





READY!

Past masters

IF IMITATION IS THE SINCEREST FORM of flattery, then the classic home computers and games consoles of the 1980s must be the most complimented electronic devices in the world. Why? Because of emulation. An emulator allows one machine to pretend to be another, and thereby run its software. Take Apple's transition to the PowerPC processor for instance. It used an emulator to run existing software designed for the 68000-based Macs, until native PowerPC versions became available. Intel's forthcoming Itanium 64bit CPU will also feature some kind of emulation allowing it to run existing 32bit X86 software.

But this feature isn't about the serious side of emulation. We're paying homage to home computers with some software emulators that temporarily turn your mighty Pentium PC into a humble ZX Spectrum, Commodore 64, Amstrad CPC, Atari ST or Amiga.

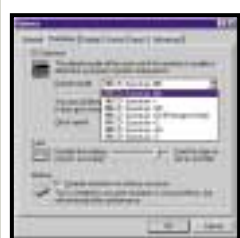
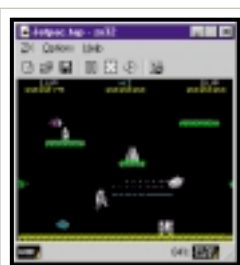
Sure, the games at the time may be visually shocking compared to Quake III Arena, but technical shortcomings are more than compensated for by superb gameplay. So, go on, treat yourself to a trip down memory lane. A couple of brief downloads later and you'll be welcoming an old friend back into your life.

NOSTALGIA AIN'T WHAT IT USED TO BE, BUT IF YOU YEARN FOR THE OLD DAYS GORDON LAING HAS SOME ADVICE ON HOW TO TURN YOUR PENTIUM PC INTO A ZX SPECTRUM OR AN AMSTRAD CPC.

ILLUSTRATION TOM BUCHANAN



Top: Dropzone running under the VICE 64 emulator
Bottom: VICE even lets you improve the sound of the 64's SID chip



Top: JetPac running on ZX32 – note the handy pause button
Bottom: ZX32's options even include emulating poor memory!

A software emulator sits between the original games or applications and your PC hardware, interpreting commands. For example, the original game may want to make a sound, and places a call to the original platform's audio hardware. The emulator interprets the commands to drive the PC hardware in a similar fashion.

An emulator will make use of your PC graphics, sound, storage, keyboard and often mouse and joystick. Some may offer additional facilities such as increasing the display size to fit your screen, or even oversampling the audio to sound even better than the original.

You may have the emulator running under Windows, but the original platform has no concept of drives C, D and so on. Instead the emulator must ensure your PC's drives act like the original cassette player, cartridge slot or rudimentary disk drive. It must also attempt to match the speed of the original hardware.

While the emulators are new cunning interpreters for Windows, the software you run on them is the same as the originals.

The process of transferring the data from the original media to a PC is beyond the scope of this feature but, fear not, plenty of people have already done the leg work. You can find just about any piece of software you want, somewhat misleadingly called ROMs, on the Internet.

We'll list platform-specific sites later, but a great place to start is Vintage Gaming (www.vintagegaming.com), which has emulators for just about every platform, a selection of ROMs, and a great set of links. Emulators are constantly being improved, so it's always worth checking to see if there's a new version available.

While the platforms and games emulated in this feature are 10 to 20 years old and, in most cases, no longer sold commercially, most are still under copyright. Unless you own the original, it's against the law to use an unlicensed copy.

The Integrated Digital Software Association (IDSA) was set up to investigate and close down sites that are distributing software still under copyright, whether they're charging for it or not. The IDSA seems most focused on hunting down the pirating of software for current games consoles, but vintage platforms are also protected. So, while emulators are readily available, many of the games you know and love have become understandably scarce on the Internet.

While we in no way condone piracy, it would seem sensible if the copyright owners of classic software came to an agreement to allow fans to relive their enjoyment. Many programmers, such as Jeff Minter, author of *Revenge of the Mutant Camels*, have made their old games freeware. We've provided some links, but be aware of the legalities and their implications.

ZX Spectrum

In 1982, Clive Sinclair unleashed the ZX Spectrum to a world (or at least a UK) clearly hungry for a doorstop of a machine with a

surprisingly endearing rubber keyboard. We celebrated the Spectrum in March's *Retro* page, but you too can relive the fun with emulation.

