

**FIRST LOOK: NVIDIA'S LATEST CARD, THE GTX280**

# atomic

**MAXIMUM POWER COMPUTING**

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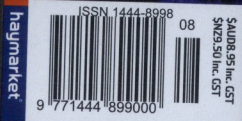
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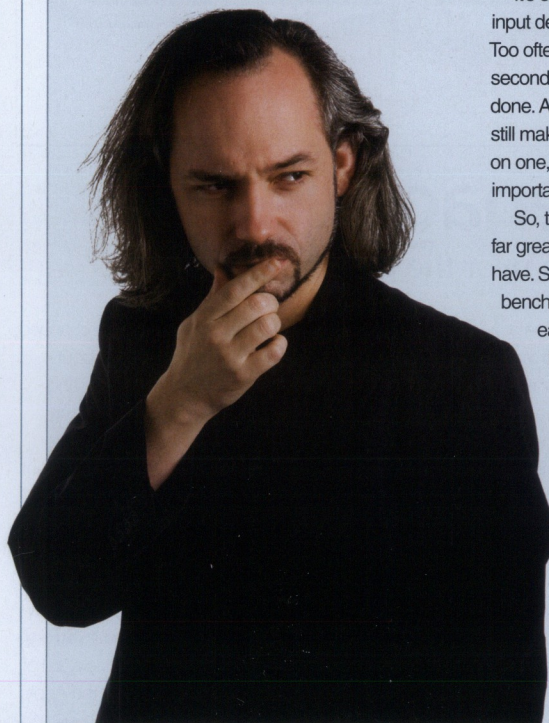
## EDHEAD

## Farewell! And mice.

Sad times, this month.

I've been blessed to work with a fantastic team since starting at Atomic, and this issue sees one of those stalwarts move on to greener pastures. Josh Collins, the man behind so many reviews and hardcore features, has left the building. I'd like to take this brief moment to chat about him.

He was a marvellous man to work with – funny, friendly, and a mean hand at any game to do with driving (though he doesn't have a license – odd). But more than that, he was the single most passionate tech-head I have ever had the honour to know. I think that shone through in everything he wrote, but if you've never been to



an Atomic event, where you could actually chat to the guy or even see him working madly at sub-zero overclocking, you've missed out on the real Josh experience.

And he'll be missed here at Atomic HQ, too. Anyhoo, on with the show...

We're trying a slight change in the way we present certain bits of content in the magazine this month. Previously, we always ran keyboards, mice and other similar peripherals in our Gearbox section. There, we'd give them bit of a write up, but nothing really in depth – more of a "Hey, here's product X, ain't it neat" kind of approach than a more critical review. After some discussion with readers on our forums ([www.atomicmpc.com.au](http://www.atomicmpc.com.au)), I've decided such things need to be looked at a little more in depth.

It's easy to dismiss the importance of good input devices, or even things like headphones. Too often these are seen as afterthoughts, where second best is often good enough to get the job done. Anyone who works with computers, and still makes the time to go home and play a game on one, knows that comfort of input is bloody important.

So, to that end, we'll be looking critically at a far greater range of equipment than we recently have. Sadly, though, there's not yet been a benching program invented that can gauge the ease-of-use of a mouse, or how perfect the action on a keyboard is. These are items that, more than anything else in computing, come to personal taste and ergonomics. We'll do our best, but it'll be worth remembering that one user's mousing heaven is another's RSI hell.

Speaking of which, my wrist hurts... I think I need a better mouse at work.

David Hollingworth  
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## Mobile menagerie

Will mobile phones take over the gaming world?

**M**obile gaming used to be a funny and safe oxymoron you could throw around to make geeks laugh. Phone handsets in particular suffered from games that seemed like errant time travellers from the 8-bit era, starting with jealous, low resolution eyes at the 3D shaded world of PCs and consoles just across the street. Eventually gamers got to enjoy the delights of decent handheld gaming on dedicated portable consoles like the PSP or DS, but of course – these weren't phones. Why should it matter to the gaming industry whether players are playing their titles on a mobile phone or a handheld console you ask? In the last year alone handset manufacturers sold over a billion devices, while handheld consoles barely broke the 12 million mark, that's why. It's a lucrative, juicy market to tap into, and yet for so long a handset that could flip between a phone and a games machine simply didn't exist.

