTEEN":C3$="
THURTEEN":C2$="TWELVE":C1$="ELEVEN"
10005 D9$="NINETY":D8$="EIGHTY":D7$="SEVENTY":
D6$="SIXTY":D5$="FIFTY"
10007 D4$="FORTY":D3$="THIRTY":D2$="TWENTY":
D1$="TEN"
10009 D2$="TWENTY":D3$="THIRTY":D4$="FORTY":
D5$="FIFTY":D6$="SIXTY"
10011 D7$="SEVENTY":D8$="EIGHTY":D9$="
NINETEEN"
10017 HN$="HUNDRED":TH$="THOUSAND":ML$="
MILLION"
10020 RETURN

```

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Reflex skills

Continuing with Mike Williams' letter of Spectrum tips - amongst other goodies he has written a page on *Tir Na Nog* that I'll be passing on to Adventure Corner. He includes Pokes for games that have already been covered in the column, but there are still a fine crop of new ones for us.

"If you load *Gilligan's Gold* in with a Currah Speech unit fitted it will load but crash when it starts to run. It can then be saved at a normal speed which allows you to enter these pokes for infinite lives - *Poke 52881,0* : *Poke 52882,0* : *Poke 52883,0*. *Scuba Dive* - once loaded type L or S to load/save scores then *Break* and type *Poke 45696,0* to make your opponent's air go down quickly. *Cookie* - *Poke 26197,0* stops the bin monster throwing things (hooray!). *Firebirds* - *Poke 24164,n* where n is up to 255. *Pyramid* - *Poke 44685,0* for infinite energy. *Eureka* - *Clear 23999* : load ""code : *Poke 58117,0* : *Rand Usr 58112* to bypass the arcade sections. *Booty* :

10 *Border 0* : *Paper 0* : *ink 0*
20 *Clear 26870*
30 *Load ""screen\$*
40 *Load ""code 26880*
50 *Randomise Usr 26880*
60 *Poke 58294,0*
70 *Randomise Usr 52500*
Brian Bloodaxe :
10 *Clear 64000*
20 *Print at 9,2* : "play bloodaxe tape" : at 11,9 : "from the start"
30 *Restore*
40 *For n=23296 to 23374* :
read a : poke n,a : next n
50 *Randomise usr 23296*
60 *Data 6,3,197,221,33,0*
70 *Data 0,17,0,0,62,255*
80 *Data 55,205,86,5,193,16*
90 *Data 239,221,33,232,254,17*

People frequently write about *Lunar Jetman* which they find Ultimate's most difficult and frustrating game. However, the high scores we get in from time to time show that there is a knack to it, indeed people have several

methods to get through it. John Cousins writes care of BFPO 16: "On the first stage pick up the bomb and drop it on the rover, drive or teleport to the missile base and drop the bomb on top. The hardest part is dropping the bomb on to the buggy without missing and leaving huge craters everywhere - I find you can drop it on the front cab and it somehow reappears in the right place.

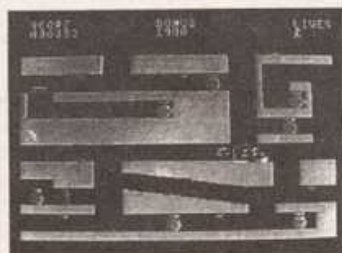
"On harder levels, unless you and the bomb are near the base, park the rover near one teleport and move the other as far from the base as possible. Return to the buggy for fuel or to avoid aliens. When the missile is launched you move from the teleport and blast away. The later levels have problems in the form of teleport snatching liens which dump them miles from anywhere and others that chase you all over the place. I have scored 115,000 on level 15. My other high scores are *JSW* finished, *Atic Atac* 99% and 100,000, *Sabre Wulf* 91% and 109,000, *Arcadia* 600 on level 9, *Jet Pac* 650,000 (I got bored after that), *Chuckie Egg* 347,000 on level 28 and *Micro Olympics* (CBM 64) 100 metres sprint in 6.33 seconds."

Added violence

Kel Ives of Coventry has scored 114,490 on level 10 and prefers to just wait at the rover until the missile appears and go for it in mid flight. He also favours putting the gun turret on the rover to bump up the score blasting aliens.

My own technique for the game is to surround the rover with craters, then get in it and cringe.

Brian Thompson of Beckenham has written in to say that he has finished *Pyjamarama* with 100%, which is an admirable feat but not normally still worth a mention since so have several thousand other people, but he goes on to ask when we will be reviewing the Amstrad version of *Archon* from Ariolasoft. I was unfamiliar with the game but it has also been very highly



recommended by Pete Gibson of Plymouth.

First the bad news - the Amstrad conversion has been delayed, and certainly won't be appearing before September - it seems that they have had some problems with it. (Similar reasons were given for the non-appearance of *Halls of the Things* on the Amstrad which is a shame.) The good news is that *Archon* is a very playable game - well worth a look when it does arrive.

Briefly it is a two player or one vs computer game where you play a wizard or sorceress who controls an army of weird creatures and spells, trying to knock hell out of the other side. It is set on a sort of high-tech chess board and each of your creatures have

different strengths and movement, ratings etc. The fun comes from a mixture of action and strategy.

Original mix

In play it is very like a game that is never far from my Spectrum - *Chaos* from Games Workshop which works on a similar principle although without the pseudo chess aspects. Both represent a truly original mix between wargaming, strategy and arcade games and are a welcome change from multi-level platforms and cute sprites. They are also serious contenders for the best multi-player computer games you can buy, a direction that may become more and more important in the future.

Games Workshop was always a promising company - its releases were always cleverly designed games, although let down at times by their programming ability. Unfortunately they have withdrawn from the micro market so an Amstrad version is unlikely, but of the two, I would just pick *Chaos* as the best. It has severe flaws such as no abandon game option, but it does support up to eight players. In contrast, *Archon* puts heavier emphasis on reflex skills - having chosen the creatures to put into combat you must fight it out in real time and people who aren't so hot at finger work find that even their most powerful beasts are massacred by computer controlled wimps. Still, both are well worth a look.

Tony Kendle

We are searching for the top UK computer games player - the best there is!

The very best of Britain's game players will get to fight it out on a number of top secret new games - scheduled for release in the autumn.

Here's how it works

Study the table below and look at the column for the machine you have - these are the games you'll need to master. Send your high scores in on the form below, making sure that your scores are authenticated by a responsible individual signing the form. Any score achieved using technical short-cuts - such as infinite lives Pokes - will not be accepted.

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.

	Commodore	BBC	Spectrum	Amstrad
Game 1	Suicide Express	Elite	Technician Ted	Sorcery
Game 2	Beach Head	Jet Pac	3D Star Strike	Splat!
Game 3	Shoot the Rapids	Chuckie Egg	Cyclone	Manic Miner

Game Wizard Entry Form

Micro
Game 1 score:
Game 2 score:
Game 3 score:
Name
Address
.....
Your signature
Witness's signature
.....

Tony Bridge's Adventure Corner



Offers of help

Although this Corner should not be regarded as the Rubicon for adventurerers, nevertheless, it is an important part of the function. The Elf's mailbag is always full of not only pleas for help, but also offers of assistance. I assume that all these good people will not mind having their names and addresses mentioned here.

First of all, Hugh Walker. You've seen his name mentioned many times here, and he is always willing to help other adventurerers. If you write to him (including a SAE of course for a reply), his answer is sure to be as interesting as the adventure itself - he is very knowledgeable on most of the good Spectrum games: 7 Burnet Avenue, Burpham, Guildford GU1 1YD.

Nick Carter is a very keen adventurer and would be very happy to help others with problems in *Mysterious Adventures*, *Lords of Time*, *Return to Eden*, *Erik the Viking*, *Emerald Isle*, *Heroes of Karn*... well, a lot anyway, you get the picture! His address is 6 Canberra Towers, Southampton SO2 9JT. Freddie Still has solved *Valkyrie 17*, *Hobbit*, *Urban Upstart* and *Ghost Town*: 2 School House, Wellclose Square, London E1. Andrew Hall offers help to BBC-ers in *Lords of Time*, *Colditz*, *Castle of Riddles*, *Philosopher's Quest*, *Sphinx* and some of *Twin Kingdom Valley*: 4 Warwick Crescent, Rochester, Kent ME1 3LF.

If you have done some of TKV, you could probably help Andrew on his way - in fact, I always find that two or more players can crack an adventure in pretty short order, which is a very good (maybe the best) reason for corresponding

with other adventurerers. Bridget Ankers has managed to solve the whole of TKV, and so offers help to others less fortunate: 27 Holt Drive, Hooley Estate, Matlock, Derbyshire DE4 3BB.

