

ARM

The magazine for members of

The ARM Club

**Converting Photodesk
for Iyonix users**

**Mini PCs with Windows
and RISC OS**

**Free For All
PD programs**

**Science websites
with views into space**



Issue 48 — Winter 2003

Eureka Needs A New Editor

Would you like to join the Eureka team? There's no pay but it's enjoyable work and you do get free Club membership. Also, at the moment, there's a unique opportunity to start at the top.

Eureka needs a new Editor. After editing Eureka for eight years, I shall be retiring from the job next year and we need someone with enthusiasm and drive to take over. So what's involved? Well, it's a four times a year job so it shouldn't get in the way of any other of your activities.

We have a team of contributors sending in regular features and you can commission other articles from anyone willing to do them. You don't have to be a 'techie' (I'm not) as the Club's Committee (which you will join) has some of the leading RISC OS experts who will write the more technical articles and deal with any technical queries which may arise.

The Editor's main job is to check the contributions for spelling and

grammar and fit them into the page templates. You then print the completed pages and send them to our proof reader, who will spot any little errors (or big ones!) which you may have missed. Finally, print out the complete magazine and send this master copy to the printers. From there, the printed copies go to our pack and despatch team to be mailed out to members.

You can keep Eureka looking the same as it is now, add your own ideas and improvements or revamp it all completely. Think you can do the job? I'll be readily available to provide any help or advice you may need.

If you don't think the Editor's job is for you, you can still become a contributor (*see page 52*).

Email or write to me if you're interested (the addresses are on the last page). I look forward to hearing from you.

Peter Jennings

All opinions expressed in Eureka are those of the authors and not necessarily those of the Club or its Committee members and officers.

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Midlands Show Cancelled

You may already have heard that the Club's annual Midlands RISC OS Show, due to take place in Birmingham on November 29th, has had to be cancelled, due to a serious fire at the National Motorcycle Museum.

For details see next page.

Technical Help For All

The Club's Technical Help Service is one of the most valuable benefits of membership. Like insurance, it's something you hope you'll never need but something which comes as a great relief when a problem does arise.

The great variety of questions and problems can be seen from the selection we publish in Eureka but it should be emphasised that, although many of the questions *are* of a technical nature, the Technical Help team are just as ready to answer the most elementary of queries. Our members are of all stages of knowledge and computing ability and the service is open to all.

You can send your query by email, letter, telephone or fax. It will be dealt with and answered as urgently as possible, bearing in mind that the Technical Help team are all unpaid volunteers with full time time jobs to do! You don't have wait to read the reply to your problem in Eureka.

The addresses or phone and fax numbers to use can all be found in Club Contacts on the last page of every issue of Eureka.

The Fire Which Cancelled Our Show

This year's Midlands RISC OS Show, due to be held at the National Motorcycle Museum (NMM), has had to be cancelled due to a severe fire on 16th September which destroyed three of the five exhibition halls. Exhibits totalling

main exhibit halls that were severely damaged.

The Club usually uses the Premier Suite, although we had the Manxman Suite last year and were due there for this year's Show.

The Midlands RISC OS Show's organiser, Ralph Sillett, explains how the disastrous Motorcycle Museum fire has caused the Show to be cancelled this year.

approximately 500 machines were destroyed, while 250 were pulled to safety.

The buildings were safely evacuated with no casualties, using established emergency procedures.

The Imperial Suite suffered considerable smoke and water damage and is undergoing refurbishment but may not be available until January 2005.

The Premier, Compton and Manxman suites are unusable due to the structural damage caused by the fire. They are on the same floor level as the

As you may be able to see from the pictures opposite (supplied by the NMM) it must have been a very difficult fire to control. I am glad that no lives were lost and no-one was injured.

Due to the time of year, it was not possible for the Club to find a suitable venue for us to carry on with the Show. Those which were the most suitable had no dates available until into the New Year.

We are now looking for another venue for next year's event as it is unlikely that the NMM will be available until 2005.



Our main concerns for a suitable venue are for easy connections with all parts of the UK and costs low enough to allow the smaller exhibitors to attend and to keep the entrance fee to a minimum.

The Museum site after the fire (top) and some of the destroyed exhibits.

As soon as we have found a venue and made a booking we will advertise on our website and other places.

RISC OS South East Show 2003

Months of feverish hard work by the SASAUG team once again presented us with a well-organized and successful show in Guildford.

Attendance seemed similar to last year, though slightly more spread out

conversions and selling CDs of Debian Linux for ARM machines.

RISCOS Ltd were also present, taking *Select* subscriptions, and demonstrating it on a variety of machines, including one bare case

Toby Smith took time off from The ARM Club stand to tour the show at Guildford and found some exciting new products and helpful, friendly, dealers.

due to an expanded show floor, to accommodate more exhibitor space than the previous year. That's got to be a good sign for the market!

Going round the stands, I noted that Castle had the largest presence, doing good business demonstrating the Iyonix and related accessories. A hardware fix service was also being offered for recently identified problems, helping Iyonix owners keep their machine up to date without returning it — a cunning idea!

Iyonix users were also well served by the industrious Unix Porting Project team, providing details of their utility

that actually turned out to be the show's only working Omega.

The magazines were represented by Archive, Acorn Publisher and Acorn User, all happily chatting away to visitors and offering subscription deals.

The ever impeccably dressed Martin Würthner was showing off his latest version of ArtWorks, now fully 32 bit compatible and loaded with all of his previous excellent extensions. Copies seemed to be going almost as fast as his CDBurner could generate them.

The voluminous storerooms of CJE



were represented in the back corner, continuing Chris Evans's reputation as the 'Corner Store' of RISC OS software and hardware. Much focus was being made of their new wireless networking kits.

Virtual Acorn were busy promoting their latest versions, including the RPC-SE version, featuring RISC OS 4 Select enhancements. Initial versions of the network support were also being shown, developed in conjunction with Rcomp and OreganoUK, plugging the final gap in

making this a really great product for those with PCs.

RComp themselves were demonstrating the latest release of WebsterXL, now supporting increased security and an array of new page-saving mechanisms.

Also noticeable on the stand was a RISCube, Rcomp's new miniature PC and Virtual RPC offering. The RISCube is targeted at those wishing for a small, quality machine capable of running both Windows (where

necessary) and RISC OS software in the same machine. All this is backed with the usual care, attention and customised building you'd expect from friendly RISC OS dealers.

Photodesk were demonstrating a vast array of digital cameras, mainly working through the USB system, available bundled with their excellent RISC OS software. The latest version of Cameradesk, the digital photography download utility, now supports a new almost universal standard, the PTP (Picture Transfer Protocol) that is used by an increasing range of camera manufacturers in an attempt to standardise the digital photography world. Cameradesk is also now 32 bit compatible for Iyonix users.

The biggest news of the show was probably about Neil Spellings's latest project — the team behind Aemulor (which runs 26 bit software on the 32 bit Iyonix) have been hard at work on a native RISC OS DVD player, named CINO. Their stand was kept busy all day showing assorted DVDs. After just five weeks' work they have a functional playing system that's only just below full speed, using



certain specific tricks on the Iyonix hardware. More improvements are expected over the next few weeks to get the system up to full speed. No pricing or availability information was available yet, but keep your eyes on their website for more details (www.cinodvd.com)

Finally, show stalwarts Fortran Friends were happily demonstrating both their usual polyhedra software and a full bell ringing simulation, hooked up to a small wooden bell tower, which certainly drew some attention.

Thanks must go to the SASAUG team for their hard work both in organising the show and running the event on the day. It's a hard and often thankless task, but the friendly and upbeat atmosphere certainly acts as a tribute to their hard work.

You Only Have To Ask

Monitor connection

Question:

I live in Australia and can not expect to find much help with Acorn computers.

I have an A3000 without a monitor (it gave up after after 15 years or so). I

You will need to set the computer to use this by issuing a *Configure MonitorType 0 command.

This can also be done by switching on and holding *zero* on the numeric keypad, which is easier if the screen display is unreadable.

Some of the questions sent to our Technical Help Service and the answers provided, by email, phone, fax or letter in this valuable free benefit of membership.

bought an AKF40 from an A5000 and was told it would work with a nine to 15 pin adaptor.

A standard 15 pin to 9 pin adaptor will work.

Not so I found. My two questions are: does the AKF40 run on an A3000 and is there a cable diagram I can get to make it work?

Allan Butler

Answer:

It will do but it supports only the low 'TV' resolution modes 0 to 17 and 33 to 36. You will not be able to use the higher resolution modes 18 to 28.

Program problems

Question:

Can you help me to find the patch !PCR13 and to get another copy of the StrongARM RO3.7 upgrade CD. Also, can you tell me what file extensions I need to put on Galaxians 6502 machine code image to get it to work with warm silence !6502em?

Andy Evans

Answer:

You will find the patch !PCR13 at

home-1.worldonline.nl/~jandboer/.
It's the first entry you get on typing
PCR13 into www.google.co.uk/.

You can download the default RISC
OS 3.7 disc contents from:
[acorn.riscos.com/riscos3/37/37DiscA
rchive/](http://acorn.riscos.com/riscos3/37/37DiscArchive/).

If Galaxians is a BBC program it
should not have any file extensions or
type. It should be left as the original
untyped files which will instead have
BBC style load and execution
addresses.

If you have lost this information due
to it being copied to a PC, the only
way to restore it would be to find
another copy of the game. A search on
Google reveals several likely sources
on the first page.

Note that downloading copies from
the internet can only be sanctioned to
replace legitimate copies you already
own on the original BBC B media.

Email deliveries

Question:

For several hours on Sunday I
received no emails, even ones I might
have expected.

I was bidding for a couple of items on
eBay auctions at the time, so should
have received messages confirming
bids, indicating I'd been outbid, and
so on.

Since Monday morning, however, I
am being flooded with messages, with
multiple repetitions of those I'd
expected on Sunday and extra copies
of new emails which people sent to
me since.

By 14.15 today (Tuesday) I have
received 73 duplicated messages. One
has appeared 17 times today.

A pattern seem to be emerging in that
all are dated Sunday during the period
when I was unable to download any
emails. Times are all between 13.51
and 23.08 that day.

Emails sent yesterday and today are
not duplicated.

Particularly annoying as on Sunday
afternoon a friend sent me an email
with several *Word* documents
attached which takes ages to
download and this has turned up
about ten times in total so far.

I checked the Freeserve telephone recorded message helpline yesterday but that reports no known problems at the present time. I virus-checked my hard disc with Killer — no problems reported. Could the trouble be on my machine anyway?

Any idea why this is happening and what is more important whether anything can be done about it?

Brian Billington

Answer:

There are two possible explanations:

1) A fault in an email server, between or including your ISP or the originator, which has caused multiple messages to be sent.

If there is a failure to deliver a message at any stage, it can be retransmitted and very occasionally the original and retransmitted copy can both arrive.

Examine the full headers of duplicate messages, if the dates of the *Received:* entries at the beginning are different, they are likely to be retransmissions, probably by the last

mail server that is the same in both.

2) The fetching of emails from your ISP did not complete.

Emails are deleted from the server only when your email program has confirmed they have been downloaded correctly. If for some reason it is interrupted, the messages will still be there when you next try to download.

To see if this is the case check the logs created by your mail transfer program. In the case of !Popstar there will be a log called *Popstar* in !SysLog.Logs which should indicate if a problem occurred before completion.

There could also be a large email which does not finish downloading before you hang up. If your ISP offers webmail access, try logging on to see what is waiting for you to download.

It is possible to adjust the settings of the mail transfer program to fetch a lower number of small size messages in one go, resulting in fewer messages to be refetched after a problem.

Buffer overflow

Question:

I have been using Impression Publisher without problem for many years until yesterday. Suddenly it fails to boot giving the error 'buffer overflow'

Ken Page

Answer:

This sounds like it may be related to the number of fonts installed.

Have you recently added any fonts to your system? Some older software uses a fixed buffer to store the font names available on the machine, which can overflow if there are too many. It can also have problems with individual fonts which have very long (40+ character) names.

The solution is just to install a small working set of fonts on the computer in the normal *!Boot.Resources.!Fonts* (using the Configure font merge tool) and keep more unusual fonts separate.

You can do this by having a number of additional *!Fonts* folders which add themselves to the font path when double clicked on or use one of the

many shareware or commercial font manager utilities.

Email errors

Question:

My main problem is that when I download emails I get various error messages and sometimes have to go into the 'Backup' directory to extract them as *raw* data.

For example I have just accessed the ISP using DialUp with Messenger already loaded. As soon as the first email was received I got a post mortem window open up which scrolled a lot of info too quickly to read. Everthing then paused until I hit *Enter* to close this window. Then the emails for other members of the family were downloaded and appeared to be received OK.

However, by this time I had been logged out of Messenger, presumably when the post mortem window appeared, and had to log back in but as soon as I hit Enter I got an error message which said:

'Uncaught Trap:Data
Abort.pc=1FFFFFFF8:registers at
0004768C'.

This was followed by:
'Debatch Failed —
NewsDir:MsgServe.MsgIDs — This
File is already open'.

I was then able to log into my email box and view the message received. However on previous occasions this has not always been possible and I have had to resort to the Backup directory within NewsDir as previously mentioned.

I have spoken to R-Comp who are not aware of this type of problem but when, during conversation, I mentioned that the hard disk had been replaced last autumn it was suggested that a 20GB disk was a likely source of the problem and that setting ADFS buffers to 0 within Configure should overcome the difficulty. Sadly, it hasn't.

All of the other applications on my machine run without problem. I am running a Risc PC 700SA with OS 3.7.

This problem has been troubling me on and off for months although it seems to be currently every time I download emails but I cannot state for

sure whether it coincided with the change of hard drive or not.

I have tried rebuilding NewsDir from scratch in case there was some corruption causing the problem but without success.

I have noted on some of the Post Mortem screens mention of a *Flex Memory Error* but do not know whether this is significant.

One thing which is interesting is that, because I am not deleting emails from the ISP at the first download, I am rebooting the machine to overcome the errors and then accessing a second time (to delete) and picking up the same emails without error!

I need to upgrade the machine to the Universal Boot Structure in order to run R-Comp PC Networking software and have achieved this once but when trying to update all of the Boot files put something in that the machine didn't like and screwed it completely.