Thankfully times – and technology – have changed, and the industry is more fired up than ever about gaming on phones. If the most recent D.I.C.E and Game Developer Conference events are anything to go by, developers and publishers are starting to treat the mobile market with a seriousness that might allow even the most jaded players to forgive the endless waves of half-arsed Java games on Symbian OS phones. And why shouldn't they treat the scene seriously; the industry is staring down the barrel of current and next-gen phones that are finally capable of being awesome games machines. Even if you enjoy burning effigies of Steve Jobs in your backyard of a Sunday afternoon, it can't be denied that the Apple

iPhone is one such 'new breed' of portable device.

"It puts the sexy back in mobile" commented Jill Braff, senior vice president of global publishing for the mobile game house Glu Mobile. Her sentiments are echoed by Travis Boatman from EA mobile, "It really is an evolutionary jump; the iPhone is realising the promise of mobile".

Bold words, but for a change undeniably lacking in hyperbole. The iPhone is feature rich, has unique controls, and an in-built distribution method for software. Herds of people are probably going to own one.

Though Apple seemed tight-lipped about the iPhone SDK early on, the kits were finally released to developers, resulting in games like *Spore* and *Bioshock* slated for an iPhone release. These aren't your typical amateurish mobile efforts; these are fully fledged top-tier titles with PSP/DS-style graphics, sound and game play. Even if the iPhone flops as a gaming device, the market is starting to swell with viable alternatives like Nokia's N-Gage re-visited or Google's Android.

The emerging tech playground isn't just exciting from a software standpoint either; the hardware running these mini game platforms is set to make news as multiple manufacturers, designs and standards all compete for a share of the marketplace. Mobile CPUs will be an area to keep a close eye on. Unlike the realm of the PC, the mobile market is saturated by RISC based ARM processors, with ARM having provided low cost, low power consumption processor solutions to the embedded market for years.

Intel, of course, is looking to eat away at that dominance, with mobile gaming sure to bring the fight to the surface, but Intel's only offerings to date – the Atom and Atom Centrino – have fallen a little short of the mark. With power consumption the number one factor behind a good embedded processor, Intel's Atom is unusually power hungry when stacked up against an equivalent ARM offering.

GPS-driven gaming, multi-core handsets and other awesome tech is rallying around us, so don't give up on the humble phone as a gaming alternative just yet – it's eyeing off your Xbox 360, and it's out for blood.

“Mobile CPUs will be an area to keep a close eye on.”

SHORT  
CIRCUITS

Codemasters  
GENIUS AT PLAY™

While Stephen Hawking might be turning down the constant offer of knighthood in the British empire, David and Richard Darling, the brothers who founded Codemasters back in the 1980s, had no such reservations about being made 'Commanders of the Order of the British Empire' (CBE) recently for their loyal service to the computer games industry. With famous titles like the *Dizzy* series, *Micro Machines* and the *Colin McRae* racing games under their belt, who could really deny these guys whatever honorary title the Queen wants to throw their way in-between tea and scones and sceptre-waving.

*Quake* was a damn sexy game 'back in the day', but at the Research@Intel Day 2008, the chip giant demonstrated *Quake* for the modern era with an entirely ray-traced version of *Enemy Territory: Quake Wars*. The notable additions were water with accurate reflections and refractions as well as physically correct glass shaders. The three million rays shooting out in all directions also allowed the engine to run collision detection based on rays alone, which is nifty to say the least. Powered by a four-socket quad core system, the demonstration barely managed 29 fps at 1280 x 720, which teaches the valuable lesson that PC gaming



# Nuke-em-up construction kit

Setting us up the bomb has never been so easy.

There are some things you'd probably prefer not to find on a notebook PC, and ranking just a smidge above suggestive nude photos of your grandparents, are complex blueprints for a sophisticated and compact nuclear warhead. Well, unless the notebook belongs to a worker at the sophisticated and compact nuclear warhead factory.

US Authorities, however, have in their possession one such cache of digital designs, buried in heavily encrypted files, that were recently handed over by the Swiss government. The Swiss were conducting an investigation into engineers awaiting trial for involvement in a nuclear-smuggling racket. The Swiss president Pascal Couchepin said "These were detailed construction plans for nuclear weapons, gas ultracentrifuges to enrich uranium as



well as guided missile delivery systems." Dubbed the 'Khan' network, these rogue traders are known to have supplied regimes like Libya, Iran and North Korea with nuclear information on the sly.

# Hacking the bean

Coffee machines, the hackers new best friend.