Alison Richards, another BBC owner, has a large selection of games, so write to her for help: 112 Stockley Road, Barmston, Washington, Tyne and Wear NE38 8EQ.

John Wilson has sent me many interesting notes and observations about Spectrum adventures over the months (years!), notes which amount to yards and yards of print. While he has not specifically given his permission for mentioning his address, I hope he won't mind me doing just that, as he always has interesting comments to make: 26 Spotland Tops, Cutgate, Rochdale, Lancs OL12 7NX.

Scott Graham, appropriately, lives up in Scotland and has completed, among others, *Knight Quest* ("Probably one of the hardest I've played, and I include Level 9's"), *Lords of Midnight* and *Doomdark's Revenge* as well as *Valhalla*.

He is offering maps of the *Doomdark* series at £1 each, a practice I don't particularly approve of, but you can negotiate with him (and the phrase you need in *Emerald Isle*, Scott, is rather obscurely, Push Ceiling): 'Sirius', Mill Loch, Lochmaben, Dumfriesshire, DG11 1QA. Another Scot is Euan Terras, who offers his help in the Level 9s, *Sherlock*, *Urban Upstart*, *Hampstead* and so on: 9 Leslie Terrace, Prestwick, Ayrshire.

Help in return

While some adventurerers are willing to give help, they would have also like some help in return. Richard and Marie Hawkins are happy to help with *Eureka!*, *Funhouse*, *Snowball*, *Ground Zero*, *Gremlins* and so on, but they are also having terrible problems with *Sherlock* and *Kentilla*. If you can help them, or need them to help you, write to: 16 Chancet Wood Drive, Sheffield S8 7TR. *Lords of Time* is one of the most popular and enduring of Level 9's games (where's the follow up, Sue?), and one of the many readers offering help in the adventure is Adam Jackson of 8 Mintern Close, Hedge Lane, Palmers Green, London N13 5SX.

lem, send it to us, and a fellow adventurer may be able to help.

Remember - the system only works if those adventurerers who have solved the puzzles get in touch. Every week is Save An Adventurer Today (SAAT) week!

Stuart Lorimer (Thorinslayer) wishes to exchange views with other adventurerers about *Eureka!* as well as games like *Mountains of Ket* and the Middle Earth series from Level 9 and so on: 62 Devonshire Road, Aberdeen AB1 6XG.

Gary Candido has written several times to me, and I've mentioned his name before, but maybe not his address. He offers help on the usual range of Spectrum adventures (*Hobbit*, *Twin Kingdom Valley*, *Valhalla*, *Tombs of Xieops*, *The Pen and the Dark*): 216 Brettell Lane, Amblecote, Stowbridge,

More patience

West Midlands DY8 4BG. Richard Brown also offers help with the usual range, but has also finished *Bored of the Rings*. He found it rather easy (or at least, not as difficult as he would have liked), and rather inconsistent - in short, not the minor classic that the Grand Elf thought it was. However, he did have some kind thoughts about it, so if you want to share them, write to him at 58 Garth Heads, Quayside, Newcastle NE1 2JE.

Yet another helper for *Eureka!* - this is Ian Sumter, who says, "I don't think it's fair how you always take the mickey out of *Eureka!* It is a good adventure game, and I give it a rating of 9/10." I'm not always taking the mickey out of it, Ian, though I still find it almost unplayable. However, I realise that other people have more patience than I, and some of the problems are quite nice, I admit. Incidentally, the Dog (or Cod?) Latin in the Roman adventure was well spotted by you, and I agree with you about the carelessness in presentation. I'm afraid that I don't have room here for your excellent clues for this program - if readers would like some help, write to Ian at 10 All Saints Road, Chelmsford, Essex CM1 5HJ.

From a bit further away, Malcolm Schmidt offers help in several Commodore adventures, including the *Zork* series, lots of other Infocom games, *System 15000*, *Sherlock Holmes*, *Will o' the Wisp*, *Voodoo Castle* and the Level 9s. His problem is that he lives in South Africa, so finds it difficult to meet other adventurerers. If you'd like to converse with him, his address is: PO Box 1276, Kelvin 2054, South Africa.

I could mention dozens more adventurerers who have offered their help to others - as I've said before, interaction of this sort is one of the most interesting things about this hobby of ours. Next week, I shall mention some of the readers who are asking for help along with some hints and clues for various adventurerers.

It would be well worth remembering, however, that most software houses will, if asked, give clues to their adventures. Don't be surprised, though, if you are asked to furnish some proof of your purchase of the game.

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Basic interpreter

Jonathan Dale of Codnor, Derbyshire writes:

Q I have a Vic 20 and am thinking of buying a Commodore 64. The literature says that the C64 has 38K of useable Ram with the Basic interpreter and 54K without it. What is this 'Basic interpreter'?

A The Basic interpreter is used to execute Basic statements (or programs). What Commodore are saying

is that if you want to run Basic programs you can use up to 38K of memory (the C64 needs the rest for itself to support the interpreter), but if you are going to run machine-code programs you can utilise up to 54K of the memory, as the space reserved for Basic in the Ram is no longer required.

Machine-code assembler

Stephen Heath of Derby writes:

Q I own a 48K Spectrum and would like your advice on a good machine-code assembler for under £20. Also, do compilers convert all Basic to machine code?

A The Picturesque assembler is one of the best available and together with the monitor package also marketed by Picturesque make a major impact on machine code program development.

As to the compiler question the answer is usually no. You can check out what kinds of restrictions there are as normally these are clearly stated in the instruction booklets that come with the compilers.

The Blast compiler from Oxford Computer Systems claims, however, to handle all Basic commands, including strings.

Oxford Computer Systems can be contacted at Hensington Road, Woodstock, Oxford (0993 812700).

Software shortage

Matthew Dowse, of Stainforth, South Yorkshire, writes:

Q I own an Aquarius home computer, which, although Z80 processor-based, suffers from a shortage of software.

I would like to know whether a machine-code program for another Z80 computer (say the Spectrum) would run on my machine?

A Unfortunately not. There are a number of reasons for this. Most importantly the layout of the Ram and Rom in the two machines is totally different. Also, the difference in memory size make it impossible. The Spectrum has a 48K Ram, your Aquarius has considerably less.

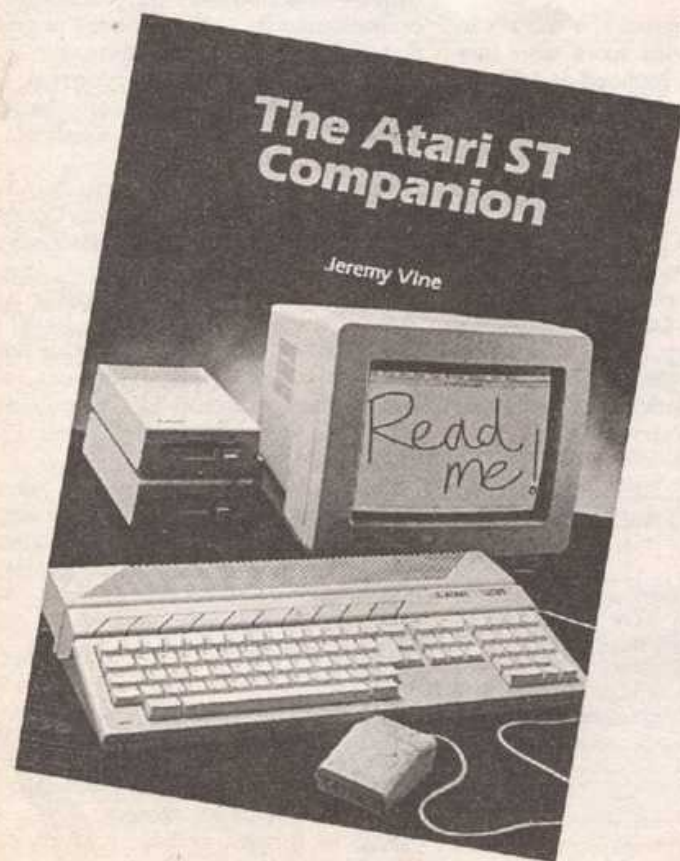
Loading problems

H A Manassei, of Eton, Windsor, writes:

Q I own a BBC Model B - one of the very first models - and I am having difficulty loading most of the recent programs. It loads and displays the first screen and then just displays 'Bad Program'.

A Your problem is that you have an old version of the BBC operating system. To overcome this you need to get your machine up-graded with the latest OS. This can be done by your dealer ... almost while you wait.

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WANTED Data Recorder suitable for Commodore C16 or Plus 4. Tel: Blyth (Northland) 0670 356601.

WANTED Any small computer to learn basic on. Will offer 2 radio controlled model cars (value £50) as exchange. Tel: 0244 675717.