Fortunately, after a lot of difficulty I managed to put the old Boot structure back in place and am now loath to have another go. While all this was

going on I had to do a Ctrl-R reset which defaulted Configure and now I cannot get my 17" monitor to fire up so I'm back to my AKF60! Again I'm fighting shy of messing around too much until I sort out the major problems of email - which I hasten to add was in evidence before I tried these 'upgrades'.

Pete Privett

Answer:

After Messenger has crashed it will leave many files open which can prevent it functioning correctly. A quick solution is to press F12 and type *Shut but be aware this can upset any other applications which are running and have files open, such as databases. Often it is safer to reboot.

There certainly could be problems if you have used a hard drive over over 2GB with ADFS buffers non zero with RISC OS 3.7. Due to a bug in this version of the OS it can lead to the inability to access files, and general unreliability of the filing system.

Often the only solution is to *Configure ADFSBuffers 0 perform a

full backup and then reformat the disc. From then on you must also ensure that ADFSBuffers is never non zero, to prevent the reoccurrence of problems. It will be set to a non zero value after a CMOS reset if you do a Ctrl+Delete+Break.

You should also be aware that with RISC OS 3.7 the disc format becomes very inefficient for discs over 4GB, and with your 20GB drive each file will be taking a minimum of 2MB !!! It is likely that it will become full before a fraction of its capacity is used.

I've found the Mesenger Pro experienced a serious of problems when using old toolbox modules that can produce crashes as you described.

Ensuring you have an up-to-date boot sequence with the latest toolbox modules installed in !System is a first priority. The latest 3.7 boot sequence also contains a patch for the ADFS buffers problem but it is not ideal as it won't be on a shift break which can lead to disc problems reoccurring.

You can download the RISC OS 3.7 Boot sequence from:

<http://acorn.riscos.com/riscos3/37/37DiscArchive/>

The latest toolbox modules can be found at:

<http://support.riscos.com/Support/Updates/>

It is likely the you did not copy the monitor definition into !Boot.Resources.Configure.Monitors and then run !Configure (double click on !Boot) and go to the monitors section to reselect it.

While you can try to get around all these problems on RISC OS 3.7 my best recommendation would be to upgrade to RISC OS 4, I think it will offer real benefits in your case, and the installation will not be any more work than you will have to do to fix your hard disc and boot sequence.

The benefits it will give you are:

- No problems with ADFSBuffers, enabling them to be set to non zero which will speed up filing system operations considerably — especially for random access databases such as Messenger uses.

- You can reformat your drive to use the much more efficient disc storage format to allow you to get the most from your 20GB disc.

The minimum size of files will be reduced to a mere 80K.

- The considerable advantage of long filenames and the removal of the 77 files per directory limit.

- The latest universal boot sequence is provided with the upgrade. (You will still need the latest tool box modules).

- Many user interface improvements.

- Noticeable increased speed and reliability with the more efficient RISC OS 4.

Send you queries, whether techie or elementary, to our Technical Help Service, by email to support@armclub.org.uk or write to the Club's Merton Court address (which you can find on the last page) or fax 07020 954018.

If it's urgent you can phone 07010 708098. (Phone and fax are at higher rates).

Mini PCs With RISC OS

A6

In the last few weeks, two new, very small, Windows PCs have come on the scene — both from RISC OS companies! They do, however, also have RISC OS abilities as well and can be switched between the two operating systems at will.

From Stuart Tyrrell Developments there's the A6, in a miniature case described as being little bigger than a stack of A4 paper and measuring 32x21x18cm (or, approximately, 12.6x8.3x7 inches).

This is fitted with VirtualRPC-SE, said to perform at least as fast as a 287Mhz StrongARM Risc PC, and WindowsXP.

The machine is available in three variants. All come complete with DVD drive or DVD/CDRW, fast hard drive, floppy disc, 333/400MHz dual-channel DDR memory, Geforce 4MX graphics, 56K internal modem, 10/100BaseT networking, 4xUSB ports, 2xIEEE1394 ports (Windows only), SPDif optical (input Windows only, output RISC OS/Windows), WindowsXP Home and

VirtualRPC-SE. keyboard and mouse are included, along with speakers for those machines where they are not part of the monitor.

The case is available in silver or black and, alternatively, in traditional ATX style.

The machine variants are:

A6B: Base unit, DVD, 40GB hard drive, 256MB memory.

A6: 15" LCD monitor, DVD/CDRW, 80GB hard drive, 512MB memory.

A6DB: 17" LCD monitor, DVD/CDRW, 120GB hard drive, 512MB memory.

A6

Prices: A6B £599; A6 £899;
A6DB £999 (+£25 carriage + VAT)

Supplier: Stuart Tyrrell Developments
PO Box 183, OLDHAM,
Lancs OL2 8FB

Tel: 0845 458 8803/01706 848 600

Fax: 0870 164 1604

Email: info@stdevel.co.uk

Web: www.stdevel.co.uk

RISCube

The other new machine, the *RISCube*, is an expanded version of R-Comp Interactive's shoe box sized SpaceCube range of PCs. It is fitted with RISC OS 4.02 and WindowsXP Home (Pro is available as an upgrade) and can boot up in either. It is available in a variety of specifications, ranging from entry level, StrongArm-class performance up to machines said to give results suggesting 400-500Mhz RISC OS performance.

As a special deal, it is being supplied with *UniPrintVA* software, which allows RISC OS to print to almost any printer with WindowsXP drivers, including USB, parallel or Windows-only printers.

The entry level RISCube has a CD rewriter, DVD player and mid-sized hard drive. It includes USB, firewire, PS2 keyboard/mouse ports, printer port, floppy drive and TV out and comes with 256MB of RAM with 16MB for graphics. Networking is included.

The higher end machine includes a large, ultra-fast hard drive, 2600+ processor,



RCI's RISCube computer case

512MB of high-end, dual-channel DDR RAM with up to 128MB Nvidia graphics with dual-monitor capability and 'SoundStorm' 5.1 audio.

There is also a special 'customise your RISCube online' facility which allows you to specify the components you want.

RISCube

Price: Standard machine £699

High Spec £899 (all inclusive)

Supplier: R-Comp Interactive

22 Robert Moffat, High Legh,
Knutsford, Cheshire WA16 6PS

Tel: 01925 755043

Fax: 01925 757377

Email: rci@rcomp.demon.co.uk

Web: www.rcomp.co.uk

Free For All

Hello to all. I'm your new PD/Freeware/Shareware reviewer.

Due to time constraints in getting this article to be published, I have merely reviewed some of my favourite freebies as currently installed on my A7000+ (RISC OS 4.02).

there are lots of RISC OS computers out there I'd love to own, but can't afford — just like when the Archimedes first came out!!

So. where do we look for public domain and similar software? I started by looking under HENSA, an academic based repository of

Andrew Burgess introduces himself as our new reviewer who'll be searching for and trying out the pick of the public domain and other free programs.

I have been a fan of Acorn machines since my Dad (a BBC TV Producer) brought home a BBC Micro Model A (16K) numerous years ago. We upgraded that to a Model B (32K) and then a Master 512K (with PC emulator) and this launched my career — programming mainframes and the now unavoidable PC.

I never 'lost the faith', and upgraded from the BBC Master through an A3010, to my current Risc PC, A4 laptop and A7000+. I'm pleased to say that the Acorn market is back to normal as far as I'm concerned —

software, which has since moved to the UK Mirror Service www.mirror.ac.uk/. Look under *Browse by platform/Miscellaneous Platforms/Acorn RISC-OS* then chose one of the providers, such as 'Acorn & RISC OS'. Then FILES gives you a list of the stuff there to browse through, or INDEX.desc gives you a general list of areas/directories to browse.

There is also the opportunity to upload your own programs to this archive, but I haven't tried this!

The old HENSA archives used to have a full file list with descriptions, but the UK mirror site doesn't seem to.

I have also discovered www.acornsearch.com, which has subsequently moved to become www.drobe.co.uk and now The ARM Club Editor has pointed me to <http://filebase.acornusers.org>, though I've yet to investigate further.

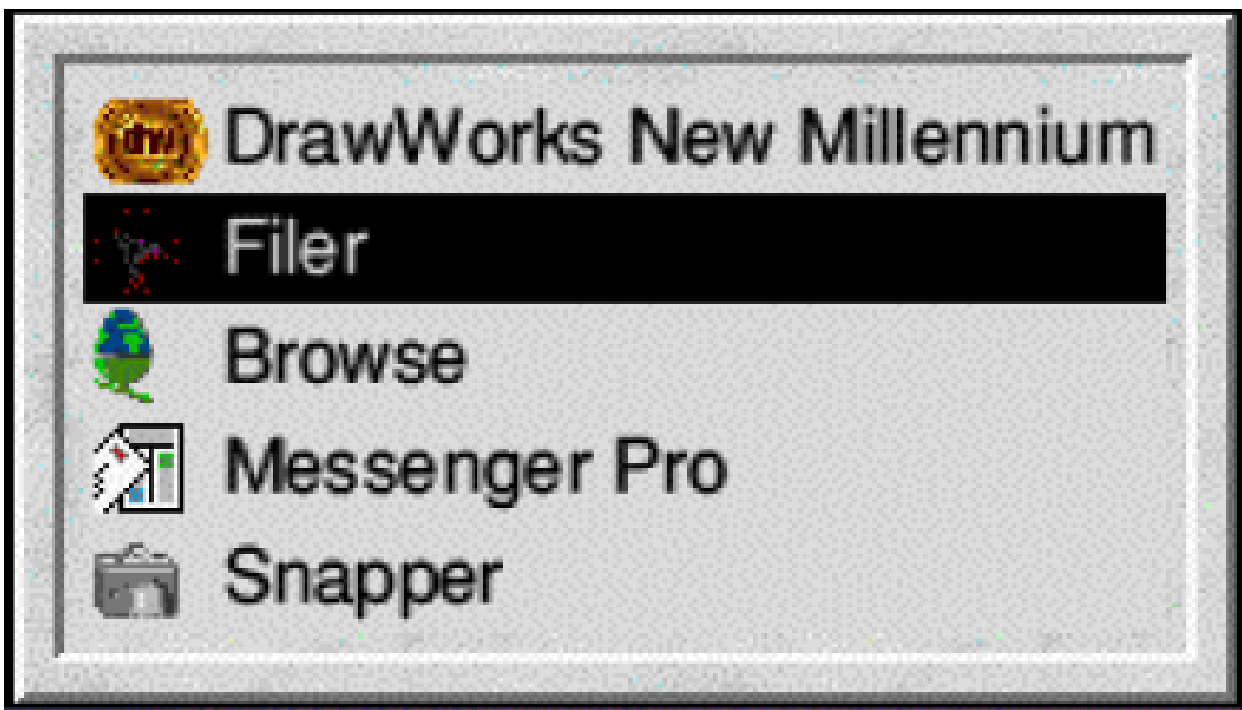
Or there's Paul Vigay's excellent website at www.vigay.com.

Right, with no more ado, straight into the first reviews.

CoolSwitch

For those of you who have to use PCs as well as our beloved Acorn Risc OS machines, you might have discovered the quick switching between applications on Windows through the use of Alt and Tab together. If, like me you thought: "Why can't I have something like that on RISC OS?" Well, now you can. The program is called !CoolSwitch and is found at <http://wonderworks.geekgang.com/free/cs.zip>.

Once it's installed (there's no icon on the iconbar), you can use the Alt-Tab combination to switch applications.



CoolSwitch switches you between applications with ALT-Tab

Hold down the Alt key and repeatedly press Tab, till you're on the relevant application, then release both keys to give it the 'focus'.

I initially thought it had one drawback in being unable to Alt-Tab onto individual application windows but looking on Wakefield RISC OS Computer Club's website <http://wrocc.org.uk> I found that this functionality is available using Ctrl-Tab. What I mean by this is if you have five filer windows and five edit windows open, you use Alt-Tab to select the application, then do Ctrl-Tab to select the individual instance you're interested in. Suddenly finding this out, suddenly makes this program far more useful to me!

KeyCD

!KeyCD is available on The ARM Club CDRom3 among Sound Utilities. It's billed as a program that will allow you to play and change CD music tracks while playing a computer game.

The Help file describes it thus: 'KeyCD enables you to control the CD player from the keyboard no matter what the computer is doing. So, for example, you can be playing a game and still change tracks, stop, start, eject, etc.' It works well from a standard RISC OS desktop, although no icon is displayed. It provides 'Control-Shift and another key' style short cuts, as shown in the panel below:

KeyCD combination (left hand Control and Shift Keys)

Control-Shift-(+) on main keyboard: Plays the CD from the start

Control-Shift-number on main keyboard: Plays the track number selected (i.e to play track 10, do this plus one and zero.)