The two most popular emulators for the Sinclair ZX Spectrum are ZX32 and RealSpectrum. Both are modest downloads, measuring 255KB and 310KB respectively.

RAMSOFT claims RealSpectrum 'is the world's first emulator offering 100 per cent exact reproduction of all the multi-colour effects commonly seen in demos and some games, not only on the screen but also in the border'. Sounds impressive, but we experienced some difficulties getting it to work on our Windows 98 test system.

We had more success with Vaggelis Kapartzianis' excellent ZX32 emulator, which offers a host of options to increase the size of the display, simulate a bordered TV image, emulate a Kempston or Interface 2 joystick, and even simulate the slowdown of performance during memory accesses. A row of buttons neatly offer system reset, pause and easy loading of Spectrum software. You can also relive the fun of programming Sinclair Basic with the one-touch words such as PRINT and GOTO.

As far as games are concerned, we found ROMs for Ultimate classics such as Jet Pac and Atic Atac at Emulation! (www.emulation.com). Mathew Smith's Jet Set Willy was available at Cowl Innovations (www.cowl.co.uk/spectrum/software.html), but in an authentic attempt to prevent piracy, you'll still need the original piece of cardboard with cross-referenced coloured squares to start playing. Emulators Unlimited (www.emuunlim.com) had a variety of Melbourne House hits including The Hobbit and Sherlock Holmes. All games measured between 14 and 28KB to download.

ZX32: www.geocities.com/SiliconValley/Bay/9932

RealSpectrum: www.vintagegaming.com

Commodore 64

Commodore Business Machines may have started life as the manufacturer of serious systems such as the PET, but in the early 1980s it had become best known for its VIC-20 and CBM-64 home computers. Hiding serious gaming hardware under their beige cases, both became must-haves for kids who felt Sinclair just didn't cut the mustard (*Retro* May 2000).

By far the most popular Commodore 64 emulators are Håkan Sundell's CCS64 and the sinister sounding VICE written and maintained by a number of programmers over the years.

CCS64 is a modest 277KB download that runs in a DOS session in or out of Windows. Once fired up, you're faced with the familiar words: '64K RAM System. 38911 Basic Bytes Free. Ready', but no menu bar. Press F9 and navigate the C64-style menus to open tape or disk images from your hard disk.

VICE is the largest download in this feature,



measuring a relatively whopping 1.69MB, but you get five Commodore emulators, including the C64, C128, VIC, PET and CBM-2. You also get an easy-to-navigate Windows interface with a row of pull-down menus. There's a vast range of options, including refresh rate, video standards and oversampling of the C64's all-important SID sound chip. They don't call it the Versatile Commodore Emulator for nothing.

For the most comprehensive range of CBM-64 titles, head to www.c64.com. Here we found Archer Maclean's superb Defender clone Dropzone, tapped our feet to the incredible music of Rob Hubbard with Thing on a Spring, Monty on the Run and Commando, relived unbelievable gameplay on Andrew Braybrook's Paradroid and even tracked down Andrew Challis' Trollie Wallie, complete with note-perfect Jean Michel Jarre soundtrack! Most games measured around 35KB.

CCS64: www.ccs64.com

VICE: www.cs.cmu.edu/~dsladic/vice/vice.html

Amstrad CPC

In the early 1980s, playgrounds rattled with battles between proud ZX Spectrum and CBM-64 owners, while BBC-B users observed from a safe distance. Amid such home computing bedlam in 1984, Amstrad launched its first computer: the CPC-464. Later to arrive

in a variety of configurations, it gained a strong following (*Retro* July 2000).

Our first CPC emulator is 'Arnold' from Kevin Thacker – we downloaded the latest 395KB beta version, which claimed to be for Windows, but appears to be the same as the previous version for DOS. Fortunately, for those who fear a command-line interface, Arnold launches into a window with a familiar line of pull-down menus for configuration. Here you can emulate any of the CPC models, and totally configure the display, sound, storage and system – there's even a cheat database.

Next up is CPC Emulator from Ulrich Doewich and none other than Bernd Schmidt, the man primarily responsible for authoring the core of the Ubiquitous Amiga Emulator, UAE. Measuring 223KB, the CPC Emulator runs in a DOS session, and requires that you navigate through a text-based interface. A few key presses later you've successfully configured the system, pointed the emulator towards your game ROMs and started playing.