The Jura-Capresso Impressa F9 coffee machine is more than just a ludicrously expensive dispensing device for that sweet coffee lovin', it's also proved to be the latest tool for the hacking community. Securityfocus.com has revealed that the Jura internet connection kit that comes with the coffee maker has several vulnerabilities that'll allow a remote user to connect to the machine, change the user's coffee settings for a weaker brew, or even force the Impressa F9 to flag itself for a service call.

This is all thanks to a software layer designed to allow a remote coffee 'engineer' (what the...?) to diagnose problems with the Impressa and perform remote service. The craziest discovery of all is the fact the software has a hole in it allowing a remote attacker to gain access to the Windows XP system it's running on at the level of the logged on user. Hot coffee anyone?



## PIPELINE



### S.T.A.L.K.E.R.: Clear Sky

September 2009

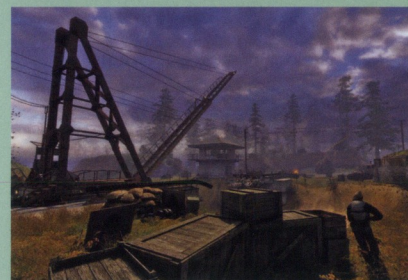
S.T.A.L.K.E.R. was a title that delivered solid graphics, a freeform post-apocalyptic RPG world and a plethora of awesome weaponry to deal death with it. Unfortunately, it took roughly a billion years to finally get released, which hurt it somewhat. GSC Game World's follow-up prequel should have none of the delays that marred the original game, leaving us only with the promise of better AI, improved graphics and a more fleshed out story – basically everything that made S.T.A.L.K.E.R. great but more of it. Sounds good, and could be just the thing to win over those gamers who ditched the original because of its crawl towards the release date.

[Platform] PC

[Developer] GSC Game World

[Publisher] Deep Silver

[Web] [stalker-game.com/clearsky/index\\_en.html](http://stalker-game.com/clearsky/index_en.html)



isn't quite ready for photo-realism at reasonable performance just yet.

**An unintentional bug in the latest MMO *Age of Conan*** could have the feminists forming their own group to gank FunCom, with reports that female characters – purely through in-game gender choice – do less damage than their male counterparts. According to some sources the weapon swing time in *AoC* depends on the duration of the visual swing animation, and female characters swing their weapons about 25 per cent slower than males, resulting in less damage over time. Lucky they're still the fairer sex, eh?

**It's eye gouging time amongst the movers and shakers** of the technology industry, with NVIDIA and other chip manufacturers attacking Intel over its supposed 'illegal restraint of trade' regarding the upcoming USB 3.0 specification. NVIDIA, SiS, Via and AMD are attempting to establish their own competing standard for USB 3.0, despite an Intel spokesperson denying the company is making the USB specification, or that it's 'borrowing heavily from the PCI special interests group'.

**Rejoice console owners of the world! Or at the very least console owners in the UK;** an appeals court has recently overturned a lower court ruling and stated that mod chips do not violate copyright laws. A man charged with copyright infringement due to being involved in the import of Xbox mod chips from Hong Kong to be used on UK Xboxes has had all charges dismissed thanks to an appeal, and anyone who enjoys the freedom of a chipped console would be praying the decision ripples outwards with thunderous fury.





## Josh Drescher, Associate Producer, EA Mythic

**A**s an Associate Producer with EA Mythic, Josh Drescher does a little bit of everything from project oversight to high-level design to public relations and press. Josh joined the studio (formerly Mythic Entertainment) in 2001, prior to the launch of *Dark Age of Camelot*. Since that time, he has acted as a Technical Support Lead, Project Manager, Senior Designer and Associate Producer – though rarely all at the same time.

Currently, Josh is hard at work on EA Mythic's upcoming next-gen MMORPG, *Warhammer Online: Age of Reckoning*, based on Games Workshop's tabletop fantasy war game. We recently got a chance to quiz him about the WAR, and what it's going to be good for...

**atomic** WAR has had a few delays in coming to market. How hard is it to balance all the development and needs of a modern MMO?

**Josh Drescher:** Every time we've adjusted our perspective launch timing it's been because we believed the project needed more time, attention and polish. The modern MMO fan has an expectation of quality, stability and completeness and we feel that they deserve a game that offers all three. So, at the end of the day, it's not a balance at all – we simply won't release the game until it's ready.