Control-Shift-(-) on main keyboard: Stops the CD

Control-Shift-(-) on numeric keyboard: Pauses the CD

Control-Shift-(+) on numeric keyboard: Un-pauses the CD

...and the perplexing Help short cut

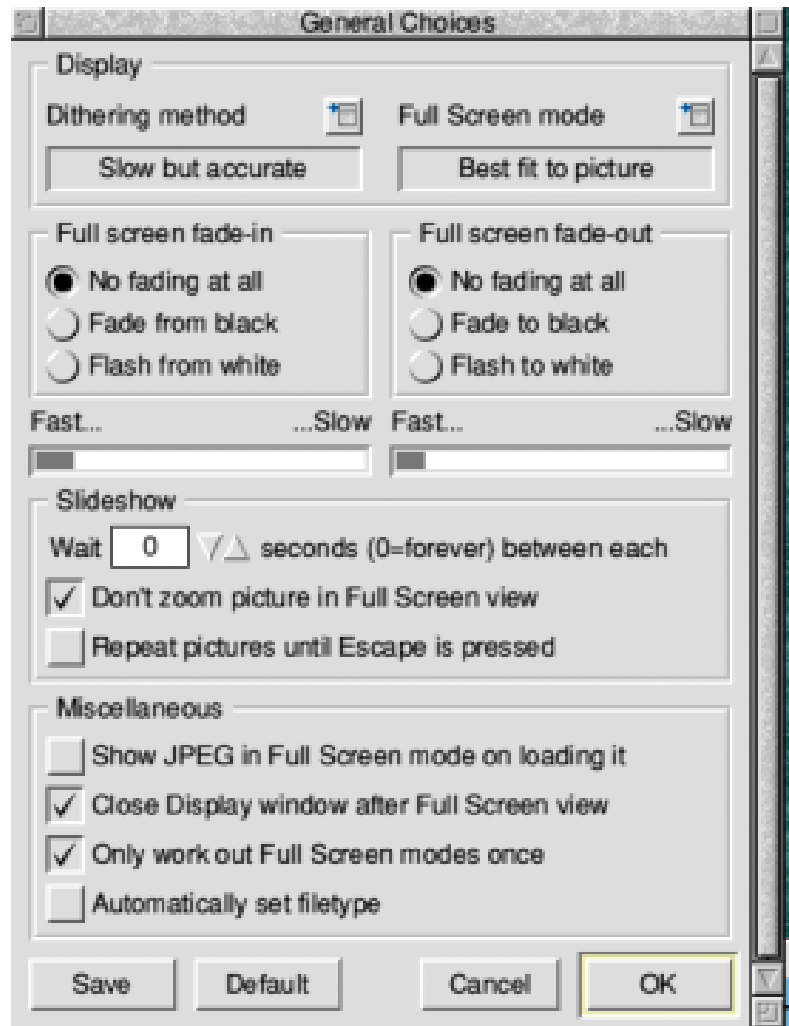
Control-Shift-(#) on numeric keyboard: Ejects the CD

I've tried, but I cannot find a hash (#) on my numeric keyboard. I think my BBC Master had one but it didn't have a CD drive! I tried other keys, but the CD drawer remained resolutely closed unless I pressed the external button.

!KeyCD is not as versatile as a true CD player application such as SmartCD. You have to remember what track you want to hear and it doesn't display which track you are playing. But if you like keyboard short cuts (and I do), it's extremely useful. I only had one minor niggle with it; if you have an editable window (I had a !Edit window open) it types the character in there as well as controlling the CD. But, aside from that, it's great and far quicker to select a track than through SmartCD.

SwiftJPEG

I was constantly irked to see Microsoft Photo Editor loading up JPEG pictures far, far, quicker than



SwiftJPEG choices

anything I had on my (less than totally up-to-date) RISC OS hardware. I had an elderly copy of !SwiftJPEG (version 1.01) which impressed me, but it refused to load my Olympus (2 megapixel) and Fuji (0.3 Megapixel) Digital Cameras' JPEG images. I posted a message on the newsgroup Comp.Sys.Acorn.Apps and was impressed when the programmer placed a posting to say he'd updated it.

I downloaded version 1.02 (from http://nines.rowing.org.uk/folder/swiftjpeg_102.zip) and on my RISC OS 4.02 A7000+ it didn't moan about my images but opened them as a long black post-box type slot, without any photo represented. I contacted the programmer, and he advised that I may have one of the 'unusual' RISC OS implementations but didn't advise how to fix it.

I gave up on it for quite a while, until I next rebooted my Risc PC running RISC OS 3.7. I'd previously transferred a 'dodgy' digital camera JPEG image onto it and, wonder of wonders, !SwiftJPEG 1.02 loaded it rapidly and perfectly. I could display it full screen (cropping a little off the edge —I'm not using ViewFinder

hardware), or 1/2 scale with a big black border. I tried again later on my A7000 —still the postbox. I hacked into the source code (provided on download, under Resources directory within the application folder) and forced !SwiftJPEG's RunImage to think it was running on RISC OS 3.5. (by fixing the line `osversion% = 35000` to be default. (*See the panel below*)

I ran it again; nothing. It used the standard RunImage in the application folder and as I didn't know how (and failed trying) to get it incorporated in the proper place in the application folder.

I now just run the RunImage directly from a short cut and I get decent speed

```
REM Check that the OS version is OK and we've a JPEG plotting method
osversion%=FNgetosversion osversion%=35000 :REM force to RISC OS 3.5
IF osversion%=0 THEN ERROR 490,"SwiftJPEG cannot determine the
operating system version (no UtilityModule found?)"
IF osversion%<31000 THEN ERROR 490,"SwiftJPEG requires a RISC OS
3.10 or later to run"
SYS "OS_CLI",RMEnsure SpriteExtend 0.99 RMEnsure JPEGRender 1.02
Error 490 Cannot find JPEG plotting SWIs - is SpriteExtend 0.99 or later
running?"
```

!SwiftJPEG coding change to try to get it working on RISC OS 4.02

images on my 8MB A7000 (though my 65MB Risc PC 700 is a little faster and I didn't have to doctor the software).

The speed for loading a 2 megapixel (1200 x 1600) digital camera image on my 48MHz A7000+ is 40 seconds, so on an Iyonix it should be incredibly fast! Of course, because this program runs on RISC OS, fractional resizing can be done in the zoom box easily. For example, for 3/4 size enter a 3 in the first zoom box and a 4 in the second. Those these zoom settings are not retained if you do a *save* and have to be re-entered next time you run !SwiftJPEG.

I have tried the other shareware editors and viewers, and none of them compare to !SwiftJPEG for speed on my hardware but I wish I could find an editor that does and works with my camera images. I've tried probably all of them but most object to my camera's images and those that don't take a long time to load the image!

Apparently !SwiftJPEG will also work on RISC OS 3.10 (A4 OS) but I didn't have all the correct versions of the modules required to prove this.

QuickFiler

!Quickfiler, which you can get from www.avisoft.force9.co.uk/downloads/QFiler210.zip, is a Windows-style keyboard short cut facility for the RISC OS filer. Although it doesn't cover all eventualities, it does help to save time on filer operations —once you can remember the short cuts — but the filer window must already have the *focus* for the keyboard short cuts to appear. These short cuts appear on the Filer menus — appended to the standard RISC OS options.

QuickFiler provides the following short cut keys :

Select all: ^A
Clear selection: ^Z
Open parent: ^B
Delete: DELETE or ^X
Count: ^N

Help: ^H
Stamp: ^S
Large icons: F2
Small icons: F3
Full info: F4
Confirm: F5
Verbose: F6
Force: F7

Newer: F8

Sort by name: <F1

Sort by type: <F2

Sort by size: <F3

Sort by date: <F4

Close window: ^F2

Protect: ^F5

Unprotect: ^F6

Public: ^F7

Private: ^F8

!QuickFiler requires the new !Boot structure as on a Risc PC or any RISC OS 4 machine. It's installed by running the Installer application provided—which presumably places it in the right place in the new !Boot structure (Universal Boot structure, as follows).

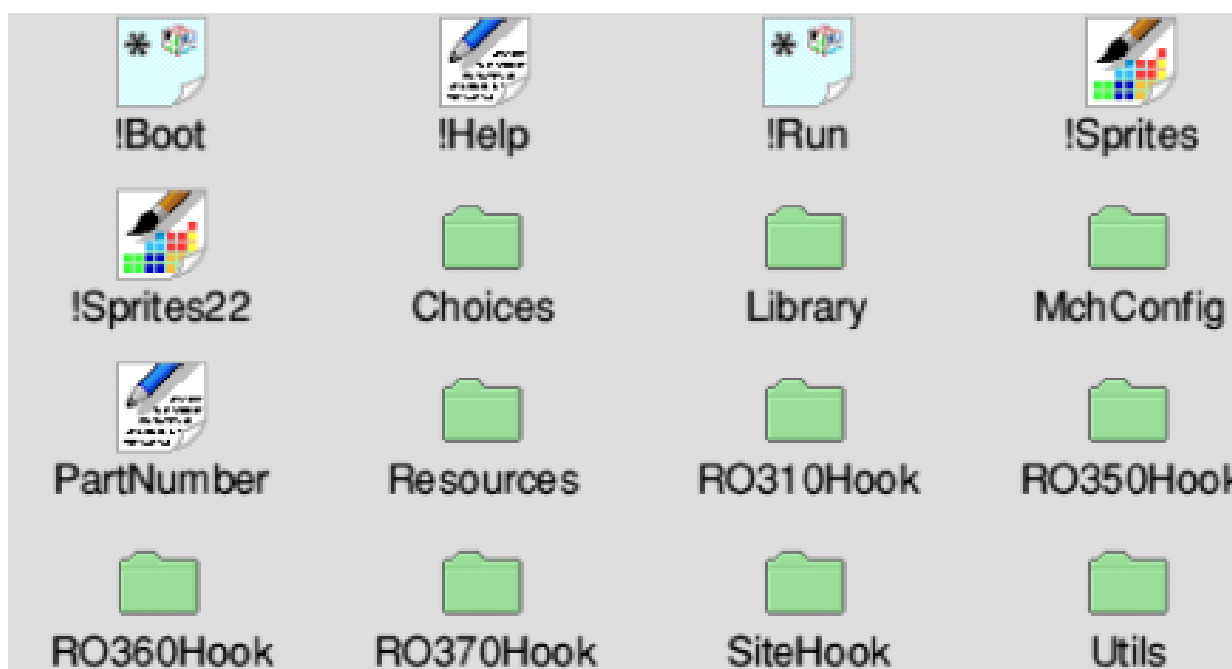
My copy of QuickFiler (version 1.25) does not provide short cuts to *Copy*, *Rename* or *Find*, as these are apparently 'Non Trivial' to implement but, on version 2.10, *Copy* functionality is now available and apparently works on RISC OS version 3.00 to version 5 (Iyonix).

I'll have to download this myself and give more details later. Watch this space!

Universal Boot Structure

Although the RISC OS Universal Boot Structure is not what one would conventionally call freeware it is available to download at <http://acorn.riscos.com/riscos/releases/UniBoot/uniboot.zip> and as I've done something on replacing my Risc PC's RISC OS 3.7 !Boot recently, I thought I'd include something on it. I had been attempting to install networking on my RISC PC and somehow I'd managed to corrupt my existing !Boot structure (I had done a lot of tinkering). My *~CDReinit* file kept recreating itself, despite my repeated deletions, and other facilities were becoming unstable—I'd migrated to my A7000+ because of this. Despite following network installation instructions from Paul Vigay's website (www.vigay.com) on installing the network, it steadfastly refused to work. I downloaded the Zip file onto a 250MB Zip drive.

I had little space available on my 850MB hard disc and didn't even have room to transfer the 2.7MB Zip file. I had also been running out of space on my 250MB Zip drive discs and had to transfer files to the A7000+, plus archive some Risc PC



files off onto more readjusted Zip drive discs before I attempted to install on the Risc PC. Anyway, to cut a long story short, I cleared 7MB on my Risc PC, which I thought would be enough, but wasn't —I had to extend it to 9MB. It would have been easier to have copied across the network, but I couldn't, as that is what I was trying to install. I renamed my current !Boot to *OldBoot* (as there were things in the original I didn't want to lose and I liked the pun) and unsparked the archive to create a new !Boot folder on the Risc PC hard disc.

All the expected folders were there (*see above*) and the Risc PC booted into the normal default desktop. My usual picture had disappeared but it didn't give me any issues, like my

earlier !Boot had done. To my joy, following my instructions the network sprang into action. "Yes!" I shouted!

Theoretically, one could use this to install the new boot structure (as I call it) on a RISC OS machine that doesn't already have this set up (it looks like it would work on RISC OS 3.10). The instructions on the site quoted above imply that you have to remove the relevant higher *Hook* folders. For example, if you have RISC OS 3.5 you should remove the folder *RO360Hook* from under !Boot in the boot structure.

I haven't tried this yet, but may install it on my A4 in future. If I do, I'll let you know how I do.

Photodesk: Just 16 Bits More

When the Iyonix was revealed. One of the first question I asked along with many others, was “What software will be available for it?” It was well known that the faster processors now available, such as the XScale used in the Iyonix, had

TechWriter before the Iyonix was developed for set top box use and these were quickly released for the desktop. David Pilling immediately converted his entire software catalogue, including Ovation Pro and SparkFS, to 32bit and made it all

David Ruck explains the trials and tribulations he faced when he took on the job of converting Photodesk to 32bit so that Iyonix owners could use it.

dropped support for the 26bit mode that RISC OS and all its applications relied upon. While the major sticking point of converting the OS to 32bit had obviously been overcome, what about all the applications? Anything that wasn't pure BASIC, that is C or assembler applications and modules, wouldn't run, which counted out all the major programs.

The good news was plenty of work had been going on behind the scenes to get as much software as possible ready for the launch and that work has been going on ever since. Icon Technology had actually produced 32bit versions of EasiWriter and

available free of charge from his website (living up to his *St Pilling* nick name).

As well as native conversions, a clever piece of software called *Aemulor* was developed, by Spellings Computer Services, that could run many 26bit programs, although not at the same speed as proper 32bit code. This allowed applications, such as Computer Concepts's old faithful *Impression* and *Artworks*, to run. Martin Wurthner first produced 32bit versions of the *ArtWorks* rendering modules to speed up the main program running under *Aemulor* and has gone on to produce *Artworks2*,

which not only is fully 32bit and substantially faster but also is one of the first major programs to offer significant new features.

While every day more good news was coming in about conversions of commercial programs and, just as importantly, the vast amount of public domain utilities which make RISC OS a joy to use, there was one major program notable by its absence—the corner stone of photo-retouching on RISC OS: Photodesk. As time went on more and more people commented on the lack of any news and many expressed reservations about purchasing an Iyonix until it was confirmed that this important piece of software would be available. I already owned an Iyonix and was frustrated to have to switch back to the Risc PC to do retouching and image processing work. If there is one application that could benefit from the Iyonix's faster processor, vastly increased memory, UDMA discs and a much higher resolution and quicker screen update, it was Photodesk.

Early in the new year Martin Wurthner contacted me, to suggest I get in touch with Photodesk Ltd and

offer my services, as there didn't seem to be any work in progress. It was rumoured that it would be a big job due to the sources consisting of over hundreds of BASIC assembler files. Only days earlier I'd been saying to the other members of The ARM Club Committee that I was sure Photodesk was being converted but it was so important that, if necessary, I'd do it myself. So, having painted myself in to a corner on that one, I went ahead and offered. Chris Hornby, the man behind the Photodesk company, agreed to get in touch with the actual author of the program and get the sources for me to work on. He did warn that the author had been very busy with other work and may not be able to spare the time to do this for a while.