WANTED Oric 1 48K or Atmos in good working order. Also good database and word processor and other software/peripherals. Send details to: David Oya, 24 Kingsway, Banbury, Oxon OX16 9NY.

WANTED powerpack and all leads for Texas TI99/4A also wanted Spectrum or CBM64 to swap for Racing Cycle, vgc.

WANT good ZX Printer plus paper to swap my good working Comcon Programmable Interface with its matching two fire button joystick. 54 Park House, 314 Seven Sisters Rd, London N4 2LS.

WANTED pocket computer (any type) with 16 line by 1 character display (LCD) working. Tel: Oxford 881617.

SINCLAIR QL Software and books wanted. QL penpals wanted (any country) to swap ideas, programs, etc. Write to N. Kennett, Micklefield Lane, Rawdon, Leeds, LS19 8BA.

WANTED Atari disc drive, will pay up to £100 + Atari touch tablet. Tel: (York) 25016.

SPECTRUM 48K, Kempston I/F, Alphacom 32 printer, plus books + S/W. Swap for CBM64 with data recorder + cash adjustment. Tel: Runfold 2966, eves.

C16 Owners. Wanted Pen Pal! Tel: 0290 25305.

SWAP photographic equipment for CBM64 computer. Tel: 01-603 3137, eves.

SWAP Vic 20 computer for Musical Keyboard + cash. Tel: 01-574 0450.

SPECTRUM 48K plus tape recorder and S/W. Swap for CBM64 with tape recorder. Tel: Fred 01-727 7624.

SWAP Commodore 64 with 1525 printer and C2N cassette recorder. For BBC B with accessories, DFS if possible. Tel: 0922 75657.

WANTED Commodore 64, disc drive, for Akai video, 5 months old. Tel: 021 5239 009, Mark.

WANTED Currah Micro slot or equivalent must be in good condition and working order. Tel: 0763 61392 and ask for Viv.

WANTED 1541 disc drive for use with CBM 64. Tel 0900 2130.

SWAP Amstrad CPC464 green screen monitor, joystick and games. Swap for any 125cc or 100cc motor bike or sell for £220 ono.

SWAP TI 99/4A solid state command module and cassette. Tunnels of Doom, Quest of the King boxed with guide book for QL. Psion update Easel etc or Chess.

WANT to swap your BBC software? Then don't delay, write today! Send your list to Miss A. Dence, 8 Beare Close, Hooe, Plymouth PL9 9RT. Also £10 paid for revs on disc.

WANTED green CPC464. Leeds area 551865.

WANTED back issues Antic, Analog, page 6 and monitor magazines. Also Atari 850 Interface, 800XL and 1050 disc drive. Tel Mike 0793 39105 evenings.

SWAP Scalextric 400 set worth £35 for a Currah micro speech unit for ZX Spectrum. Tel: 0371 2031.

SWAP CBM 64, disk drive, recorder software for Amstrad CPC464. Sell for £270 (2 months old). Sell printer £95 or swap Amstrad disk drive or large screen colour TV. Tel: 0904 707699.

SWAP Currah microspeech plus Ferguson datacard plus Tasword 2 plus Superlode 2 plus Mett plus £100 worth mags for Prism VTX 5000 or sell £50. Tel: 0246 206447.

I WOULD like to hear from anyone who is willing to sell their chess rom cartridge for the Atari home computer. Tel: Brian on Portsmouth (0705) 263948 anytime.

WANTED Amstrad CPC64 colour will swap 48K Spectrum, Speech, light pen, joystick interface and tape recorder. Tel: Ath 884558.

SWAP BBC B + Cassette + joysticks + S/W graphics Rom + Speech Synth for CBM64 + Disc Drive + tape deck + S/W. Paul Chapman, 29 Warwick Close, Catterick Garrison, North Yorks.

WANTED Alphacom 32 printer for spectrum, not more than £25. Reason Pensioner. Tel: 01-267 3696.

SWAP Word Processor tape or disk, for CBM 4032 & 2031 or 8250 for other business progs, tape or disk for 4032 etc, or what have you. Tel: 0202 26110.

WANTED urgently, Oric Atmos manual, will pay £5. Contact John on Witney 2557 (day) or Ramsden 249 (evening).

SWAP £800 worth of Spectrum in Lo Profile k/boards. List very large. For BBC B bits 'n' pieces or Electron outfit. Write Mr Elvin, 214 Morninglow Rd, Firth Park, Sheffield S5 6SG.

WANTED Disc Drive for Oric Atmos, must have all leads and any books. Any other hardware, software. Tel: John 0482 857345, after 6pm.

WANTED cheap computer, ie Jupiter Ace, Sord, 16K Oric 1, 16K Lynx(?) or others plus Ram pack for ZX81 or ZX80. Tel: Toby on 02814 2450 (working only).

WANTED: CBM64 software to buy. Must

be cheap. List and prices to Mike, 86 Leicester Rd, Quorn, Leics.

SELMER Electric piano swap for Commodore 64. Contact 01-595 9300, George.

SWAP CBM64 plus C2N recorder, joystick, books, £300 s/w, swap for QL or reasonable offer. Tel: 01-695 0722.

WANTED DRAGON, will swap Jupiter Ace + some games. Tel: West Lothian 823617.

SWAP Spectrum Plus + games + joystick interface + mags + books. Still under guarantee plus CGL/M5 computer + manuals both boxed for CBM64 + C2N or sell £160. Write with phone number, Gary Sanger, 30 Station Ave, Wickford, Essex SS11 7US.

SWAP Casio PT50 programmable keyboard, inc Rom + books. Still in box, cost £95. For Atmos in working order. Tel: Brighton 0273 592774, eves.

CAN Anybody sell me a Sinclair Spectrum microdrive and interface? I will pay £40 max. Must be in Bristol area. Tel: Winterbourne 778277. Please reply quickly.

WANTED CBM 1541 disk drive. Will swap for Spectrum 48K with DKTronics keyboard and joystick interface and joystick. Ask for Kerry. Tel: 0832 73795, after 4.50pm.

WANTED CBM64 pen pal to exchange ideas, software, etc. Write to L. J. Woodford, 16 Wellspring Tce, Pontymister, Gwent NP1 6BE.

SWAP original ZX Spectrum keyboard + dustcover + £20 for ZX printer or Alphacom 32 printer. Tel: 907 1204, ask for Douglas (Harrow area).

SWAP Electron inc Elite & five games, books, for 22-26 colour TV or sell £90. Swap CBM printer for TV or 1701 monitor or VHS recorder or £95. Tel: 0904 707699.

BROTHER HR5 printer for Sinclair QL, cable provided, 6 months old, cost £175 sell £90. Tel: Stone 817591.

VIDEO Swap NEC744E video recorder, excellent condition, cost £300 for a printelr or an Amstrad disc drive. Tel: 01-992 7187, after 6pm.

WANTED Monty is Innocent, will swap for 3D Star Strike, also swap Night Gunner for Trashman or Travel With Trashman. Tel: 09853 442 (Maiden Bradley).

WANTED Alphacom 32 printer. Will pay up to £25. Tel: 021 742 3840.

SWAP My Joe Waugh custom racing cycle worth £600 for a BBC B 1.2 OS + DFS + Disk Drive, fair to excellent condition considered. Tel: 0670 813087, after 4pm.

WANTED QL list, QL Super Sprite Generator, QL Monitor, Integrated Accounts, Metacomco Pascal for sale Pascal. Tel: 021 742 1969.

WANTED Commodore 64 + Cass + S/W? Offer Ham International AM-FM-USB-LSB, low-mid-high frequencies plus lots of extras. Tel: 735 3952 for info 12-1.00 weekdays only.

WANTED Schematic/circuit diagram for an Atari 800XL not old Atari, need for own personal use, cash waiting. Tel: Basildon (0268) 284771 evenings.

WANTED ZX80, ZX81 or Jupiter Ace, must be in perfect working order with all leads. Up to £15 paid. Tel: 353 21 334270, after 5pm.

SWAP Turboprint printer interface (interface most Centronics printers to Commodore 64 with Commodore graphics) for MPS801 printer. Tel: 0248 353346.

WANTED CBM 1541 disc drive, all offers considered. Tel: 01-435 9707.

WANTED ZX80 or Jupiter Ace. Willing to pay £10. Also wanted crash issue 1. Phone 0342 713422 evenings only.

WANTED to buy Jupiter Ace computer. Tel: Peterboro' 0733 234407.

WANTED Modem and teletext adaptor for Spectrum, also Sinclair Logo. Tel: 01-683 1039, after 6pm.