Speaking of which, we found a handful of CPC games among the various emulation websites, but by far the best was hidden within Emulation Unlimited. Point your browser towards http://tacgr.emuunlim.com/aa/reviews/reviews_index.html for an index of the highest rated games to be featured in



Top: Highway Encounter running under Arnold – note the display modes
Bottom: Arnold's CPC desktop with the choice of Amstrad systems



What inspired the emulators?

It's testament to the programmer's skill that these emulators work as well as they do, but apart from adoration from the millions of downloading fans, what exactly inspires someone to write one in the first place?

Bernd Schmidt was inspired to write UAE because he had an Amiga 500 and wanted to keep some of the software. Schmidt was 'lucky to have a friend who owned the HRM (Commodore Hardware Manual) which he "borrowed".'

Håkan Sundell wanted to know everything about his C64, and was inspired to write an emulator as soon as he bought an Amiga 500 because he 'missed the old machine, its mysteries and the games'. Sadly the Amiga wasn't up to it, but when Sundell had to pick a subject for his Masters thesis, the

choice was easy: a CBM-64 emulator for his 486 PC. Sundell says 'the first prototype took at least 1,000 hours and the current CCS64 source code measures over 1.5MB'.

A couple of years ago, Paul Bates was shown the PaCifiST emulator, but was disappointed to discover it wouldn't play his favourite Atari ST game Paradroid '90. He began the basics of an emulator as an experiment – 'Before long I had a couple of my old game demos running and then word got out onto the Internet. Originally WinSTon was planned to be a two-month experiment, yet here I am over two years later and still coding!'

Almost 15 years ago, Darek Mihocka was a first-year university student who had just upgraded his Atari 400 to a new ST. 'Problem was, all the cool software

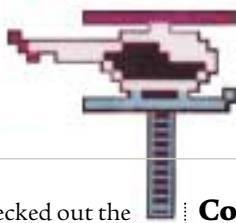
back in the early and mid-1980s was written for 6502-based machines. So in 1986 I started writing a generic 6502 emulator called Xformer. In 1990 I ported Xformer over to MS-DOS and then faced a similar problem: I had my cool Atari ST software which I now wished to run on the PC. So in 1991 I started writing Gemulator. So the inspiration came out of sheer necessity.'

All the authors we spoke to agreed that games aren't what they used to be. Schmidt said: 'Ten years ago, companies would still produce simple but entertaining games. Today, you get the impression they spend more on graphics and movies rather than gameplay. It's also unfortunate that whole genres of computer games have become extinct. There's hardly anything without 3D graphics.'

Sundell agreed: 'Even

though the classic games don't have cool graphics and sound, they have something that newer games lack: they're fun to play and can be picked up quickly. Today it's like the game producers start with an extremely cool 3D engine, then try to make a game out of it.'

Bates puts the popularity of emulation down to nostalgia: 'People have fond memories of old games that they spent hours playing. For me it was Paradroid '90. Just seeing it again brings it all back.' Mihocka hits the nail on the head: 'Classic games didn't have the benefit of megapixel 24bit colour displays. You had to convey your idea on a 320 x 240 pixel screen with 16 colours, so games tended to rely more on imagination. In many ways the classic games are very similar to old Hollywood movies – they had content.'



Top: UAE wins all prizes for the most comprehensive system options
Bottom: Classic Amiga platform action with Turricon



Amstrad Action magazine. We checked out the isometric *Alien Highway*, the arcade action of *Gauntlet 2* and *Boulderdash*, and the superb *Tornado Low Level* – all between 16 and 80KB. Arnold: www.arnoldemu.freemove.co.uk CPC Emulator: www.vintagegaming.com

Atari ST

In 1984, the founder of Commodore, Jack Tramiel, left to head up Atari. One year later came the first of many Motorola 68000-based STs, complete with graphical user interface and MIDI ports. We'll be detailing its life in next month's *Retro*.

Like the Commodore Amiga, emulating the Atari ST is a two-step process. Like the original units, you must decide if you're going to play games or use the operating system. The emulator itself provides the first step, but then you must either have a suitable game ROM, or a copy of the Tramiel Operating System (TOS) to experience the remarkable little green desktop.