This proved to be true and as the weeks went by I considered doing the conversion by reverse engineering the assembler, as I had done for quite a number of still useful PD programs that were no longer being developed (which you can find at www.quantumsoft.co.uk/druck/). To help with the conversions I developed my ARMalyser tool (www.armclub.org.uk/free), which

takes a RISC OS executable (absolute, module, utility), identifies which parts are code and which are data and produces output containing the code with various warnings of likely problems if it were to run in 32bit mode. This output can be edited to remove the problems and passed through an assembler to produce a 32bit version of the executable.

So I had a poke around inside my copy of !Photodesk Olympic edition to see what it consisted of. The main program is an absolute file but closer inspection revealed that it was actually a very large BASIC program that had been compressed, then converted into an executable binary and then squashed. The BASIC program does the donkey work of creating the main window and loading the other parts of the program. Most of the complex memory allocation and core routines which manipulate the image are contained in the substantial Photodesk module, which offers a large number of SWIs with a multitude of reason codes to do the work. Other modules were the standard colour picker and PhotoCD handlers and a special TwainPDIF

module to allow direct capture from Twain compatible scanners. There are also a couple of small absolute files to set up variable and ensure tasks are running.

Photodesk is very modular allowing extra plug-in routines to be added to the core program at a later date. These are split into three categories. There are plug-ins to load and save 15 different bitmap and vector file formats. These look like mini applications and contain a compressed BASIC program which displays a small dialog allowing you to choose whether Photodesk claims a double click of the filetype. The actual loading and saving is done by an assembler file of type *utility* (&FFC). The second category is the special effects, such a cloning and filers. These consist of assembler utilities arranged in a directory structure similar to how they appear in the Photodesk special effects menu. The assembler file also contains the template data which defines the controls which appears in the middle of the special effects setup window. There are no fewer than 36 special effects included in the Olympic edition, including the texture explorer

which is a larger piece of code and supplied inside its own application sub-directory. Lastly, there are 51 assembler files in the utility directory with cryptic three-letter names. These contain core functionality, such as screen display at various colour depths, and all the tools which appear from image processing icon.

That was a heck of a lot more code to convert than the few small modules and utilities I'd tackled so far. But luckily the intimidating number of separate executables would actually make it easier than if it were a single amorphous blob of code. As each executable only contains a small number of routines, all related to a particular action, any problems with that action will be far easier to track down than if the routines were scattered throughout a huge amount of other code.

I started the conversion, at the beginning of February, by setting up the project and running all the code through ARMalyser and seeing how good a job it did. To be able to distinguish which areas of an executable are code and which are data, ARMalyser uses the entry points

in to the executable and tries to track all the possible branches through the code to identify all routines. While following the code it identifies any data loaded in to registers or passed to SWI calls. However, a large amount of heuristics must be used to do this as, for example, some code may not be directly called by any routines but instead run via jump tables which are built only at run time. These heuristics won't cope with every program and need tweaking to cope with techniques that are particular to an author or compiler to get better results. The 100 modules and assembler which I had identified for conversion required a number of tweaks and showed up some areas where I could improve the presentation of data blocks passed to SWIs and also some bugs that needed fixing. In all it took two weeks to improve ARMalyser to a stage where its output was suitable to work on and, importantly, could be immediately fed back into the assembler to produce executables identical to what went in.

By this time, the 579K of raw code had turned into 6.7MB of assembler source! Standing at the bottom of this

mountain, I was expecting weeks, if not months, of giving up my spare time to the process of conversion. On the weekend of the 15th Feb, I set about the main Photodesk module. As this was the core of the system it needed the most testing and would be in use while all the periphery code was testing, so it made a good starting point. Thankfully the module did not contain much code which relied on flag preservation, so the conversion mainly consisted of altering error returning code from using `ORRS PC,R14,#1<<28` to set the V flag and exit, to the 32bit equivalent which is `MSR CPSR_f,#1<<28`. This went so well I had time to convert the couple of little absolute programs that set up system variables and ensures tasks are running. I even had time to check my conversion had not broken anything on the Risc PC.

Feeling confident, on Monday I started tackling the smallest group of assembler files (only 1.2MB), which were the loading and saving routines for the various file formats Photodesk supports. These were quite straight forward but a few relied upon external modules and programs. The ArtWorks loader required the rendering

modules but luckily Martin Wurthner was able to provide advanced beta copies of the 32bit versions he was working on for ArtWorks2. The JPEG loader required the `cjpeg` and `djpeg` programs and the PNG loader required the `spr2png` program, 32bit versions of these being kindly supplied by Leo White and Darren Salt respectively. The next day I tested the code by creating images in each format at colour depths of one to 32bits and with masks where appropriate. Each was loaded in, examined and saved back out and compared to the original. Photodesk doesn't support every variation of the formats (such as 1,2 of 4 bpp Clear files) but all the ones that worked with the 26bit version also worked with my conversion.

On the Wednesday, I didn't do anything. I'd already spent all weekend and two evenings on it, the South West Show was coming up and there was far too much to do before then, so I had a night off. However I got bored on Thursday and decided to push on with the Special Effects code. Much to my surprise I fairly flew through that, again there was next to no code which needed to be flag

preserving so I was able to do most of the work on each file by simply search and replacing `MOVxxS PC,R14` and `LDMxxFD R13!,{...,PC}`^ with `MOVxx PC,R14` and `LDMxxFD R13!,{...,PC}` respectively. Reeling square eyed from this effort, which lasted right into the early hours, I realised that there was a chance of getting something working for the show. Friday was an even bigger challenge with 2.5MB of general utility code to convert compared to Thursday's mere 1.3MB and not forgetting some testing.

I really did put in a mammoth session that night, from when I got in from work at 5.30pm until 3.45am. There were 51 utility files, as much as the rest put together, and this time a fair amount did rely on flag preserving behaviour. Most instances were conditional instructions or subroutines following after subroutine which had been conditionally executed and these could be fixed branching around the code on the opposite condition. However, some routines were called by a quite evil dynamic method depending on runtime values and the branching technique wasn't feasible.

Instead, I had to add code to the function to stack the flags on entry and restore them afterwards. It turns out that this function must have been in a library because it appeared in half a dozen different utilities -- but the disadvantage of reverse engineering is that each one of them has to be fixed separately.

Just before I had to go to bed to stand any chance of making it to the show the next day, I ran the code still warm from conversion through the assembler. A quick test of loading up on the Risc PC and trying out a few of the image processing tools and special effects, convinced me I had not broken anything obvious, so I copied it across to the Iyonix. The first problem was the protection mechanism, to stop Photodesk being used on machines it hasn't been installed on, popped up an error box telling me I had been naughty. I obviously won't say how I got round this but I have put it back again in the release copy!

The next thing was fairly major. Instead of the work area of the Photodesk window there was just a rectangular area of random colours.

Luckily I knew what this was, as earlier in the week I had been exchanging emails with Adrian Lees, of Aemulor fame, who had been trying to get Photodesk to run under Aemulor. He pointed out that the rendering code contained a strange routine which checked where the screen was in memory and, if it was higher than the Risc PC's normal location, it invoked some strange code instead.

I found the rendering code in the utilities section and confirmed this. It looked like the routine was to handle screen memory where each line is disjoint than the others; the sort of thing you need to deal with interlaced screens such as for TV broadcast use. Perhaps this was code for the Pineapple graphics cards, which were available a number of years ago. This code was now causing problems because the Iyonix screen memory was not in the same place as the Risc PC's either, so this code was used instead of the normal rendering routine. Commenting out a few assembler instructions cured that and, low and behold, everything I tried seemed to work OK, so it was off to bed at last for a short but happy sleep.

The next day I loaded up my Iyonix and my old AKF85 monitor (the 22" Iyama wouldn't fit in the car even if I could lift it) and did the relatively short journey from Gloucester down to Loxton, the location of the South West show. After setting up the machine (involving borrowing some mains cables which I had forgotten to bring, due to being a bit worse for wear that morning) I looked around for Photodesk Ltd to show Chris the 32bit Photodesk in action. Unfortunately he had not been able to make this show and I'd been too busy beforehand to get the news of this.

But Photodesk running on the Iyonix soon received quite a bit of attention from visitors. As we were next to Neil Spellings's stand, people assumed that it was running under Aemulor, so I had to keep explaining that this was the native 32bit version. Word soon reached Jack Lillingston on the Castle stand who came running over to see it and asked if he could reveal the good news during his presentation on the Iyonix. I agreed, although I was a bit worried about people thinking it was on sale when it hadn't been tested and I didn't even have a formal agreement with Photodesk Ltd yet.

During a whole day of playing with Photodesk (mainly by cloning multiple copies of the Trans America Tower from my San Francisco holiday photos), the only bug I'd found was Artworks files could be loaded by dragging to the iconbar but not to an existing canvas, which was pretty encouraging. At the end of the show I left my Iyonix with Castle so that I could get it upgraded from the prototype spec up to the full production model with 512MB RAM and I also ordered a podule back plane so I could see if I could get my 24i16 card to work (I still haven't got round to this). So without the machine the only thing I could do when I got home was email the converted Photodesk to a few people to beta test and sit back and wait for any problems to be reported.

Unfortunately it didn't take long. The beta testers reported that almost nothing worked, nearly every operation dynamicfailed with a 'Memory cannot be moved' error. I was very frustrated about this, as all the things which they were having problems with I had been demonstrating on the stand at the show and, without my Iyonix, I

couldn't check any of the problems. Castle were extremely busy with all the orders from the show so I had to wait over a week for my machine to come back and, as soon as I powered on, I ran up Photodesk and found it suffered from all the same problems.

The problem was obviously memory related and the one thing that had changed since it last ran successfully was that I had the memory upgraded from 128MB to 512MB. So I went straight to work investigating where the memory allocation routines were in Photodesk. Luckily at this point the real sources for the program arrived from Photodesk Ltd. The rumours of its composition turned out to be true, except there weren't just hundreds of BASIC assembler files, there were over a thousand: 1,188 totalling 11.4MB to be precise — *arrrrrrh!* I set about comparing the source to what I had reverse engineered to see if they were the same, which wasn't straight forward as things like the special effects had templates embedded in them and fields for the effect settings were used to save back the current values. Ignoring these, I found that most of the source was up to date except a few of the loaders and

special effects which seemed to be two years older than the ones I had. But I didn't intend to use the source straight away as this would involve making all the changes to it that I had done on the reverse engineered code, which was a considerable job. The important part was that, unlike my reverse engineered files, the real source contained useful comments that described what the code was doing, essential if you are going to do any serious debugging.

With the help of the source comments, I managed to track it down to the Photodesk module itself. The routine that was going wrong was one which temporarily allocated memory for intensive routines, as was used for all the special effects and functions such as scaling and rotation of the images — just about everything really. It took quite a bit of head scratching to work out why it had gone wrong. To ensure that the operation Photodesk was attempting performed as quickly as possible, the memory routine took all the free memory in the machine and added it to its dynamic area, which reduces the need to use the slower disc based virtual memory if space is not

sufficient. After the operation the memory is returned to the rest of the machine. This is the reason why many of the major Photodesk operations don't multi-task. Even if they did, the machine would not be usable because it has grabbed all of the free memory.

The reason why this no longer worked is due to assumptions which were made on how the memory system worked, which were OK up to now but broken by the vast amount of memory in the Iyonix. The Iyonix is capable of taking 1GB of memory which has a slight drawback in that the total address space for both the application slot (which can now grow up to the total memory in the machine) and dynamic areas is limited to around 1.5GB. This means, with a 512MB machine, only two dynamic areas with the size the same as the amount of memory could be created, so a SWI call (introduced in RISC OS 4) is used to limit the maximum size of Dynamic Area, normally to 128MB. This stops the available space from being used up by a couple of applications and preventing others from running. The limit is set with an OS_DynamicArea,8 SWI located in

the file !Boot.Choices.Boot.PreDesk.DALimit, which can be altered by the user, although you should be aware that increasing the value can cause problems when you run several dynamic area-using applications at once.

Photodesk uses its dynamic area for storing all the image data. This is created with a maximum size of -1, which indicates that it should be big enough to hold all the memory in the machine. When Photodesk needed to allocate temporary memory, it read the amount that was available and added this to the dynamic area. This was fine on earlier machines; the DA could always fit what was free, as some would always be taken up for other uses. But as soon as the dynamic area is limited to a size much smaller than the total amount of memory using OS_DynamicArea,8 (on the Iyonix or on older machines), it was possible to have more free memory than you could fit in it. When the OS_ChangeDynamicArea call was issued, it complained it could not add the amount of memory requested and gave the 'Memory cannot be moved' error ('There is not enough memory to complete this operation' on older

machines), which stopped Photodesk in its tracks.

The solution was actually quite simple; all I had to do was alter the code so it worked out how much space was left in its dynamic area and only try to add this amount if there was more free — problem solved! I actually went on to modify the memory handling a bit more at this point, by adding a system variable PhotoDesk\$DynamicAreaSize (set in !Run) which could control how large the maximum size of the Photodesk's dynamic area was. The OS_DynamicArea,8 call allows limits to be placed on dynamic areas asked for in three ways, which makes it possible to have a higher limit for applications which say they need a specific amount, than those that just say give me the biggest possible (but don't always need it). This could enable Photodesk to have a 256MB area, while most other dynamic areas were limited to 128MB.

While I was modifying the memory calls I was quite surprised to see that Photodesk still had support for using the application area so it could run on RISC OS 3.1 which does not feature

dynamic areas. I remember Photodesk coming out after the launch of the Risc PC to exploit its 24bpp graphics and had forgotten it was also sold for Archimedes machines. Somewhat ironically on RISC OS 5 this is again the preferred way of doing things, as the 32bit operating system removes the limit of 28MB on the wimp slot and allows it to grow up the size of the memory in the machine. Using this would allow you to allocate almost all of your 512MB to Photodesk, if you required it, with none of the problems or running out of dynamic area space. So I put in the feature where if `PhotoDesk$DyanmicAreaSize` was set to zero it would use the application memory instead of a DA. Unfortunately, I found out over time that not all of the features added to Photodesk since people used it on RISC OS 3.1 had been tested with the application memory instead of DAs and there were a few bugs.