WANTED Working or not. CBM 4023 'friction' feed printer for conversion. Must be friction feed. Come on you guys. Where have they all gone? Fair price paid. Tel: 0244 660677.

WANTED 'Interpod' interface to connect CBM 64 to CBM dual disc drive, ie, serial to IEEE 488. Firm has gone bust. Has anyone got one? Tel: Bill on 0244 660677.

SWAP BBC B with s/w books all cables for extensive Spectrum outfit, interface, modem, discs, or micros, printer, etc. All letters answered. Mr H R Elvin, 214 Morninglow Road, Firth Park, Sheffield S5 6SG.

WANTED Com-com joystick interface, will pay £10 ono. For sale approx 100 assorted computer mags. Cost £60 sell for £8 ono or swap for Com-com interface. Tel: (04747) 3530 (ask for Graham).

SWAP Dragon 32 + software and joystick, books and magazines + CB with antenna for Spectrum 48K, or sell for £90. Tel: 0783 294020.

WANTED Spectrum keyboard, eg, LMT, Lo-Profile, Saga, Dktronics, Stonechip. Pay £20-£25 or swap for ZX81 + power pack, manual, software etc. or light pen + Automata 10 pack + Megabasic with manual + Twin Kingdom Valley + Electronic Intercept. Tel: (Graham) 04747 3530.

ACORN PLUS 3 disc drive for sale or swap. Open to offers. As new condition. Tel: Simon 051 722 5962 after 6pm.

ARE THERE keys on your Spectrum which are worn out? Then buy my brand new Spectrum case for only £8. Tel: 370 0749.

WANTED Memotech RS232 interface for Z81. £25 offered. Would consider Maplin RS232. Tel: Worcester 351617.

AMSTRAD PEN PAL wanted. Write to Shane Kay, 4 Acklington Drive, Colindale, London NW9 5WL.

SWAP two month old Prism Modem 1000, OEL Communication Cartridge + Micronet software for 1541 disc drive. Tel: Elgin 44735.

COMPUTER SWAP

Computer Swap entries are limited to 30 words. All entries cost £2.50 and can be accepted in writing only. Please enclose a cheque or postal order or give Access or Barclaycard. No in the box provided. Only text appearing in the grid will be printed. Send the form to: Computer Swap, Popular Computing Weekly, 12-13 Little Newport Street, London WC2H 7PP.

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

☐ Please charge my Visa/Access card no:

.....

DIARY

Event	Dates	Venue	Admission	Organisers
Computer Show	August 31 10.30am-8.00pm	Co-op Hall East Street Swindon Wiltshire	50p	CJS/Northleach 04516 609
Personal Computer World Show	September 4-8	Olympia London	£2.00	Montbuild 01-496 1951
Electron and BBC Micro User Show	September 27-28 10.00am-6.00pm September 29 10.00am-4.00pm	UMIST Manchester	£2.00 adults £1.50 children	Database Publications 061-456 8383
Amstrad User Exhibition	October 8-8 10.00am-6.00pm	Novotel Hammersmith	£2.00 adults £1.00 children (in advance)	Computer Marketplace 01-930 1612

WANTED Atari 810 disc drive with some software will pay up to £100. Tel: Penzance 69838 between 6-7pm.

SWAP my Acorn Electron with software, books and Electron Users for your Spectrum Plus or even a Commodore 64. Anybody! Tel: Derek, South Shields 551490. We love Jack Tramiel!!!!!!

SWAP QL ZKUL or Typing Tutor for DP Sprite generator or Zapper or Archiver or Backgammon or any good football pools prog. Tel: Adrian on 0934 697095.

AMSTRAD pen pal wanted home or abroad to swap ideas and tips. Write to N. Hadi, 80 York Rd, Montpelier, Bristol BS6 5QF.

EXCHANGE Korg SAS 20 keyboard, stand, cartridges etc. Cost £500. Wanted BBC system or WHY? 01-908 1460.

BROTHER HR-5 boxed with paper and ribbons, Centronics interface, under guarantee. Will accept first offer of £120. G Pegler, The Cricketers, East End Road, Bradwell on Sea, Southminster, Essex CM0 7PT.

WANTED for Oric Atmos 48K. 1) Oric Microdisc system. 2) Oric or compatible modem for Prestel and bulletin board use. Call Ian on Rugby 2062 with details.

SWAP Seikosha 700-a colour printer for bi-directional NLQ matrix printer with Centronics and serial ports. Immaculate condition. Tel: Lowestoft 0502 518625. Or sell £220.

SWAP DKTronics speech for Amstrad computer for Pascal and an assembler monitor for Amstrad. Tel: Mansfield 556823.

SWAP electric bass guitar (three months old) for 16K memory expansion and printer for a Vic 20. Tel: Roy, Swanley 66465.

SPECTRUM DKTronics keyboard. Joystick. 10 games, books, tape recorder. Swap for Amstrad, Commodore with cash adjustment or 140 pound notes. Farnborough 57134 (Kent).

WANTED Amstrad CPC 664 colour. Will exchange with colour CPC 464 and £130 negotiable. Includes many games, books, magazines, joystick (Quickshot), Tasword, Deupac, Knightlore etc. M. Syn, 6 Ibis Lane, Chiswick W4 3UP. 01-995 9522.

WANTED ZX81, no leads, power supply, manual. Good condition. Will pay £20. Write Jim, Mpore, Delphi, Greece, GR 33054.

WANTED Jupiter Ace and software, no leads etc. Good condition. Will pay £40. Please write to: Jim, Mpore, Delphi, Greece, GR 33054.

STUDENT would like your old neglected computer. Please write giving details and cost to Dilip Hirani, 58 Honeywell Lane, Oldham, Lancs OL8 2AA.

WANTED Someone with whom to exchange ideas and hardware for the Amstrad computer cassette computer only. Tel: Mansfield 556823 (Colin) anytime.

WANTED Sharp MZ80K, 48K with disc drive + printer (optional). Contact 06065 51461 ask for Mr Pearson.

WANTED Interface I may consider one with microdrive or with non-working microdrive must be very reasonable due to limited amount of cash or swap and cash. Tel: 0843 68522 evenings.

JUPITER ACE wanted complete with leads, manual and 16K ram pack. Contact Cpl. Fahey, MDSS TPMH, RAF Akrotiri, BFPO 57.

Amstrad for Sale

AMSTRAD disc drive + interface + system disc, as new £150 ono. Also Amstrad software. Tel: 0745 32668.

COLOUR AMSTRAD perfect condition, boxed, as new, still under guarantee. Including joystick and £400 software: Sorcery, Alien 8, Combat, Lynx, Pyramarama, Ghostbusters, Rollaball, etc. + mags. Only £330 ono. Tel: Halifax 41074.

AMSTRAD CPC 464, colour monitor, 8 mths old, perfect condition. Want to upgrade to CPC 664 so £230 (no offers). Tel: (0282) 67418 anytime.

AMSTRAD CPC 464, colour monitor, 3" disc drive, Seikosha GP 80A printer, Protek modem + interface. Over 170 programs, 80% on disc, joystick. Only £750. Tel: 0555 72175 ask for David.

AMSTRAD CPC 464 with colour monitor and manual. Various software. Hardly used. Still boxed. Forced to sell so only £240. 01-737 4169.

AMSTRAD CPC 664 with software and discs worth over £500 plus Spectrum 48K, keyboard, synthesiser, joystick, interface II, over £200 software, books and magazines. The lot £500, will split. Tel: John 01-534 3805.

AMSTRAD 464, green screen, joystick, £150 software. £180. Disc drive + interface 1 + 2 discs £155. Tel: 01-337 4595.

AMSTRAD CPC 464, complete system computer colour monitor, disc drive, speech synthesiser, light pen, maxam rom, dust covers, books, mags + software. value £870 sell for £479. Tel: 01-743 3937.

AMSTRAD disc drive twelve weeks old, hardly used, complete with three blank discs, boxed. £129. Also Amstrad software. £3.50 each. Tel: 0630 57129.

AMSTRAD 464 and colour monitor, Quickshot II Centronics lead, headphones, software, book on Z80, manual etc. etc. In original boxes and good condition. Bargain at £400 ono. Tel: Halesworth 2689.

AMSTRAD CPC 464 (green) firmware guide, programs book plus over £95 worth of software including Sorcery, Knightlore, Ghostbusters, Amskey, M/c Tutor, Mini-Office. All perfect. Only £215. Thanet 597659 eves.

AMSTRAD complete system, colour

CPC 464, disc drive, Seikosha printer, 200 programs, 130 on disc, DKTronics light pen, Protek modem + interface, joystick, books, club, printer paper, ribbons. Only £599. Tel: 0555 72175 David.