**atomic** Have there been any difficulties in dealing with such a tightly controlled IP as the Warhammer world?

**JD:** Honestly, no. Games Workshop is protective of the Warhammer IP, as you might imagine, but our team is populated – from top to bottom – with people who've been Warhammer fanatics for years. As a result, we have a deep sense of respect and affection for the IP and wouldn't think of doing anything that might violate the 25-year tradition of

the 'official' Warhammer timeline. The Age of Reckoning exists independently from the established, canonical progression of the Warhammer world. We chose to do this so that we could shamelessly steal... um... I mean... leverage and take inspiration from every bit of the Warhammer IP.

**atomic** Okay, let's talk good stuff. What would you say is the single best thing that WAR has to offer possibly jaded MMO players?

“It's like the World Cup – but with axes, fireballs and mutated tentacle arms.”

Warhammer across countless media. It's extremely rare that GW comes back and asks us not to do something we've requested.

**atomic** Where there any issues where the dev team felt they had to deviate from the established cannon of Warhammer?

**JD:** We were careful to set WAR outside of

**JD:** RvR combat – without question. Large-scale, world-spanning conflict and competition aimed at the utter demolition of your enemies, domination of the entire game world and eternal struggle and glory for you and your allies. It's like the World Cup – but with axes, fireballs and mutated tentacle arms.

**atomic** What would you say is the biggest point of difference between WAR and other fantasy MMOs?



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**JD:** I've already mentioned RvR, which is our stand-out differentiating factor, so I'll touch on some development philosophy that sets us apart. With *WAR*, we provide a complete hobby experience – by which I mean the following: we give you something to obsess over and fixate on, but in a way that allows you to interact with other people and share the obsession. Unlike other games, however, that interaction is both cooperative (you play *with* other people) and competitive (you play *against* other people). Shared experiences, shared goals, shared defeat, shared triumph. You're part of something bigger than just your involvement in the game.

It's like being a football fan. Your experience isn't limited to the rules of the game, it also includes looking forward to game-day, painting your whole body blue and screaming alongside your fellow fans. And screaming at the fans of the other team. And then going home, coming back for the next game and doing it again.

Like I said – eternal conflict, never-ending battle in an epic fight for conquest and glory alongside an army of thousands. That's what we offer.



**atomic** If you can cover it, what kind of end-game content is *WAR* going to offer for the serious raiding community?


**JD:** You mean besides being able to lay siege to an enemy's capital city, break into it, slaughter the citizenry, loot and pillage like mad and then face off against the King?

We've got dungeons aplenty, as well as major raid-level encounters that are mostly tied to capital city attacks. High level players won't have any trouble staying busy.

**atomic** Finally, let's get personal – what MMOs do you play? You know, purely for research purposes...

**JD:** At the moment, *WAR* and *WAR* alone. We've got a really strong, engaged beta community working with us and they've been a blast to play with over the past few months.

Previously, I spent a long time playing *DAoC*, I played *Ultima* back in the day, and prior to that I fussed about in various MUDs.

I try to at least take a look at most of the major titles that come out in the MMO market, because – even if a certain game isn't really 'for me' – it's always cool to see what other folks have done with their games. While we're competitors, there's also something deeply satisfying about seeing other professional craftsmen (and women) do new and interesting things within the MMO genre. 