With that fixed, I distributed a new copy to beta testers, pretty confident that I would get only minor problems reported but still details of crashes came in and these were the dreaded abort on data transfers. Different

people had problems with different functions, none of which the others or I could reliably reproduce, but they could do every time. I started looking into these with no success, as at this time I was distracted by other problems with the Iyonix.

I had accidentally deleted a manual from the Risc PC and went to retrieve the copy from the Iyonix over the network and found when I tried to copy it the machine just froze. I could copy just about every other file without problems but this one would always hang at a certain point. I contacted Castle and received excellent support. First they suggesting I try a different 512MB SIMM, which they sent immediately.

When this didn't work John Balance phoned me up for what was to be the first of many calls where he suggested various things to try. He sent me a new motherboard and then another USB card to try in combinations. By now all I was lacking was a graphics card and a case and I'd have another entire machine! It wasn't much fun swapping over all the components to try different combinations. All the cards have to be taken out, there are a

lot of wires that have to be unplugged each time and a careful note made of which pins they were connected to and which way round they went, so it could all be put back together correctly. Once all the screws securing the motherboard had been taken out, it was quite difficult working out how to get the board out through the opening, which was the same size as itself, while not losing any figures but I became quite good at it after a while.

The bad news that was none of the things I tried cured the copying problem and that when I did run Photodesk I found that on some sessions it would behave perfectly, while on others just about anything I did would cause a crash. At this point I was tearing my hair out. On one hand the copying problem indicated there was some hardware problem associated with particular file contents and on the other hand every other application I tried seemed to be running perfectly reliably on the Iyonix. So were the Photodesk crashes due to software or hardware? John, at Castle, had come to the conclusion that he knew what was going on and told me not to worry

there would be a solution in a couple of weeks.

I just had to take this on faith, as there wasn't much I could do to sort out these serious random crashes and time was ticking down to the Wakefield show, which I really wanted to get Photodesk ready for, as it would be good opportunity for sales of the upgrade and also give people yet another reason to buy an Iyonix. Also, I was going away on holiday to Canada for three weeks so, if I missed Wakefield, it would be a considerable additional delay before I could finish it. Ignoring the serious problems, I set about fixing all the minor problems beta testers had reported, which felt like fiddling while Rome burned!

The easiest was a missing arrow icon in one of the special effects settings window. Next was the clipboard window which was displaying 100% used. This was because it was using an old 32bit SWI call to read the freespace on the disc for its virtual memory calculation, which doesn't give the expected result when there is more than 2GB of space available. Luckily, a 64bit call has been provided since RISC OS 3.6 to handle

the vastly increased size of modern discs. It was quite straightforward to add code to routines in the Photodesk module see if this was available and use it in preference. I then went back to the first bug I'd found, of not being able to drag Artworks files to an existing canvas. I discovered that, as well as in the specific Artworks loader that handles loading into a new canvas, there is another routine in the utilities section which deals with the plotting over an existing canvas. A small correction got this working.

The last one was a minor problem in that the Tab key didn't work to toggle the main window over the tool windows. It would bring the main window to the front but never bring the tool windows over it on a second press. (I actually hadn't realised that this useful feature existed.) All the code seemed to be OK but monitoring the window order I found out what was wrong. The toolbar furniture on RISC OS 5 is one pixel taller than the new look style ones on older machines. This difference meant that the main window now overlapped by one pixel with its toolbar so, when it was brought to the top of the window stack, its toolbar would then be

repositioned overlapping it. This meant the main window was never at the top, so when Tab was pressed for a second time, it still thought it needed to come in front of the tool windows again, instead of going behind them. I adjusted the code that calculated the toolbars' position relative to the main window so it took into account the size of the furniture. It now wouldn't overlap regardless of the furniture used, or the pixel size of the current mode.

Not content with the bugs other people had found, I decided to go after one which had annoyed me for some time. In older versions of Photodesk you could click on the coloured square in the colouring effects window and bring up a standard RISC OS colour picker but this stopped working at some point and you had to use the much longer-winded action of using the menu to bring it up. I found this was a problem with the detection of single, double clicks and drags of the colour patch (it can be dragged in to the palette squares in order to create custom palettes), one simple value change got it working again.

At this point I also started work on sorting out all the sources I'd been given and integrating the changes I'd made into the real commented source, as this would be necessary if the software was to be developed further, although this is not something I want to do myself as I don't have the ideas needed to take the package forward.

This was an even more tedious process than the original 32bit changes, involving comparing the modified and original reverse engineered files and working out where equivalent instructions appeared in the BASIC assembler source files. The problem being whereas the reverse engineered files corresponded one to one with each executable object, the actual sources consisted of multiple files for each executable, some of which forming libraries shared between multiple tools.

Just as promised, after a couple of weeks another parcel from Castle arrived in the post. This was the UDMA upgrade consisting of a new ROM image to be loaded into the Iyonix, which would then boast disc access speeds from around 4MB/s to

20MB/s to 30MB/s with the existing 5400rpm drive and even faster with a 7200rpm one. While this was extremely welcome, the important part of the upgrade for me were the two little bits of hardware contained in the package. The first was a little circuit board that plugged into the spare pins of the PCI socket in front of the USB card. This ensures that the top 32bits of the 64 bit PCI bus were correctly terminated when not used by other cards. The other was smaller but even more critical: a tiny capacitor which fitted between the end of the lead from the reset button and the circuit board. John told me that both the problem when copying certain files across the network and Photodesk were due to spurious signals being induced in the reset line by a certain pattern of bits going across the PCI bus. This caused some of the chips in the machine to reset and resulted in the machine hanging — nasty! Placing a capacitor on the lead stops these signals being induced.

My faith in Castle was rewarded, as soon as I tried it. Copying was fine and Photodesk performed flawlessly. I was still getting crash reports from

the beta testers but I just had to sit back and wait until one by one they received the upgrade and their problems went away too. Now that's the sort of debugging work I like!

I then noticed the date. It was less than two weeks to Wakefield and, while good reports were now in from beta testers, the upgrade wasn't in a state to ship to users. Because the protection mechanism ties it to a particular machine, you need to run the installer to create a working setup and this wasn't 32bit compatible yet.

I dug out my Olympic CD from the dusty pile of jewel cases and checked it out. Luckily this was another BASIC program that had been compressed into a 26bit absolute. The BASIC was all fine, it was the wrapper code which didn't work. So it was simple case of extracting the BASIC and replacing an old read-only copy of !SparkFS inside the installer with the one that comes with the Iyonix. I then copied across all the new executable components into the installer and recompressed all the BASIC files with the 32bit compatible !MakeApp2 (by Dick Alstien).

With the installer finally done and tested, I phoned up Chris Hornby to see if there was any chance, with just one week to go before Wakefield, of him being able to get it ready. I actually caught him driving home from the airport after a trip to South Africa. He was very pleased at the news that Photodesk was ready and would phone back to arrange what we could do for the show. With a week to go at this point, and Chris only just having received the installer package by email, there wasn't enough time to make a batch of CDs so he'd only be taking orders at the show. But the important thing was it was completed on time.

Come the day (single now) of the Wakefield show, it was the usual mad rush to get everything organised on our stand, so I only had a very brief time to talk to Jason Perry, who was manning the Photodesk Ltd stand, just to make sure he knew about the 32bit version, which he did. After that I was tied up on our stand with the a constant stream of technical support and DiscKnight questions and it was all over too soon. By the time I'd packed most of the stand into my car I'd missed Jason to see how it went.

However I got a phone call from Chris Hornby the next day to say the upgrade had done very good business and he would be dispatching the upgrade CDs in the next few days. With this good news I was able to forget about developing for the next three weeks and have a fantastic time travelling across Canada from East to West. By the end of it I could close my eyes and not see reams of assembler instructions fly past.

Once back home and having worked through the mountain of email, I was pleased to see a Photodesk mailing list had been set up on Smartgroups (www.smartgroups.com/groups/photodesk) and had a large number of Iyonix owners using my 32bit versions. The only drawback being that I've now been roped in to providing support to people having problems.

I've still got a few things I need to do:

- Finish updating the file loader and special effects sources with 32bit changes (these are the ones where the source is slightly out of date compared to the binaries and will need a bit of effort to resolve).
- Resolve the problem loading jpegs from digital camera that have been rotated losslessly with !Jclean which causes them to appear stripy.
- Adding support for the new alpha transparency sprite format introduced in Select 3.
- Investigate the slowness of the crawling ants which are displayed around image selections in montage mode.
- Document the plug-in interface to allow other people to write tools for Photodesk, which was the starting point for Martin Wurthner to do such great things with Artworks.

After I've done these, I hope to pass the package on to someone else to maintain, as I mentioned before.

So if there are any talented programmers with experience of BASIC and assembler, who have good ideas for ways to enhance RISC OS's number one photo retouching package, please get in touch with either me (druck@armclub.org.uk) or Photodesk Ltd.

RISC OS Rhymes

The verses still flow from Alan Wickham's poetic computer

Sprites and Pixels



Where Cathode Ray on Phosphor fell,
That's where the Sprites and Pixels dwell.
Where Photons make all iridescent,
Red, Green and Blue shades fluorescent.
The brightest colours may be seen
In that fair land men call "The Screen".

Lo, comes the knight, Sir Vector Ffont,
Upon his Mouse, as is his wont.
Why, then, does he not ride a mule?
Sir Vector Ffont is Miniscule.
These cursive Ffonts, the Sprites declare,
Are simply getting everywhere.

But he rides on in armour smug
Hard Discs covering his Phono Plug
Floppy Discs he does disdain
They serve not an Electronic Brain
And if, by chance, he did one use
A Five-Quarter Incher he would choose.

Comes then the Damsel, all in tears.
'Tis Demon WYSIWYG she fears.
And just to add to her distress,
She hasn't got a Web Address.
She needs a FREELANCE for her aid,
Who's not of WYSIWYG afraid.



There stands the villain, COMMAND.COM
With his SIDEKICK, 'Seedy' ROM.
He started as a Software Dealer
But ended as a Cycle Stealer.
He's wanted as a Data Spooler
And fears he'll end up in the cooler.

Here come the two in holy orders
Complete with DVD Recorders.
Canon Ink Jet, and he's no sprinter
Nor his cell mate, Brother Printer.
They're certainly no four sec. milers,
More likely Basic (Text) Compilers.

There's the aged Web-Site Surfer,
Should be a bowling green deturfer.
Thinks himself a great Downloader
But is just a myth exploder.
The Pixels cry "How this ham
Clutters up his Disc with Spam".

WYSIWYG's mate, the Number Cruncher
Was once a Population muncher.
Found herself too old to cater
With lots of Demographic data.
Now she is content to totter
From the YOCTO to the YOTTA.

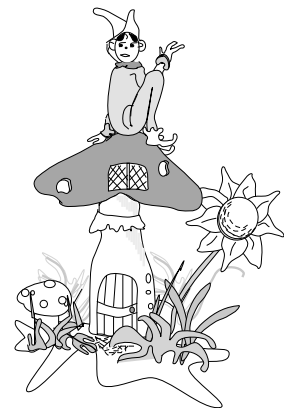
See Major Upgrade and his man,
Private Key, evolve a plan.
To Download all they can afford
And sell it off as 'Bullitin Board'.
Why, then, don't they aquire the trash?
They have the Fonts, but not in Cashe.

They all see themselves in clover
Now the Millennium Bug is over.
Three Wired Systems fix their fate
(These now come, in triplicate)
The eldest, men call simply 'C',
Then Aida and Odd Parity.

Arnold Kilroy Byte

Notes for the Uninitiated

- 1) FREELANCE: An ancient DOS Vector Graphics Prog.
- 2) SIDEKICK: An ancient DOS File Manager.
- 3) Cycle Stealing: Part of DMA process.
- 4) DVD Recorders: They record the transactions of the DVD [Divinity Validation Directorate].
- 5) YOCTO: Prefix like kilo etc but 10^{24}
- 6) YOTTA: Prefix like micro etc but 10^{-24}



Crystal Gazing

Cartoon by Jan Pearce



Site Seeing: Popular Science

So what's your scientific cup of tea? Astronomy? The human body? Entomology? This edition's selection of sites aims to point you towards a collection of fascinating web sites, whatever your interests in the this area, as well as providing

everybody feels inconvenienced by not having all the 'bells and whistles'.

The Science Museum site at www.sciencemuseum.org.uk/ has a number of interesting online exhibitions on wide-ranging topics,

If you're interested in any form of science there's sure to be a website dealing with it, at whatever level you're at, as Sue Clamp has been finding out.

some ideas for those who have to teach the subject.

BBC Science at www.bbc.co.uk/science/ is a very comprehensive site covering a huge variety of different scientific topics from cavemen to robots. There is a useful text only version of the site, if you prefer to view without graphics.

This makes up for the fact that some aspects of the site are inaccessible to those of us using only RISC OS for the Internet, namely the interactive elements which require a more recent version of Flash than we currently have available. Of course, not

covering subjects such as climate change, genetics and fusion. *Exhibitlets* are 'digital exhibitions which use the Museum's collections to describe important events, discoveries and personalities in science and technology.'

Additionally, there are educational pages, with sections aimed at teachers and also different age groups. The primary section has a homework and project work page with links to other relevant parts of the museum site. 'Fun Stuff' contains the inevitable interactive games, which don't work on RISC OS, but the *DIY Launch Pad* has a number of projects that children

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[Interactive Body](#), [Organs](#), [Muscles](#), [Puberty](#), [Emotions and Instincts](#), [Reading Faces...](#)

Genetics
[Sex](#), [GM Food](#), [Cloning](#), [Celebrity Game...](#)

Robots
[Toys](#), [Games](#), [Build A Robot...](#)

[Chat About Science](#)

GAMES
 Try our Beasts skeleton jigsaw

The BBC Science pages offer a variety of subjects from cavemen to robots

of all ages can do for themselves (with some help from an adult), for example, making a shadow box or a human battery.