ZX81s for Sale

ZX81 Ram pack, £200 of s/w, books, £40. Tel: 01-904 1392 (Alex) after 6pm.

ZX81 64K graphics Rom, DK Tronics keyboard, s/w + BRS with split, no offers refused. Tel: 0452 720080.

ZX81 1K for sale, including all leads, power pack, manual etc., boxed plus basic book, price £12 ono. Tel: 01-858 7420 weekends anytime or weekdays after 5pm.

TWO BROKEN 16K Ram packs for ZX81, perfect condition except connections to computer, need slight attention. Ideal for spares, repairs etc. £3 each, £5 the two. Tel: 01-858 7420 after 5pm.

FORTH COMPUTER Sinclair ZX81 fitted with Forth Rom (by David Husband). Memopak 16K RAM and Filesity rubber keyboard. ZX81 ROM also supplied. £45. Tel: Hemel Hempstead (0442) 60516.

BEATEN UP ZX81 in butchered DK Tronics case, still works. Plus Sinclair 16K and Memotech 64K Rampacks, software tool Buyer collects, reasonable offers: John Schofield, Blackburn (0254) 60033 (Day) 28127 (Night).

16K ZX81, as new, with File Sixty keyboard, AGF programmable joystick interface, learning Lab and many listings, worth £100 sell for £50. Tel: 0424 440641.

ADVENTURE HELPLINE

Claymorgue Castle on C16. How do you get from the loft to the battlements? Cameron MacKintosh, 38 Windsor Place, Canon Bridge, Ross-shire IV7 8BX.

Zim Sala Bim on Commodore 64. Stuck in dungeon. Mrs J. Hammond, 4 Maidstone Avenue, Romford, Essex.

Williamsburg on C16. I can't get started. S. Rafferty, Hayes playing Fields, Redditch Road, Kings Norton, Birmingham B38 8LP.

The Island on Spectrum. How to pass lion and light dynamite? John Forder, 21 Orchard Croft, Harlow, Essex CM20 3BB.

System 15000 on Commodore 64. What is the code for a Roulledge and Co., and the Bank Apter MMB FR. Bradford Parker, 3 Thistlewood Crescent, New Addington, Croydon, Surrey.

Sherlock on Spectrum. I can't prove Major Foulkes innocent. Any other

help appreciated. Greg Taylor, 32 Linton Avenue, Bury, Lancashire.

Wizard of Ahynd on Spectrum. I've got the princess and the two treasures, but can't get back to the castle! Carsen Meiselbach, Hombergerstrasse 119A, D-4730, Moers 1, West Germany.

Bored of the Rings on Spectrum. I can't get out of the Barrow. I have the magic beans, ale. Peter Martin, 16 Mich Karalis Street, Strovolos, Nicosia, Cyprus.

Sphinx on Electron. What do you burn to get out of the serpent, and how do you get past the ogre. P. Harper, Old Blacksmith's Shop, Berrow Green, Martley, Worcestershire.

Perseus and Andromeda on BBC B. Any help please... I'm stuck... can't seem to get anywhere. R. Dawson, 41 Union Ct., Otley, W. Yorkshire.

Sherlock on Spectrum. How do I get to the scene of the crime? Scott Nelson, 60 Wood Crescent, Motherwell, Lanarkshire, Scotland.

Philosophers Quest on BBC B. Any help appreciated, as I can only score 16! G. Ashton, La Sommezeuse, Rue des Cambres, Rocquaine, St. Peters, Guernsey.

Artic Adventures on Spectrum. I've finished all seven Artic Adventures, so if you need any help, send an sae and I will reply. Adrian Bold, 19 Towersey Drive, Thame, Oxon, OX9 3NR.

System 1500 on Spectrum. Don't know how to use Selcra - have access code but cannot use. Rob Sexton, 122 Heol Lewis, Rhiwbina, Cardiff.

Valkyrie 17 on Spectrum. How do I get out of the hotel. Andrew Rae, 116a Kingsmead Avenue, Worcester Park, Surrey.

Pub Quest on C64. I can't cross the road. How do I open the cabinet in the loo? Ian Hunter, 28a Buxton Road, Walthamstow.

Return to Eden on BBC. At the beginning, I keep getting blasted - help please. Mark James, 26 Whitecote Cottages, Whitecote Lane, Bramley, Lancashire.

Arrow of Death Two on BBC. I can't seem to get started. R. Dawson, 41 Union Court, Otley, West Yorkshire LS21 3AS.

The Fourth Protocol on Spectrum. How do you cure Thorn and what do you type in at medical security? Paul Jones, 6 Primrose Way, Wrexham, Clwyd LL11 2AT.

Fantasia Diamond on Enterprise. How to cross the river or open the manhole. Peter Mundin, 17 Coronation Avenue, Mile Oak, Nr. Tamworth, Staffs B78 3NN.

The Hobbit on C64. How do you get out of the Elf King's dungeon and through the trap door and portcullis. Shaun Brogan, 42 Castle Way, French Street, Southampton.

Spiderman on Spectrum. How do I get to Mystery? How do I beat Electro? Where do I get paper to run presses? G. Bird, 35 Wolseley Street, Newport, Gwent NP8 2HP.

Catacombs on C64. How to get through the door at the beginning to enter the catacombs. A. Conway, 1 Dudley Road, Walton-on-Thames, Surrey KT12 2JT.

Doomdark's Revenge on Spectrum. Has anybody got a better map than the one on the booklet? James Haslam, 6 Sittingbourne Avenue, Bush Hill Park, Enfield, Middlesex EN1 2DA.

Hobbit on Amstrad. How do I escape from the Goblin's Dungeon and how do I answer Gollum. Stephen Miller, Oakdene, Old Station Road, Halesworth, Suffolk IP29 8JJ.

Sherlock on Spectrum. Have solved the crimes but can't get any further. Mike Shepherd, 10 Linksfield Road, Aberdeen.

Charts

Amstrad

1	(1)	Way of the Exploding Fist (Melbourne House)	£9.95
2	(-)	Daley Thompson's Decathlon (Ocean)	£9.95
3	(4)	Beach-head (Access/US Gold)	£9.95
4	(-)	Chiller (Mastertronic)	£1.99
5	(-)	Finders Keepers (Mastertronic)	£1.99
6	(-)	Nonterraqueous (Mastertronic)	£1.99
7	(-)	Airwolf (Elite)	£8.95
8	(-)	Locomotion (Mastertronic)	£1.99
9	(3)	Dun Darach (Gargoyle)	£9.95
10	(-)	Ghostbusters (Activision)	£9.95

Atari

1	(2)	Mig-Alley Ace (Microprose/US Gold)	£9.95
2	(1)	Bounty Bob Strikes Back (US Gold)	£9.95
3	(-)	Red Moon (Level 9)	£9.95
4	(-)	Archon (Ariolasoft)	£11.99
5	(-)	Beach-head (US Gold)	£9.95
6	(-)	Pole Position (US Gold)	£9.95
7	(4)	Airwolf (Elite)	£8.95
8	(5)	Drop Zone (Microprose/US Gold)	£9.95
9	(-)	Strip Poker (Knightsoft)	£8.95
10	(-)	Leggit (Imagine)	£6.95

BBC

1	(2)	Revs (Acornsoft)	£14.95
2	(1)	Beach-head (Access/US Gold)	£9.95
3	(6)	Elite (Acornsoft)	£12.95
4	(4)	Alien 8 (Ultimate)	£9.95
5	(-)	Mini Office (Database)	£5.99
6	(10)	Knightlore (Ultimate)	£9.95
7	(-)	Combat Lynx (Durrell)	£8.95
8	(-)	Brian Jacks Superstars Challenge (Martech)	£8.95
9	(-)	Magic Mushrooms (Acornsoft)	£9.95
10	(-)	Gremlins (Adventure International)	£9.95

Commodore 64

1	(1)	Way of the Exploding Fist (Melbourne House)	£9.95
2	(-)	Beach-head II (Access/US Gold)	£9.95
3	(2)	Frankie Goes to Hollywood (Ocean)	£9.95
4	(3)	Hypersports (Imagine)	£7.95
5	(-)	Action Biker (Mastertronic)	£1.99
6	(-)	Kick Start (Mastertronic)	£1.99
7	(10)	Soft Aid (Various Artists)	£4.99
8	(-)	Dambusters (Sydney/US Gold)	£9.95
9	(4)	Elite (Firebird/Acornsoft)	£14.95
10	(-)	International Tennis (Commodore)	£5.99

Spectrum

1	(1)	Frank Bruno's Boxing (Elite)	£6.95
2	(2)	Hypersports (Imagine)	£7.95
3	(4)	Frankie Goes to Hollywood (Ocean)	£9.95
4	(9)	Dambusters (Sydney/US Gold)	£9.95
5	(-)	Action Biker (Mastertronic)	£1.99
6	(10)	Spy vs Spy (Beyond)	£9.95
7	(7)	Soft Aid (Various Artists)	£4.99
8	(-)	Jet Set Willy II (Software Projects)	£7.95
9	(5)	Dynamite Dan (Mirrorsoft)	£6.95
10	(-)	BMX Racer (Mastertronic)	£1.99

All figures compiled by Gallop/LeisureScope

Top Twenty

1	(1)	Hypersports (Spectrum/C64)	Imagine