# GUITAR HERO III

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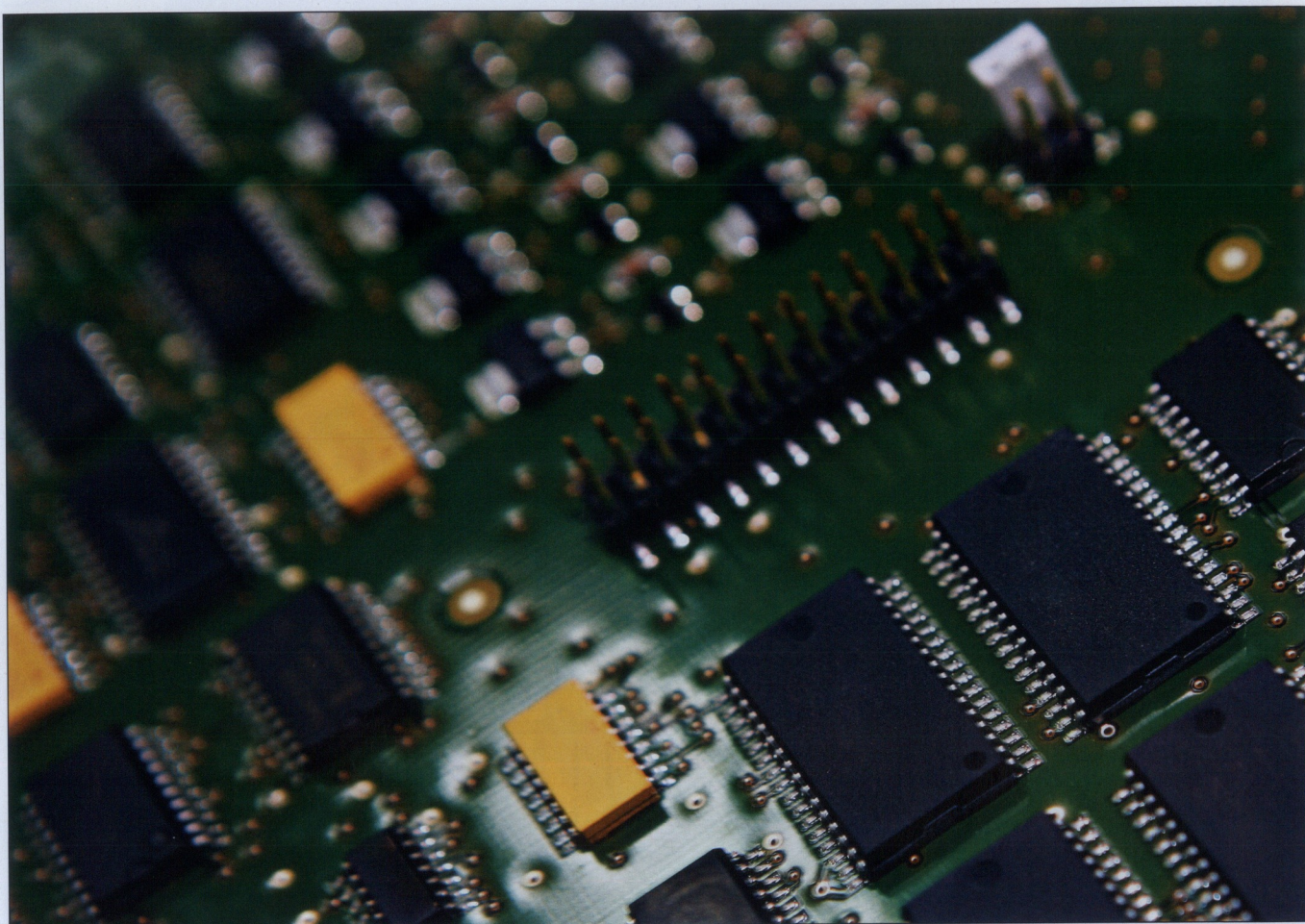


# ATOMICX-RAY

Looking at  
tech from  
the inside



X-RAY



## The fourth element

Oh if we could call this piece The Fifth Element, but when it comes to electronic circuit theory there are only believed to be four. In truth, it used to be three... Ashton Mills explains.

The basic building blocks of circuit theory, which have been all but etched in stone, teach us the essential elements of the resistor, capacitor, and inductor – it is with these that the abundant joy of electronic wonderment (aka, your beloved PC) is made manifest. Deep in the heart of your baby, these building blocks define the very nature of your gear.

But for almost 40 years now it's been postulated that one more element should exist. First described by then electrical engineering student Leon Chua in 1971, the concept of the memristor (aka 'memory resistor') was a proverbial missing link for circuit theory. Importantly, the memristor – at least as a theory – would stand on its own because its properties can't be duplicated by any combination of the other three elements. And should it exist, it could revolutionise not only circuit design, but the technology that we take for granted every day.

Until recently, that is. While Chua formulated the existence of the memristor, it took Hewlett Packard

Senior Fellow Stanley Williams and his team to discover it, or rather build it. And suddenly the pair became big news.

### The missing link

So significant is the memristor that both Williams and Chua are saying electronics engineering textbooks will need to be re-written – this isn't just a hot new tech, it's a revolution of technology we've come to take for granted, and the very basis by which circuits are designed.

Based on Chua's work, Williams and his team at HP were able to create a physics-based model of a memristor, and then create one in their lab at the nanoscale level. In fact, it's a property of the memristor that its efficiency scales with size – and nanoscale is where it's at. According to Williams, the key operation of a memristor involves atoms that change place when voltage is applied (more on this below), and this happens easier at the nanoscale.