The Theater of Electricity (American spelling!) at www.mos.org/sln/toe/, is part of Boston's Museum of Science, which houses the world's largest air-

insulated Van de Graaff generator. The site contains some lovely images of sparks and tesla coils and an interesting explanation of Franklin's kite experiment. There is also a set of lesson plans on static electricity.

The next three sites are clearly aimed at primary aged children. Enchanted

What now?

Amaze your friends by being able to poke your finger through the bubble sheet without popping the bubble. Dip your finger into the bubble mixture in the washing-up bowl then slowly push it through the bubble sheet. Because your finger is covered in mixture the surface tension (skin) of the bubble is not broken so the bubble sheet does not pop.

◀ [What you do:](#)

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[Here's the science bit...](#) ▶

◀ [back to: DIY Launch Pad](#)



Clothilde Bell

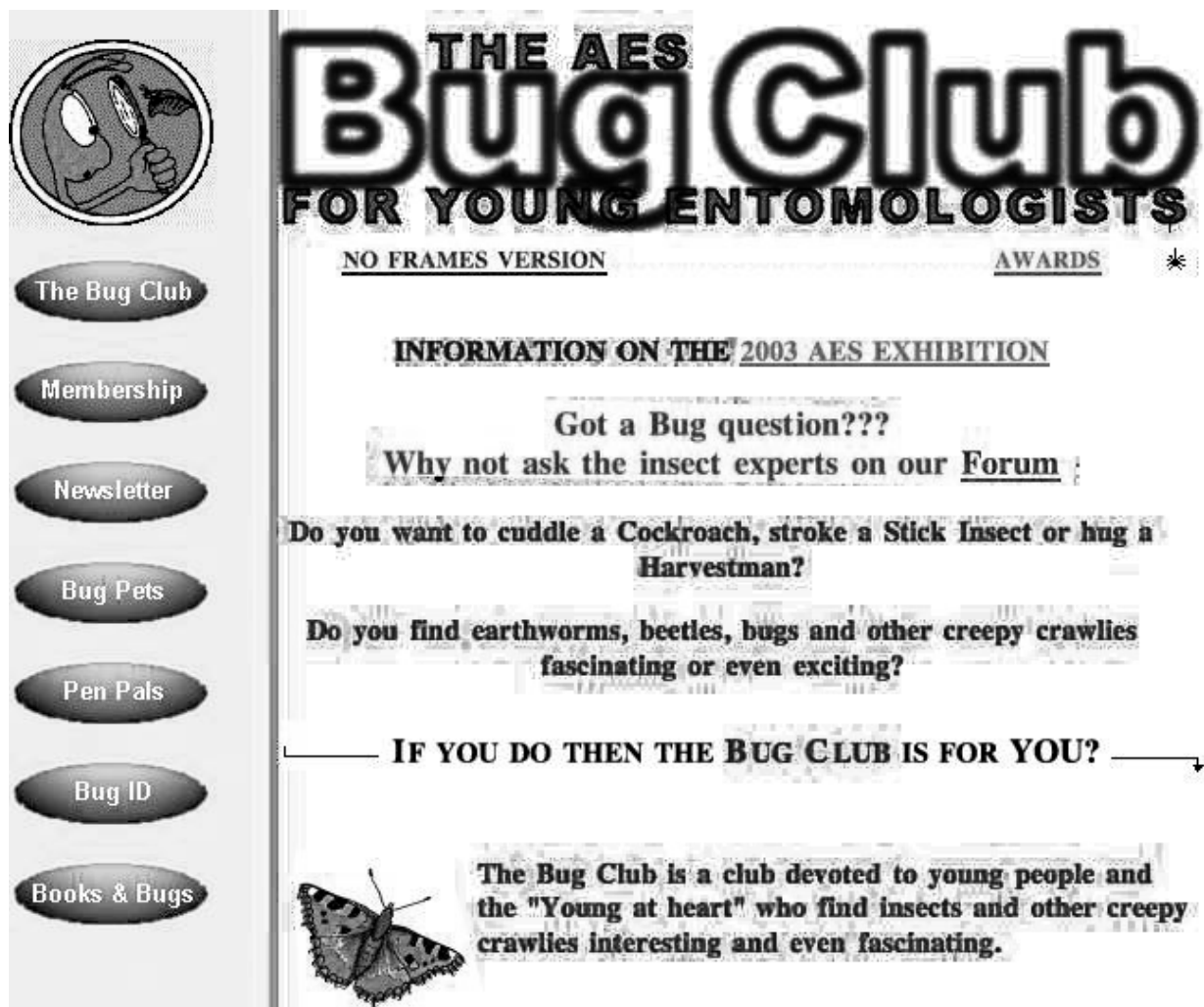
Bubble games on the Science Museum website

Learning (www.EnchantedLearning.com/Home.html) has lots of information on biomes, birds, butterflies, rain forests, sharks, whales and plants among others. The Earthlife Web at earthlife.net/ is an online encyclopedia of life on earth. It contains clearly presented pages of information, diagrams and images of everything from cells to elephants.

The Bug Club (www.ex.ac.uk/bugclub/), a site for young entomologists, has a useful

insect identification key, care sheets for those interested in keeping various 'bugs' as pets and a forum where insect experts can be asked questions.

More suitable for secondary aged pupils is the Schools Online Science web site. Although the original project which set the site up is now completed, Sheffield Hallam University are now maintaining it. The Library has a useful annotated and indexed list of science web sites, chosen to reflect National Curriculum



The screenshot shows the homepage of 'THE AES Bug Club FOR YOUNG ENTOMOLOGISTS'. On the left is a vertical sidebar with a cartoon bug character at the top and several oval buttons: 'The Bug Club', 'Membership', 'Newsletter', 'Bug Pets', 'Pen Pals', 'Bug ID', and 'Books & Bugs'. The main content area features the title 'THE AES Bug Club FOR YOUNG ENTOMOLOGISTS' in large, bold, stylized letters. Below the title are links for 'NO FRAMES VERSION' and 'AWARDS *'. A section titled 'INFORMATION ON THE 2003 AES EXHIBITION' follows, with a sub-header 'Got a Bug question???' and a link to a 'Forum'. Below this is a question: 'Do you want to cuddle a Cockroach, stroke a Stick Insect or hug a Harvestman?' followed by another question: 'Do you find earthworms, beetles, bugs and other creepy crawlies fascinating or even exciting?'. A line of text reads 'IF YOU DO THEN THE BUG CLUB IS FOR YOU?' with an arrow pointing right. At the bottom left is an illustration of a butterfly, and at the bottom right is a text box stating: 'The Bug Club is a club devoted to young people and the "Young at heart" who find insects and other creepy crawlies interesting and even fascinating.'

The Bug Club for young fans of creepy crawlies

areas of study. The Lab contains many investigations, activities and experiments that schools can become involved in. Schools Online Science can be found at www.shu.ac.uk/schools/sci/sol/contents.htm.

Some pages of Planet Science (www.planet-science.com/home.html), set up as the extension of the Science

Year initiative, give a little trouble here in Oregon 1, and of course some of the features of the interactive site are not accessible to RISC OS users, but there is an alternative text version of the site that gives a flavour of the information and activities it carries. The site focuses on young people and the adults around them, especially their parents and teachers, providing some inspirational ideas for teaching

The Solar System



What is the [solar](#) system? It is our Sun and everything that travels around it. Our solar system is [elliptical](#) in shape. That means it is shaped like an egg. The Sun is in the center of the solar system. Our solar system is always in motion. Nine known planets and their moons, along with [comets](#), [asteroids](#), and other space objects [orbit](#) the Sun. The Sun is the biggest object in our solar system. It contains more than 99% of the solar system's [mass](#). [Astronomers](#) think the solar system is more than 4 billion years old.



The Sun	The Planets
The Moon	The Asteroid Belt
Meteoroids	Comets

A child-friendly page from NASA's Starchild site

science and a substantial number of links to other science sites, all categorised.

My personal favourite is the NASA web site at www.nasa.gov/ which, in common with the BBC Science web site, has a low bandwidth version of the site without images but with links to them. This is important as I believe that being able to see the fabulous

pictures of our solar system is one of the best reasons for visiting this site. Starchild (starchild.gsfc.nasa.gov/docs/StarChild/StarChild.html) is NASA's child-friendly site. There are two versions of every page (level one and level two) aimed at younger and older readers. Both worked well here and as the sound files were WAVs I had no problem listening to the commentary being read out. They



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IMAGE OF THE DAY GALLERY

NASA's Hubble Space Telescope took this close-up of the red planet Mars

NASA's Hubble Space Telescope took this close-up of the red planet Mars when it was just 34,648,840 miles (55,760,220 km) away. This color image was assembled from a series of exposures taken between 6:20 p.m. and 7:12 p.m. EDT Aug. 26 with Hubble's Wide Field and Planetary Camera 2. The picture was taken just 11 hours before the planet made its closest approach to Earth in 60,000 years.

*Mars photographed
by the Hubble
Space Telescope
(right) and a NASA
simulation of
Saturn as seen from
the moon*

also provide three different versions of their activities: CGI, Java 1.0 version and Javascript 1.1 version.

The CGI version worked perfectly on my machine. Movies on the level two pages are in both AVI and Quicktime format. Anyone lucky enough to have a copy of Cineroma will be able to view the AVI files.

This site is an ideal place for young people to learn about the magic of space, the universe and everything!

NASA also cater for those aged 14+ at their *Imagine the Universe* site at imagine.gsfc.nasa.gov/docs/homepage.html. Obviously this has a slightly more adult look and feel than Starchild, but is no less interesting and well-presented than the rest of the NASA site.

Another section of the NASA site that's worth a visit is the Solar System Simulator at <http://space.jpl.nasa.gov/> where you are given options to view the whole solar system, the planets or their moons from various viewpoints, times and fields of view.

Writing for Eureka

If you'd like to join the team working on Eureka, but don't feel that the Editor's job (*see page one*) is for you, there is another vacancy. We need a News Editor to collect interesting news items from the Internet.

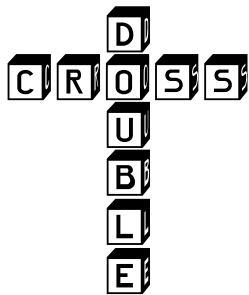
Remember, also, that we are always happy to have contributions from any of our members on any RISC OS computing subject.

You can send a single article or become a regular member of the team and, for every issue where you have a contribution, your Club membership will be extended for three months. Become a regular and you gets what's virtually free life membership!

In addition, every contribution entitles you to a £5 discount from any item of Club software.

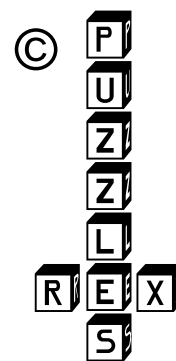
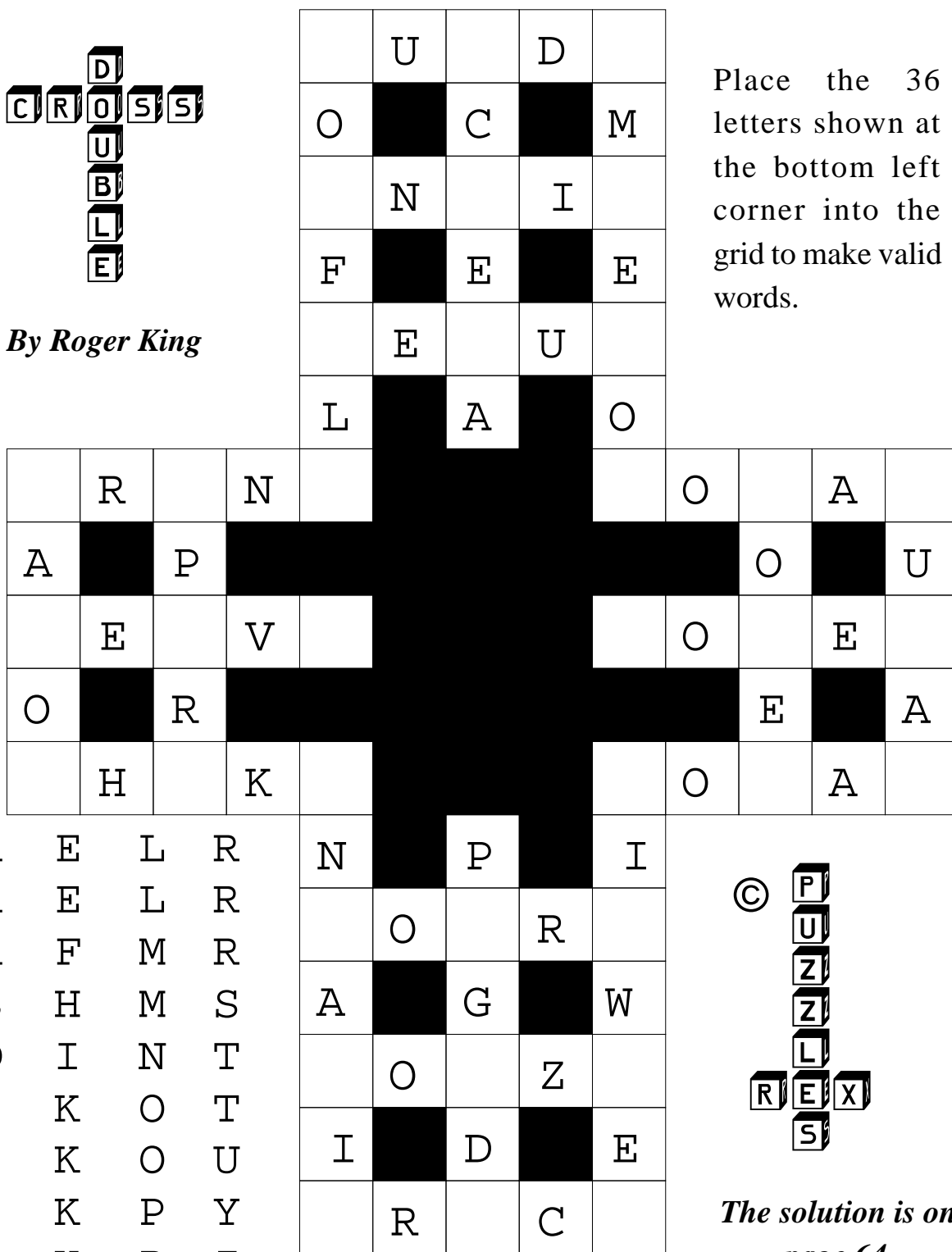
If you're interested in joining the team, email or write to The Editor at the addresses on our last page.