2	(4)	Frankie Goes to Hollywood (Spectrum/C64)	Ocean
3	(3)	Way of the Exploding Fist (C64)	Melbourne House
4	(2)	Frank Bruno's Boxing (Spectrum)	Elite
5	(15)	Dambusters (Spectrum/C64)	Sydney/US Gold
6	(-)	Action Biker (Spectrum/C64)	Mastertronic
7	(18)	Beach-head (Spectrum/C64/BBC/Amstrad/Atari)	Access/US Gold
8	(-)	Beach-head II (C64)	Access/US Gold
9	(6)	Soft Aid (Spectrum/C64)	Various Artists
10	(-)	BMX Racer (Spectrum/C64/C16)	Mastertronic
11	(-)	Jet Set Willy II (Spectrum/C64)	Software Projects
12	(9)	Elite (C64/BBC/Electron)	Firebird/Acornsoft
13	(-)	Airwolf (Spectrum/C64/Amstrad/C16)	Elite
14	(12)	Red Moon (Spectrum/C64/BBC/Electron/Amstrad)	Level 9
15	(-)	Finders Keepers (Spectrum/C64/Amstrad/MSX)	Mastertronic
16	(-)	Nodes of Yesod (Spectrum/C64)	Odin
17	(-)	Combat Lynx (Spectrum/C64/Amstrad)	Durrell
18	(17)	Spy vs Spy (Spectrum/C64)	Beyond
19	(-)	Chiller (Spectrum/C64/Amstrad)	Mastertronic
20	(-)	View to a Kill (Spectrum/C64)	Domark

Figures compiled by Gallop/LeisureScope

Readers' Chart No 39

1	(3)	Hypersports (Spectrum)	Imagine
2	(2)	Elite (C64/BBC/Electron)	Firebird/Acornsoft
3	(4)	Way of the Exploding Fist (C64)	Melbourne House
4	(1)	Soft Aid (Spectrum/C64)	Various Artists
5	(5)	Dun Darach (Spectrum/Amstrad)	Gargoyle
6	(6)	Shadowfire (Spectrum/C64)	Beyond
7	(7)	Frank Bruno's Boxing (Spectrum)	Elite
8	(-)	Knight Lore (Spectrum/BBC/Amstrad)	Ultimate
9	(9)	Dynamite Dan (Spectrum)	Mirrorsoft
10	(9)	Revs (BBC)	Acornsoft

Winning phrase No 39: "Neil explodes if he gets too happy" from Simon Owen of Rednal, Birmingham, who receives £25. Runners up: include "Hype expert flogs lead ship to Tory wet" from J Brunett of Camberley and "Weather experts lost in fog" from T Burdis of London SW14.

Now voting on week 41 - £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 41 closes at 2pm on Wednesday September 4 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 41
Address	1
.....	2
.....	3
My phrase is:	

New Releases

RETARDED

Fu Kung in Las Vegas is a game I first saw on the Einstein (of all places) and the Amstrad version looks much the same, which is all in all a complaint since recent history shows it is possible to make Amstrad arcade games look considerably superior.

Neither does the game have much by way of exciting features - in fact mostly it's like *Manic Miner* in slow motion. Jumps, for example, seem to take ages as your wacky little man slowly drifts upwards and then slowly sinks back to earth. The nominal plot is collecting four cards in each casino, though strangely enough these casinos are populated with funny objects, bouncing things, ladders and the usual whizzo frippery.

Aside from being dull, unexciting and unoriginal, the game is also technically retarded and worse than

run of the mill.

The only reason to buy it is if you have either a relative who was one of the programmers or a fetish for collecting absolutely every *Manic Miner* style game anyone has ever produced.

Program *Fu Kung in Las Vegas*
Price £8.95
Micro Amstrad
Supplier Amsoft
169 Kings Road
Brentwood
Essex
CM14 4EF

FLIPPERS

Pinball Construction Set is exactly what it says it is - a computer program that lets you design and then play a pinball game of your own choice.

Although the original version of this game, on the Atari, was out well over a year ago, it nevertheless features all the current trendy trappings of icons, a little cursor controlled hand and boxes that light up when you make a selection.

It isn't just a matter of choosing flippers, bouncy things in the middle I don't know the name of, and sundry other shapes that make your ball bounce back and forth.

You also choose how the ball behaves; speed, gravity, etc, and what sort of sound effects to include.

Setting up the board is incredibly simple: you simply use a little hand to shunt the shapes around and, once cho-

Pick of the week

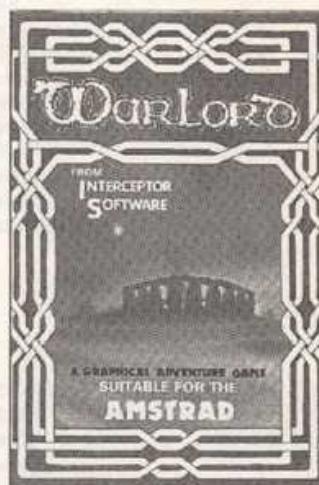
OTHER WORLDS

Of all the superb graphic adventures Interceptor have released, I think *Warlord*, the latest one, is the best. The plot is considerably more inventive than the usual bundle of vicious trolls and magic keys.

The story concerns the gods intervention in a bloody war between the Romans and the Celts. As the hostilities escalate, the gods themselves become embroiled in battle and to prevent total destruction of the world decide that a warrior from each army shall be transported to the mythical Celtic Otherworlds where magic and mythical beasts hold sway. You are the Celtic champion and must escape from the Otherworld back to the real world.

The graphics beautifully display the realm of ancient sites and standing stones - they represent Terry Greer's (the artist responsible for the graphics) finest hour.

It's difficult, although I found that kind deeds are well rewarded and felt dead



chuffed. . . my elation lasted about five locations though, as I then met a warrior who refused to let me past. If *Warlord* goes on like this I may even start dressing up in funny helmets.

Program *Warlord*
Price £8.99
Micro Amstrad
Supplier Interceptor
Micro's
The Green
Tadley
Hampshire



sen, press the fire button to set them in place.

Obviously, your chosen set up can be saved and reloaded from disc. It's simple to use and is as good as your design to play - if you have a yen to play pinball on a computer this package has everything, except,

unfortunately, tilt.

Program *Pinball Construction Set*
Price £14.95
Micro Commodore 64
Supplier Ariolasoft
Asphalte House
Palace Street
London SW1

This Week

Program	Type	Micro	Price	Supplier	Now Games	Arc	Commodore 64	Price	Supplier
Cheops	Ad	Amstrad	£8.95	No Man's Land	QL Hypperdrive	Arc	QL	£14.95	Virgin Games
Android Two	Arc	Amstrad	£7.95	Vortex	Equate	Ed	QL	£39.95	English
Brian Bloodaxe	Arc	Amstrad	£8.95	The Edge	Codename Mat II	Arc	Spectrum	£8.95	Flire
Project Future	Arc	Amstrad	£8.95	Gremlin Graphics	Nightshade	Arc	Spectrum	£9.95	Domark
Budget	Ut	Amstrad	£14.95	No Man's Land	Now Games	Arc	Spectrum	£8.95	Ultimate
CP Graph	Ut	Amstrad	£12.95	No Man's Land	Southern Belle	Arc	Spectrum	£7.95	Virgin Games
File Manager	Ut	Amstrad	£12.95	No Man's Land	The Epic	Arc	Spectrum	£8.95	Hewson
Warlord	ad	Amstrad	£8.99	Interceptor	Way of Exploding	S	Spectrum	£9.95	Turtle Software
Asteroids	Arc	Aquarius	£1.50	A Hodgson	Fist				Melbourne House
Zithers	Arc	Aquarius	£2.50	A Hodgson	Wordfinder	S	Spectrum	£10	WD Software
Organ	Ut	Aquarius	£1.50	A Hodgson	Solart	Ut	Spectrum	£5	D Pritchard
Chop Suey	Arc	Atari	£12.95	English					
Stars and Planets	Ut	BBC	£7.95	Eclipse					
Hit and Miss	Ed	C16	£7.99	Venturegate					
Monty on the Run	Arc	Commodore 64	£9.95	Gremlin					

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

SMARTER

We all know what a fabbo smash hit *Way of the Exploding Fist* was on the 64, don't we? Well, here is the first on the conversions - this time for the Amstrad 464 and the Spectrum version is also on the way in early September. How has it fared in its transcendental journey between machines?