Which leads us neatly to Paul Bates' excellent WinSTon emulator, available at the Little Green Desktop website. WinSTon measures a mere 175KB and installs itself as a proper Windows application. Upon startup, it requests a TOS image, so make sure you download one of these too. WinSTon's options include emulation of the four popular ST memory configurations, along with the ability to 'insert' images into the virtual A and B floppy drives – very neat.

Darek Mihocka's 209KB Gemulator 2000 goes further and offers emulation of the ST, Mega ST and STE models, along with the Mac Classic and the ancient Atari 400, 800, 800XL and 130XE. Again you'll need ROM images for the ST and Mac options, otherwise you'll only have the prehistoric Atari platforms to play with.

We found most of our ST software via WinSTon's home website, and enjoyed looking up Jez San's *StarGlider 1* and *2* and the wonderful platform arcade action of *Bubble Bobble*. Most of the games were supplied four or five at a time in hacked bundles, measuring 600-800KB, while TOS 1.0 came in at 100KB. WinSTon: <http://lgd.fatal-design.com> Gemulator 2000: www.emulators.com/download.htm



Top: It's the little green desktop! GEM lives again with WinSTon
Bottom: Bubble Bobble is one of the most addictive games ever written



Commodore Amiga

In 1985 the Commodore Amiga hit the scene, boasting several unique components that gave it the edge over competing models. While arch-rival Atari ST also featured a Motorola 68000 at its core, the Amiga backed up its CPU with the help of three custom chips. Charmingly named Daphne, Paula and Agnus, it's the software emulation of this tricky triplet that requires you to have a fair-paced Pentium PC to emulate the Amiga (see this month's *Retro*).

Like the Atari ST, the Amiga requires a ROM with its actual OS before getting started. Known as Kickstart files, these are normally available on the same sites as the emulators, typically measuring around 300KB.

There are only really two Amiga Emulators. One is the 201KB 'Fellow' Amiga emulator by Petter Schau. Running in a DOS window, the initial text-based interface can be slightly daunting. However, a few arrow presses later, the emulator knows where to find a suitable Kickstart ROM and any games you've 'inserted' into the virtual floppy drive. It's not a bad emulator, but pales somewhat compared to UAE.

Justifiably known as the Ubiquitous Amiga Emulator, Bernd Schmidt's UAE is widely considered to be the only one you'll ever need. A 644KB download, UAE installs itself as a Windows application, and gives you a wealth of tabbed options. There are the basic locations of the nearest Kickstart ROM and any disk images you wish to insert into the virtual drives, plus loads of controls for display, sound, memory and processor configuration. It works beautifully.

For game ROMs, the UAE Files Archive (<http://uaefiles.cjb.net>) has some good links, but for a far better resource of direct entertainment, point your browser to Classics for UAE (<http://home6.inet.tele.dk/aqvist/uae>). Here we found such Amiga gems as *Pang*, *Speedball 2*, and *Turricon* (600-900KB), which were all as addictive as we remembered! UAE: www.codepoet.com/UAE Fellow: <http://fellow.vintagegaming.com>

Wallow in nostalgia

Emulators do exactly what they say on the tin – once fired up, you're effectively using the real thing. There are a couple of strange concepts to get your head around though. First is that the emulated system is often waiting for a disk or tape to be inserted, so you'll have to load virtual media into virtual drives. Second, you may have to endure a few seconds of flashing screens as the software loads, but it's almost always much faster than the originals started up!

That said, the biggest problem for users of emulators is how to handle the waves of nostalgia as the memories come flooding back! It's time to beat that game just once more. Now all you've got to do is choose your desired platform. Hmm... Tonight Matthew, I'm going to be a Sinclair Spectrum!

Where to buy the real thing

Who needs an emulator when you've got the real thing? Today there's a huge market in collecting classic systems, and demand for boxed units in mint condition is high.

It's better news for buyers than sellers though, as the high volume of units originally sold keeps prices affordable. Sinclairs and early

Commodores tend to go for around £50 in reasonable condition. If you can't be bothered searching through endless car-boot sales, then check out the retro departments of Computer Exchange stores (www.cex.co.uk), or better still, head over to the Vintage portion of eBay's Computer section (www.ebay.co.uk) and start bidding!