The Double Cross Puzzle



By Roger King

Place the 36 letters shown at the bottom left corner into the grid to make valid words.



The solution is on page 64.

Winning Games With Logic

Today we will talk ants and have a look at a technique that was inspired by their behaviour. This gives me the excuse to present some useless facts about them.

In issue 45 I asked the question, how do ants learn? Of course the short

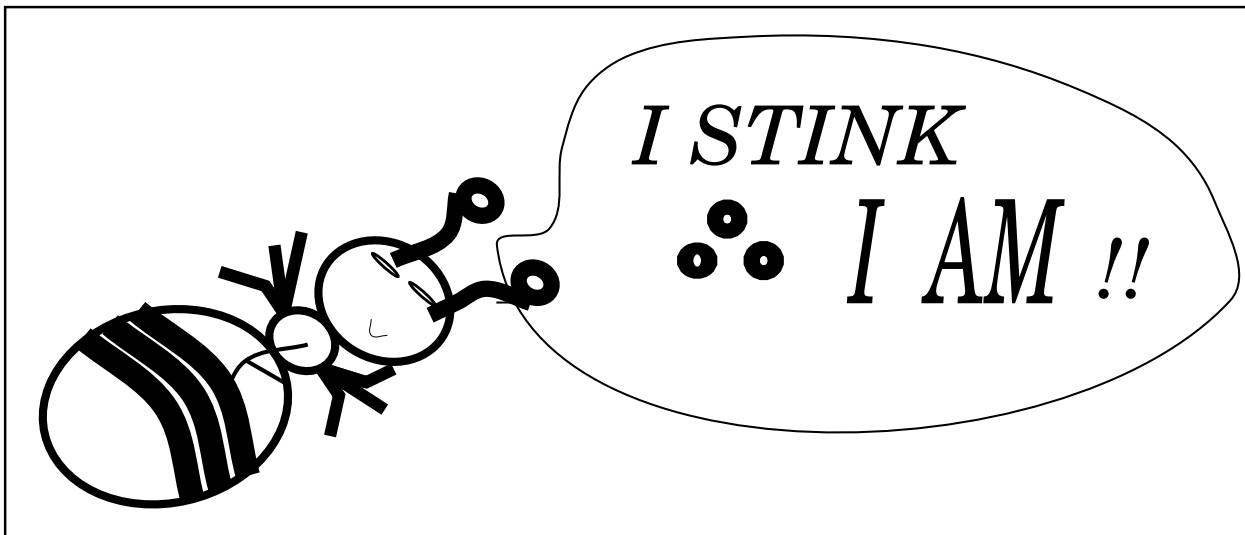
but ants don't. They do however lay a pheromone trail wherever they go (see issue 45). Pheromone trails provide a basic degree of communication (albeit in coded form) among the ants — just enough initially to keep them from wandering off at random.

The ants are on the move again as Barry Aulton sees what we can learn from them to devise some more winning ways using logic.

answer is that they don't. You may initially think of an ant colony as simply a bunch of ants running around at random, looking for food and making a nest. However, seen holistically, they are quite well defined units with their own qualities. You may have noticed, that ants can't talk!

How would the sentence: "Hi Persephone," (worker ants are female) "I've just found some pollen. Why don't you go and investigate? There is enough for everyone," get communicated? Bees point where the food is and waggle their backsides!

Ants thus, in effect, cooperate with their team mates (although they are not individually aware of this). It takes a larger number of ants, all reinforcing each other, to sustain any activity — such as trail building — for any length of time. If an activity (such as trail making, food gathering, or nest keeping) is initiated, by a few ants at some specific place, one of two things happen. If a critical mass of ants is present, the activity is likely to 'snowball'. More and more ants decide to follow the pheromone trails which will get them involved in that activity. If there are insufficient ants to start with, the activity is likely to



Ants' pheromone trails provide a basic degree of communication

fizzle out. In effect when ants need to get something done they form 'teams' that stick together purely to perform that activity. Small groups of ants are constantly forming and reforming. The groups that persist are the teams. The only reason the teams don't fall apart is because each ant in the team is performing the same activity.

You can think of a team of ants as forming a type of 'signal' that moves along with them. The effect of these signals is to transport ants of various specialisations to various parts of the colony. Let's say a signal is moving along. As it goes, the ants which compose it interact, either by direct contact or by an exchange of scents, with ants of the local neighbourhood through which it passes. The contacts

and scents provide information about local matters of urgency (such as nest building, food or nursing). The signal remains glued together as long as the local needs are different to what it can supply. However if it *can* contribute, it disintegrates spilling a fresh team of useable ants onto the scene. From a single ant's viewpoint, it is just meandering around the colony in search of nothing in particular until it feels like stopping. Its team mates usually agree and at that moment the team unloads itself by crumbling apart, leaving the team members but none of the teams coherency. The individual ants that form a signal sometimes break off and get replaced by ants of a similar type, if there are a few in the area. Often signals arrive at the destination point with no ants in

common with their starting line-up. No planning is thus required, nor looking ahead; nor is any search required to determine the proper direction to go.

Now for the algorithm. I realise that each equation halves the readership so I have been putting this off till now. Time to put the kettle on! The magic formula appears in *figure 1* opposite.

Imagine you are lost in the woods and notice footprints going in several directions. It may be reasonable to suppose that the more people that have gone a particular way, the more likely it is to lead somewhere.

This is the idea of the intensity term, the intensity here being say the number of footprints per square yard. For the ant, the trail intensity is the intensity of the pheromone trail that has been laid down by other ants that have gone that way. The more it pongs the more likely the ant will go that way! I have used this criterion to find my way out of the Barbican theatre complex in London. That is, when in doubt, assume most people after a concert are heading for the tube station. I could have been wrong

if, for example, many were heading for the car park.

My formula for choosing which way to go (I have no sense of direction!) is thus: probability I will choose to follow group i is proportional to the number of people in group i . This probability is :

Probability will go in direction $i =$

$$\frac{\text{no of people going in direction } i}{\text{total number of people going in any direction}}$$

In ant terms we consider the ants that are at a particular place labelled i and consider the probability that they will go to place j . This probability is proportional to the intensity of the pheromone trail from place i to place j .

The probability is thus proportional to:

$$\frac{(\text{pheromone trail}) \text{ intensity}[i,j]}{\text{total trail intensity going from place } i}$$

Figure 1

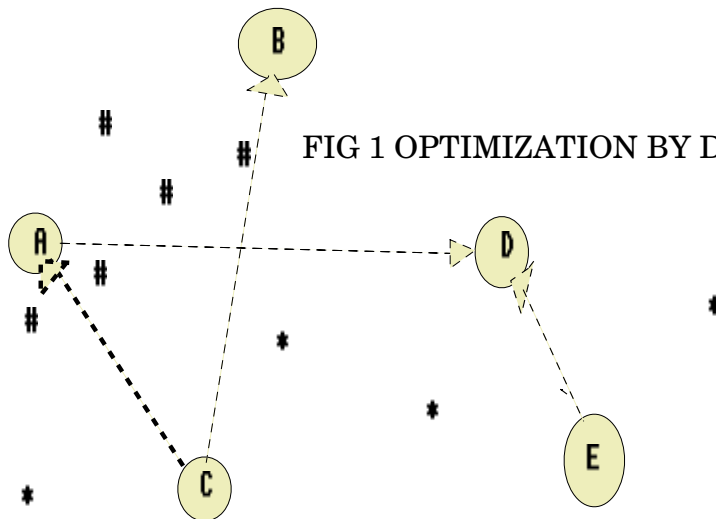


FIG 1 OPTIMIZATION BY DISTRIBUTED ANTS

A friendly computer controlled character, CCC moves from one place to another with a probability proportional to its preferences where $Preff[i,j]$ is the preference (or probability) that CCC will move

Key


Line thickness showing strength of preference

* friendly CCC,s

enemy CCC's

Cost of a friendly CCC getting from say (place) E to D is an ad hoc function of a benefit factor , plus the damage done to the CCC by enemies. We do not know this yet, this is here an estimate.

We give a CCC at place i a preference to go to the j th place in the form of

$$Preff[i,j] = \frac{(\text{intensity}[i,j]) * (\text{reward}[j] / \text{cost}[i,j])}{\text{sum of this for all places } j}$$


Where $\text{intensity}[i,j]$ is the intensity of the trail from place i to place j. This will be proportional to the number of CCC,s that have gone this way before.

Where $\text{cost}[i,j]$ say = constant * distance from CCC i to place j

$\text{reward}[j]$, say = expected benefit to CCC in getting there

This is just an ad hoc function. We simply estimate the damage that may be done by the strength of enemy CCCs in the way.

The preferences also decay with time. Thus the affect of a CCC going the wrong way or being lucky decays to zero.

Here CCC's near place C would probably choose to go to place A , since the line thickness indicates a strong preference . Presumably since it is going the right way & few enemies met.

There is, however, another factor which is game dependent and I will try to explain by examples. This reflects a ‘cost’ of getting there, which for the ant may be proportional to distance.

Suppose I want to buy an article and must decide where to buy it. I may decide my enthusiasm for buying from store j may be roughly proportional to $1/\text{cost of item at store } j$. Distance may be important. My enthusiasm for buying from store j may be:

$1/\text{cost of item at store } j * 1/\text{distance to store } j$

or even:

$(1/\text{cost of item at store } j)^N * (1/\text{distance to store } j)^M$

where N & M are integers 1 - 4. (By altering N & M , I am changing the relative importance of cost over distance.)

Meanwhile, our bog standard ant, being a dumbo, doesn’t make such rational decisions. If it can see food it may go towards it. This is accounted

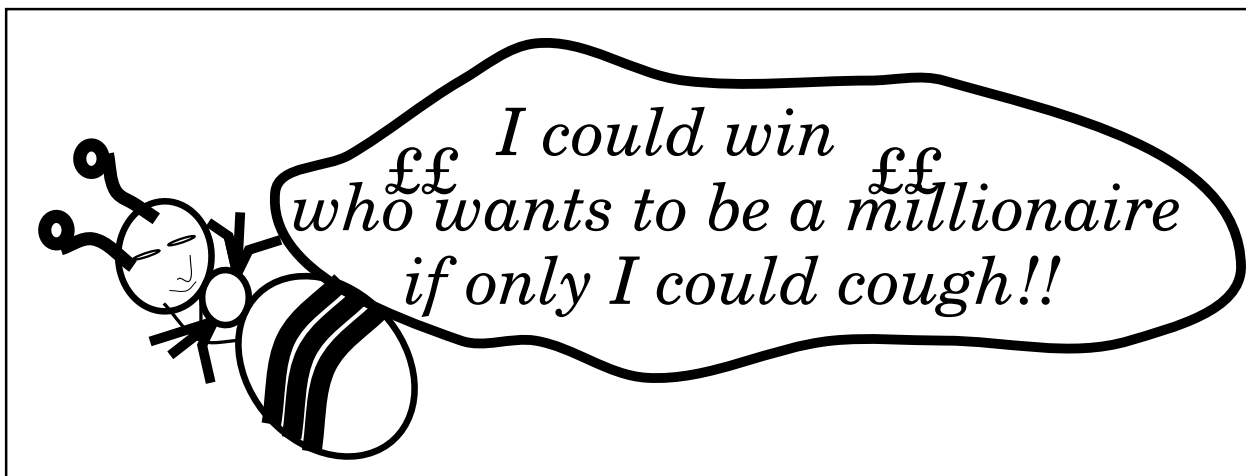
for by introducing a term which I have again called $\text{cost}[i,j]$ which accounts for the cost of the ant (or for a computer game computer controlled character, CCC), travelling from place i to place j . (This too may be proportional to the distance from i to j). Alternatively, as in *figure 1*, there may be a cost in travelling from i to j due to the number of enemies that your character has to battle its way past. There may be a benefit in reaching place j , which I have called $\text{reward}[j]$.

We now have as the probability or preference of going from place i to place j in the form:

$\text{Pref}[i,j] =$

$\frac{\text{intensity}[i,j] * \text{reward}[j] / \text{cost}[i,j]}{\text{sum of all preferences from place } i \text{ to all places this ‘ant’ has not visited}}$

At this stage you may be wondering what use this is. In some games, such as mazes, the order things are done is important. However anything that always follows a predefined order can be easily outwitted, since it never learns. Each computer controlled



character (CCC) needs to be able to:

- a) Keep track of what it has done (such as the place it has been in).
- b) Be opportunistic to take advantage of the current situation (for example, attack the stray leprechaun that happens to be passing by).
- c) Learn from experience.

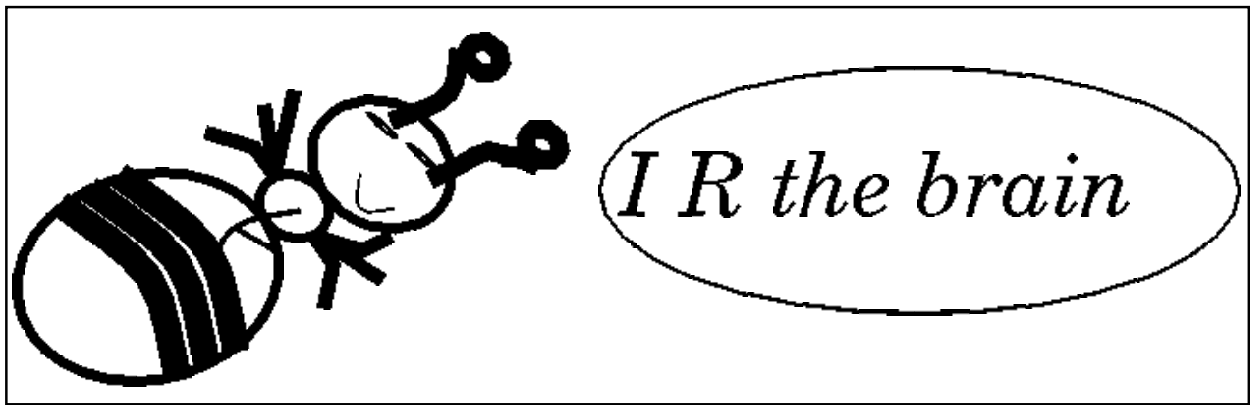
We need some way for it to learn, but how? One of the most interesting developments in A-LIFE research, has been the emulation of the way animals learn from experience.