Naturally, sound has been the first casualty. No continuous music, no screams of agony as you make your various moves... oh well. Secondly, gone are the different backgrounds, as you make your way up to 10th Dan - cue murmurings of discontent.

When you get down to playing though, you probably won't mind, as the one player version is almost as fast as the Commodore... in fact if anything the computer opposition is just a little bit smarter than before. And the actual combat graphics are as good as ever, being a faithful re-

production of the Mark I version.

I've got the odd reservation about the two player option, however. Due to the fact the 464 has only one joystick port, when playing two player, at least one contestant must use the keyboard - and this takes some getting used to.

Still, this is an OK conversion which, no doubt, will be snapped up by the waiting Amstrad punters.

Program *Way of the Exploding Fist*
Price £9.95
Micro Amstrad 464
Supplier Melbourne House
Castle House
Castle Yard
Richmond
Surrey

TRIPLE JUMP

Summer Games II, due out later this month, proves to be a more than worthy successor to last year's *Summer Games*.

The American title, which will be marketed in this country by US Gold, has all the Epyx hallmarks of superb graphics and attention to detail.

The eight new events are the triple jump, rowing, javelin, equestrian, high jump, fencing, cycling and kayaking. As with its predecessor, success depends far more on precision timing, and co-ordination of a number of moves than demonic wrenching of the joystick.

The graphics are astonishingly good, although not as astonishing to anyone familiar with SGI - all the competitors

retain that finely honed, athletic physique, and grace, even when the horse collapses and disintegrates half-way round the showjumping course or the kayak remains firmly glued to the bank.

Joystick movements relate as far as possible to real life - in the cycling, speed is achieved by rotating the joystick rather than wagging, while for the triple jump, a push to the right begins the hop (taking off from the right foot), to the right again for the step (right foot), left for the jump (left foot) and forwards through the air to the landing pit.

Ever meticulous, Epyx has included opening and closing ceremonies, and the close even has a jet-packer flying around the stadium à la Los Angeles.

Program *Summer Games II*
Price £9.95
Micro Commodore 64
Supplier US Gold
Unit 10
Parkway Ind Est
Birmingham
B7 4LY

GOOD VALUE

If you say that the averagely entertaining text adventure takes a couple of weeks to solve, then 99p is a whole lot of entertainment for very little. So, is *Crystal Quest* a good adventure?

In *Crystal Quest* you must boldly go in search of three crystals using the mighty starship USS Spectrum as transport. The plot unfolds both on the mighty etc, etc,



and down on the planet around which you are in orbit.

There is really only one complaint I have about the program - it has a redesigned character set, which ordinarily would be a nice touch, but in fact it makes the text very difficult to read.

Still, for the small amount I've been able to play of it - the adventure seems chock full of puzzles and has few 'wasted' locations, ie, rooms that don't have any real functions but just fill up the adventure. Excellent value and worth tracking down even if you have to buy it through the post (since I find it difficult to imagine many retailers taking anything this cheap).

Program *Crystal Quest*
Price £0.99
Micro Spectrum
Supplier Central Solutions
500 Chesham
House
150 Regent Street
London W1R 5FA



A Hodgson, 60 Cross St, Upton, Pontefract, West Yorkshire WF9 1EU. **D Pritchard**, Solway Computers, Holme Lea, Liddle Terrace, Silloth Nr Carlisle, Cumbria. **Domark**, 204 Worple Road, London SW20 8PN. 01-947 5624. **Eclipse**, 79 Ardrossen Gardens, Worcester Park, Surrey KT4 7AX. 01-330 3116. **English**, Box 43, Manchester M60 3AD. 061 835 1358. **Flite**, Pearse road, Letterkenny, Co Donegal, Ireland. 074 23023. **Gremlin Graphic**, Alpha House, 10 Carver Street, Sheffield S1 4FS. 0742 753423. **Hewson**, 7 Grahame Close, Blewbury, Oxon OX11 9QE. 0235 832939. **Interceptor**, Interceptor Micros, Lindon House, The Green, Tadley, Hampshire. 07356 7145. **Melbourne House**, 39 Milton Trading Estate,

Abingdon, Oxon OX14 4TD. 0235 835001. **No Man's Land**, 110 Bis, Avenue dy General Leclerc, Bloc 1 93506 Pantin Cedex, France, (1) 840 24 31. **The Edge**, 31 Maiden Lane, Covent Garden, London WC2E 8LH. 01-240 1422. **Turtle Software**, Bridge Street Mills, Witney, Oxon OX8 6YH. 0993 2557. **Ultimate**, Ultimate Play the Game, Ashby de la Zouch, Leicester, LE6 2JV. 0530 411485. **Venturegate**, 17 Harold Road, Leeds, LS6 1PR, Yorks. **Virgin Games**, 2-4 Vernon Yard, Portobello Road, London W11 2OX. **Vortex**, 24 Kansas Avenue, Off South Langworthy Road, Salford, M5 2GL. 061 872 4747. **WD Software**, Hilltop, St Mary, Jersey, Channel Islands. 0534 81392.

This Week



Crime and punishment

It is surprising that at a time when the computer is commonly given the blame for all kinds of disaster, little or no consideration seems to have been given to how computers should be punished for their crimes.

It is, of course, a little difficult to see how, for example, the three usual arguments for custodial sentences – retribution, deterrence and rehabilitation – may be applied to the case of an erring computer, but this is really only to say that custodial sentences may not be generally appropriate in such cases.

On the other hand, there is no doubt that there is in the ordinary person a very basic feeling that 'the punishment should fit the crime' and it is this feeling that may well be built on in considering the proper chastisement of computers. Built on, moreover, without having to consider any of the reservations about 'cruel and unusual punishments' that inhibit the use of this principle with human beings.

Thus the computers that caused difficulties in a recent launch of the Space Shuttle could be relegated as punishment to some substantially less interesting and exciting task; a year or so booking seats on airline flights might be thought appropriate. Similarly, the Navy computer in the Falklands that decided that Exocets were friendly, because they were French, might well be given a term of service in a language laboratory.

This kind of community service punishment is probably only suitable, though, for fairly minor offences. Sentences might be scaled up to sending to

Coventry (particularly appropriate for computers in distributed networks) and full sensory deprivation techniques (pulling the plug).

Ultimately, there may be a case for applying for serious fault the ancient law of deodand whereby a personal chattel that had been the cause of the death of any reasonable creature was itself to be forfeit. As late as 1842 this law was applied to a railway engine that had been in an accident (*Regina v Eastern Counties Railway Co.*).

Although the law of deodand was abolished in England in 1846, the argument for reintroduction seems strong, and it is noteworthy that A P Herbert reports in a more recent case (*Haddock v Thwale*, *Uncommon Law* 1935), a case where the Master of the Rolls ordered the destruction, on this principle, of a motor car that had injured the plaintiff.

One area where punishment of this kind is already built-in would appear to be the 'launch-on warning' computer system now being developed in the USA for defence purposes, although it may be argued that it is not altogether satisfactory to have the same retributive result arising from both function or malfunction.

Some will argue that we should instead punish the operators owners and programmers rather than the machines themselves, but this is by no means a compelling argument. To begin with, it is very difficult to assign responsibility to human beings with any certainty and without the complications that we observe every day in the courts.

Moreover, there is a well-tryed historical precedent for the present proposal – that of using a 'whipping boy', often of noble birth himself, whose duty it was to suffer the punishments that could not be meted out to princes.

No doubt Charles I, for instance, who benefited from such an arrangement in childhood, would have been happy to have had it extended into his adult years.

And are we not all princes to our computers?

Gwyn Mellish

Painted faces

Puzzle No 172

When Bert cleared out his workshop he found three cubical blocks of wood. "Just the thing to saw up and make some toy building bricks for my grandson," he remarked.

Upon measuring the blocks he found them to be all exactly cubical in shape, each measuring an exact number of inches along the edges, although they were not necessarily all the same size. It was quite an easy task for Bert to saw all of them up into one inch cubes.

Now, the original large blocks had had all of their surfaces painted, and so when they were cut up there were some bricks that had one or more of their faces with paint on, and others with all six faces of newly sawn wood.

In fact, there were an equal number of painted and non-painted bricks. What was the smallest number of inch cubes that could have been present?

Solution to Puzzle No 167

A set of bricks arranged in piles of orders 3, 7, and 1 will contain 371 individual bricks.

```
10 FOR H=1 TO 9
20 FOR T=1 TO 9
30 FOR U=1 TO 9
40 LET N=H*H*H+T*T*U+U*U*U
50 IF N=H*100+T*10+U
   THEN PRINT H;T;U
60 NEXT U
70 NEXT T
80 NEXT H
```

The solution depends on finding a three figure number which is equal to the sum of the cubes of its digits.

This is done using the three *For/Next* loops *H*, *T*, and *U*, to represent the hundreds, tens, and units digits respectively. The sum of the cubes is calculated and compared with the number denoted by the original digits. Values that correspond are printed out.

Winner of Puzzle No 167

The winner is M Eastgate of Canley, Coventry, W. Midlands, who receives £10.

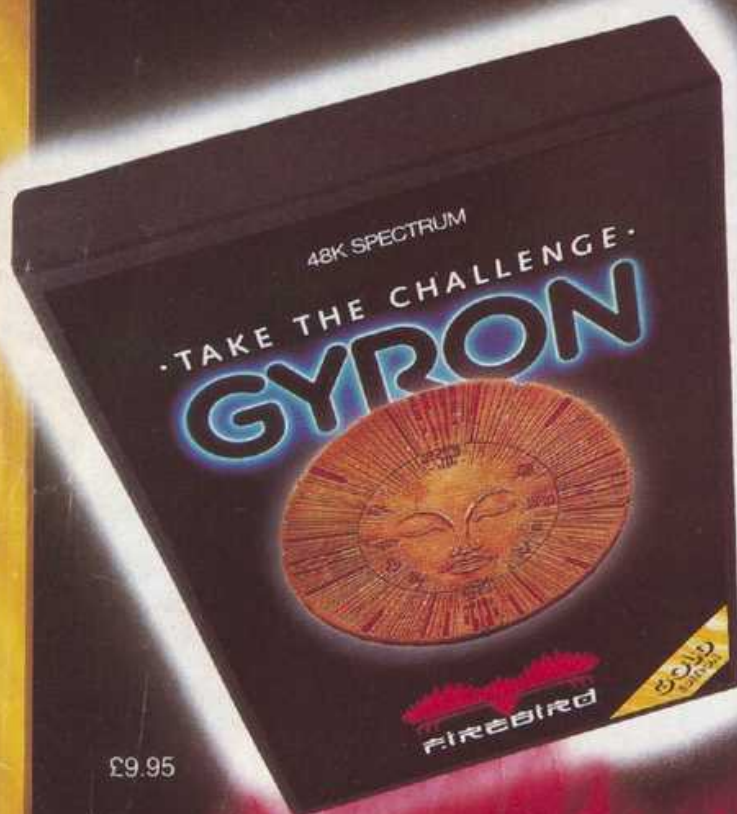
Rules

The closing date for Puzzle No 172 is September 25.

The Hackers



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Personal Computer World, Mar. 1985

"Hyperbrill"
Crash 'Smash', 93% rating, Mar. 1985

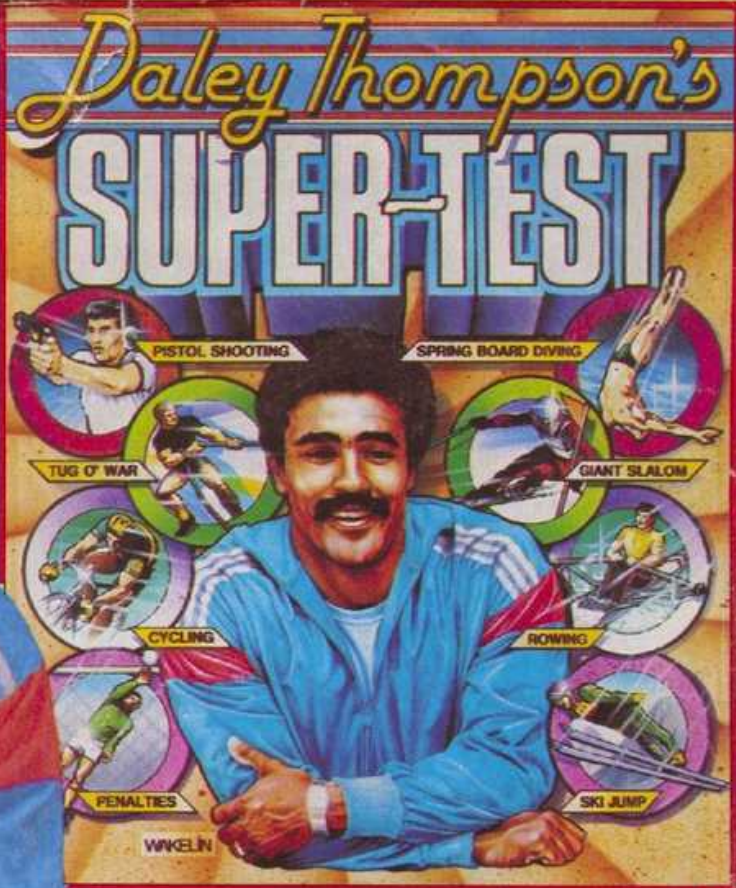
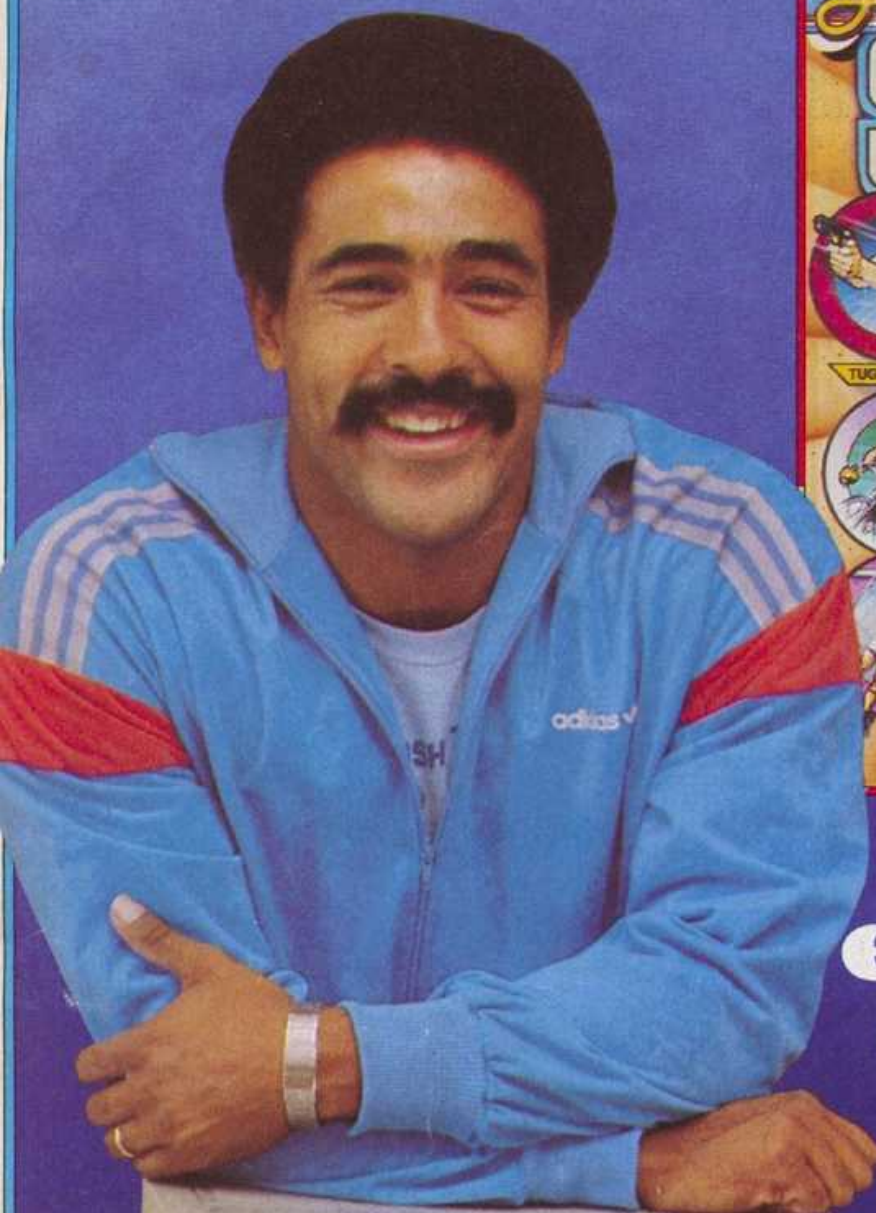
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of my
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