A successful learning strategy can be split into three separate sub-problems:

- 1) It must have an action selection mechanism (even if it's just random).

- 2) It needs a learning mechanism to create ideas to be tested and to know which of these to keep and which to reject. Initially this can be done by a random state generator (for example, if random number >50 and random number <70, enter the grisly grotto —see a previous issue).

- 3) It must have an exploration strategy in order to improve its performance. (Cats, having discovered one way of obtaining food, will often keep repeating a useless ritual that they happened to perform just before success.) A learning mechanism needs to try sub_optimal (such as random) strategies in order to eventually find a better way of doing things. (Simply leaving a minimum probability of performing a random action of 5 - 10% helps here). So we need a way to learn.



Now we must introduce *Optimisation by distributed ants*, which is a simple learning method. The action selection mechanism and exploration strategy is initially random. Learning is achieved by increasing the probability that an ant (CCC in games) will repeat an action that has previously been successful.

One of the problems that has been difficult to solve is called the travelling salesman problem (TSP). Here the salesman has to complete a round trip of a set of cities, visiting each only once, and in such a way as to minimise the distance travelled. In order to solve this problem I will introduce the idea of a ‘taboo list’, whereby when the salesman reaches a city he enters it into a list of cities he has visited and consults it whenever he chooses another city to go to, to prevent re-entering one.

Now when we compute the $preff[i,j]$

we must only sum in the denominator the terms for the places which that ant (salesman) has not been to.

In order to solve this problem we imagine there are many salesmen, say 50, some placed at each city at the start of the optimisation. We then let each salesman choose a city to go to according to the above magic formula. We then move each ant/salesman to its chosen destination city entering this city into the salesman's taboo list. When each salesman has moved we assume that each agent has been laying down a ‘pheromone trail’ wherever (s)he goes. Each time a salesman makes a move, the trail (s)he leaves on the path from city i (which it is currently at) is collected and will be later used to compute new preferences.

Armed with the above magic formula and the taboo list, we can now proceed with the algorithm.

1) Initialise set the intensity $[i,j]$ to a low value for all i,j

Place some ants (or CCCs for a game) on each place i

Set intensity increase $[i,j] = 0$ for all paths from every place i to every place j . This accumulates the ‘pheromone trail’ intensity that will be laid down by the ants during the movement of each ant from the place it is at to the place it has decided to go to.

2) Repeat until the taboo list is full (that is, repeat n times)

2.1) for every place i

2.1.1) for each ant (CCC) currently at place i

Choose the place j to move to with probability $\text{pref}[i,j]$ given by the above magic formula and move the ant to place j .

Enter place j in that ant’s taboo list.

2.2) Update the intensity increase due to this ant travelling from place i to j .

Intensity increase $[i,j] += \text{small constant}$ (or intensity increase $[i,j] +=$

constant / distance $[i,j]$)

When every ant has moved we update the trail intensity for all i & j

Intensity $[i,j] = \text{intensity}[i,j] * \text{evaporation factor}$

+ intensity increase $[i,j]$

Where the evaporation factor is a constant 0.7 to 0.95 which slowly reduces the trail intensity with time.

Since the trail intensities have been changed we now need to update all the preferences.

3) When each ant’s (salesman’s) taboo list is full we then memorise the best route (shortest route for the TSP problem) up till now and empty all the taboo lists

4) If we have not performed the required number of iterations repeat from 2)

Else print best (shortest) route and stop

Next time I will try to explain something weirder still!

The Sys Admin's

On the first day of Christmas, my user sent to me a file that crashed my PC

On the second day of Christmas, my user sent to me two Klez worms and a file that crashed my PC

On the third day of Christmas, my user sent to me three top ten lists, two Klez worms and a file that crashed my PC

On the fourth day of Christmas, my user sent to me four bad jokes, three top ten lists, two Klez worms and a file that crashed my PC

On the fifth day of Christmas, my user sent to me five Bugbears, four bad jokes, three top ten lists, two Klez worms and a file that crashed my PC

On the sixth day of Christmas, my user sent to me six dying wishes, five Bugbears, four bad jokes, three top ten lists, two Klez worms and a file that crashed my PC

On the seventh day of Christmas, my user sent to me seven support emails, six dying wishes, five Bugbears, four bad jokes, three top ten lists, two Klez worms and a file that crashed my PC

On the eighth day of Christmas, my user sent to me eight meg of attachments, seven support emails, six dying wishes, five Bugbears, four bad jokes, three top ten lists, two Klez worms and a file that crashed my PC

Days Of Christmas

On the ninth day of Christmas, my user sent to me nine top ten lists, eight meg of attachments, seven support emails, six dying wishes, five Bugbears, four bad jokes, three top ten lists, two Klez worms and a file that crashed my PC

On the tenth day of Christmas, my user sent to me ten “you must forwards,” nine top ten lists, eight meg of attachments, seven support emails, six dying wishes, five Bugbears, four bad jokes, three top ten lists, two Klez worms and a file that crashed my PC

On the eleventh day of Christmas, my user sent to me eleven “I love you” mails, ten “you must forwards,” nine top ten lists, eight meg of attachments, seven support emails, six dying wishes, five Bugbears, four bad jokes, three top ten lists, two Klez worms and a file that crashed my PC

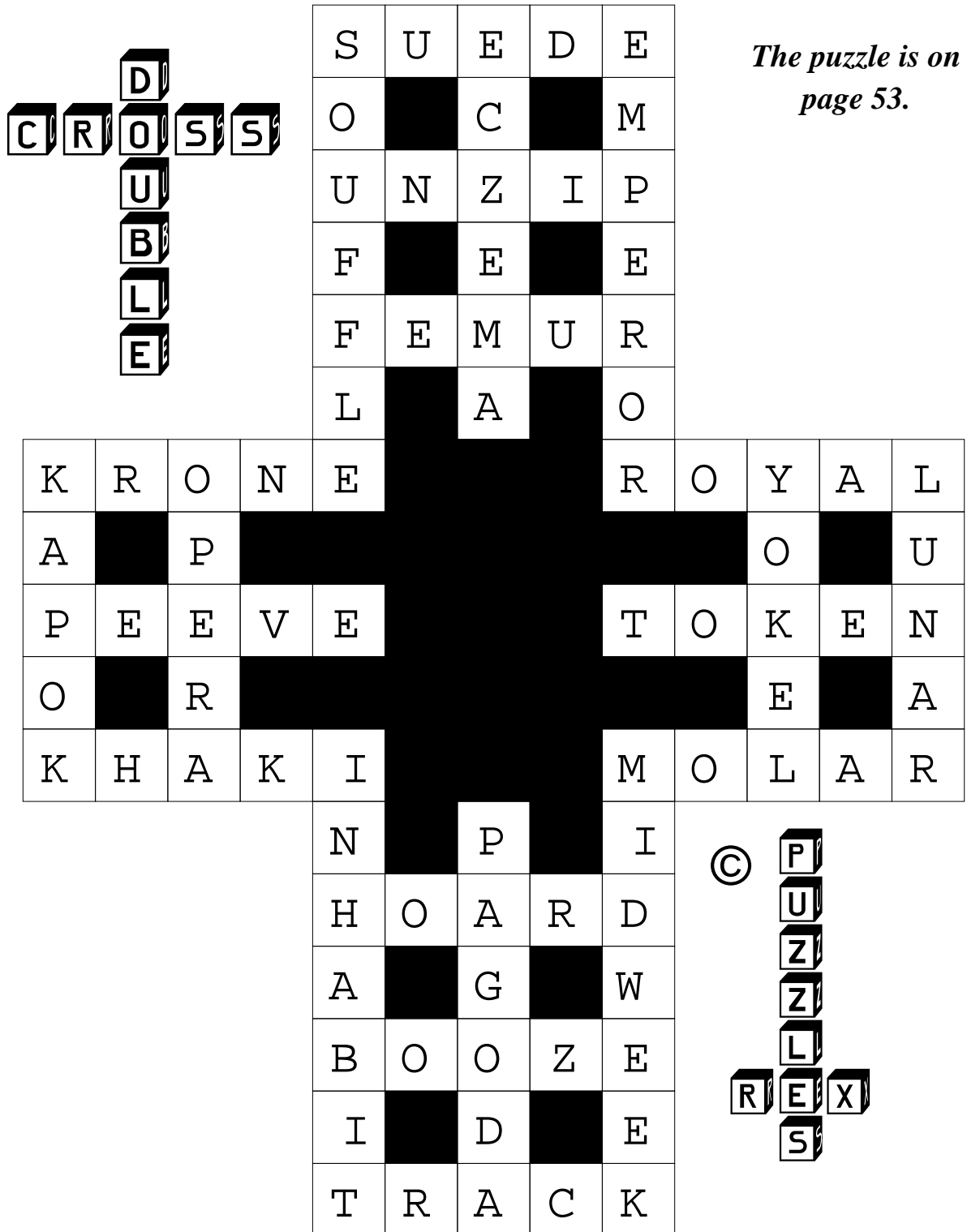
On the twelfth day of Christmas, my user sent to me twelve online petitions, eleven “I love you” mails, ten “you must forwards,” nine top ten lists, eight meg of attachments, seven support emails, six dying wishes, five Bugbears, four bad jokes, three top ten lists, two Klez worms and a file that crashed my PC

On the thirteenth day of Christmas, my user gave me a call —’cause someone unplugged his machine from the wall.

Email

Subject:	Date
I love you	5 Jan
I love you	5 Jan
I love you	5 Jan
I love you	5 Jan
I love you	5 Jan
I love you	5 Jan
I love you	5 Jan
I love you	5 Jan
I love you	5 Jan
I love you	5 Jan
I love you	5 Jan

The Double Cross Solution



ARM Arena

This time around there are a couple of matters hanging over from the last ARM Arena column and although it's been a quiet few months there have been several releases to keep those who give custom to the mostly serious-minded RISC OS market entertained!

the original Descent 2 release. *Quake* has also been released for the Iyonix resulting in an approximate 2-3 times increase in performance depending on screen resolution in addition to compatibility with this latest RISC OS machine. David McEwen, the author of the updates keeps an

Andrew Weston finds enough new releases in the games market to keep him entertained, including some eagerly awaited versions for the Iyonix.

Iyonix updates

Last time I mentioned that versions of the first-person perspective 3D space-themed combat games *Descent* 1 and 2 were being developed that are compatible with the Iyonix. These have now been released and, aside from a speed increase of roughly three times, a range of enhancements have been added graphically and in terms of the game's plot development. The good news is that these enhancements are available as an upgrade pack for all versions of the game and include improvements such as lighting and transparency effects and movie sequences that were not supported in

interested eye on possibilities for future conversion to RISC OS and so, although he is keen to finish off other RISC OS work in his spare time, it will be interesting if we see any other games of the quality of *Descent* released as a result of his efforts.

Finally, on the RComp front, *F16*, the flight simulator which was converted to RISC OS only to be found not to be catered for by the Risc PC's capabilities, has been raised by RComp themselves as a possibility for the Iyonix so watch this space for any news on this long-overdue title.

Doom

The predecessor to the aforementioned Quake, *Doom*, has spawned a whole range of related utilities and extensions some of which have been mentioned in this column.

The latest are a series of utilities to assist in the changing or designing of new DOOM graphics. These can be downloaded from MattLB's website but users should be warned that they will need a copy of the Doom+ upgrade from RComp Interactive for programs on which these utilities are dependent.

Commodore Emulation

Strictly speaking, any new software using a RISC OS-based computer is worthy of mention in a relevant news column even if it is software that is running through an emulator itself running on RISC OS. In any case, RISC OS users might be interested in the release of a RISC OS version of the Versatile Commodore Emulator (VICE). This provides emulation for all of the 8-bit machines that the now defunct Commodore released —the C128, C64, CBM2, PET, Plus4 and VIC20. Commodore as a company partitioned and transformed into

various new companies quite a few years ago and although it hasn't effectively re-united into a single company like Acorn, judging by the continued interest in old BBC Micro games it is not hard to see why people would still remain interested in playing old Commodore games as well, or indeed using other Commodore software.

Andreas Dehmel, author of version 1.13 of the conversion makes available the software on his website which is now also Iyonix compatible.

Angband

A whole range of variants has recently been released of this classic role-playing arcade adventure game that is notable for using text-characters to represent the games graphics. There are about 10 in all which differ in story line, characters and tasks. The player moves the game character about a world represented as a grid of the game graphics and objects and has to overcome various puzzles, adversaries and a large number of levels. All are available from the website of Antony Sidwell, given at the end of this article.

Christmas presents?

The release of both of RComp Interactive's classic conversions is a major bonus for Iyonix-owners who would like to play these games at an exhilarating pace on their new machine and the Descent update should add further enjoyment to the game for Risc PC owners as well.

However I hope that after Christmas I'll be able to report on the release of several more significant releases and perhaps even another conversion whether it be from the Linux or PC platform.

Again, watch this space.

Contacts

RComp

Web: www.rcomp.co.uk

Telephone: 01925 757377

Doom utilities

Web:

www.angelfire.com/mt/wumps/doom.htm

VICE

Web:

<http://home.t-online.de/~zarquon/Software.html#vice>

Angband

Web:

<http://ajps.mine.nu/angband/ports>

Coming in Eureka 49

We are already looking ahead to the Spring 2004 issue of Eureka, where we hope to have some inside information on what RISCOS Ltd is planning for the future and what the Editor of RISC World has in mind for his magazine.

We will have an article of interest to digital camera users on keeping the costs down and there will be the latest on the ARM Arena gaming scene, some interesting URLs to go Site Seeing, the best of the PD programs which are Free For All, more ways for Winning Games With Logic, a DoubleCross puzzle and a cartoon among our regular columns. But there will still be space for your contribution if you would like to send one!

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