Which leads us into how memristors are going to

re-write the books – Chua suggests that traditional circuit theory that deals in the relationship between voltage and charge is all wrong. And in the past when inaccuracies popped up in circuit theory and design, they have always been dismissed as anomalies.

But if laws of cause and effect are anything to go by, there's no such thing as an anomaly and Chua believes the memristor is the missing piece of the puzzle, stating "Electronic theorists have been using the wrong pair of variables all these years – voltage and charge. The missing part of electronic theory was that the fundamental pair of variables is flux and charge". Or in other words, the changes between voltage and charge.

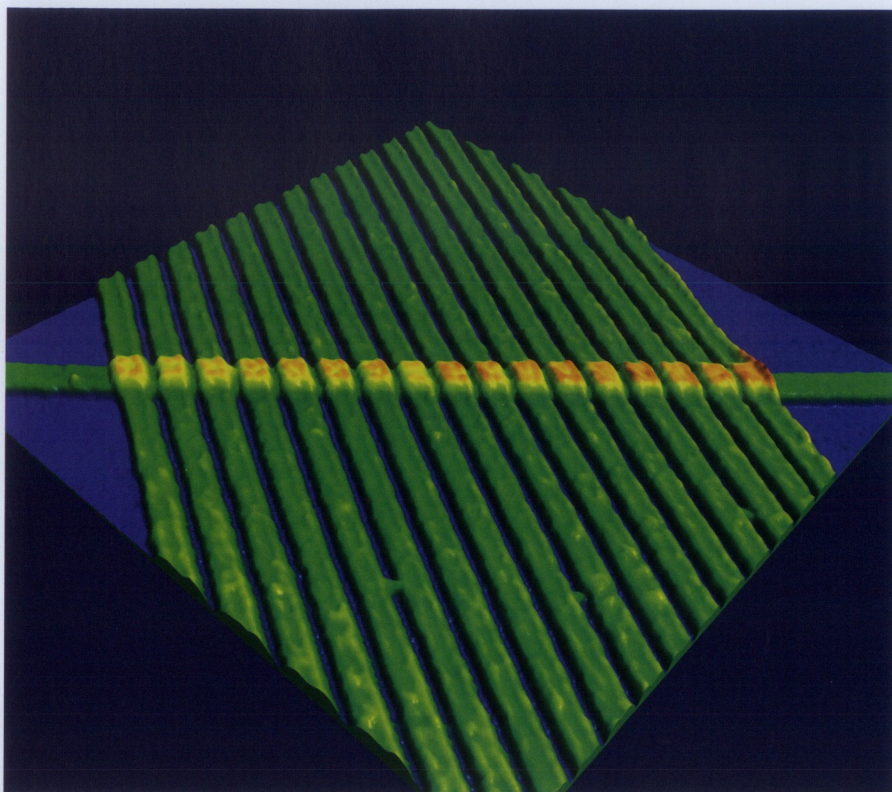
And this is the theory that enabled Williams to embark on creating the world's first memristor.

### Properties of the memristor

This is the sexy part. The very sexy part.

Like a capacitor, a memristor has a 'memory', but





The memristor in its nanoscale glory. Source: HP.

unlike a capacitor the memory is a function of the fluctuation in current that changes its resistance. Said another way, a memristor will 'remember' the last charge that passed through it. Which just happens to be a feature of non-volatile RAM, one of the perceived benefits to the new technology.

Chua had postulated that something like the memristor should exist based on the four electromagnetic qualities of current, voltage, charge, and magnetic flux. Electrical engineering teaches that resistors relate current to voltage, capacitors relate voltage to charge, and inductors relate current to magnetic flux. So where was the piece of the pie that related charge to magnetic flux? This would be one of its defining properties: becoming more or less resistive depending on the charge that flowed through it.

According to Williams, this works through virtue of hysteresis, where the rate of change of the memristor speeds up as it moves from one state to another. This is one of the 'anomalies' that was previously explained away by current circuit theory, but which is a core feature of the memristor.

An example of this is the way titanium dioxide changes its resistance in the presence of oxygen, an effect which electrical engineers haven't been able to explain but currently exploit to create oxygen sensors. But this mysterious effect had always been a pointer to the existence of the memristor. Indeed, Williams and his team used titanium dioxide in construction of the first memristor.

Williams' proof comes in the form of a thin pair of

layers of titanium dioxide inserted between a pair of platinum electrodes. One layer of titanium dioxide has depleted oxygen atoms which, when a charge is applied, shift between layers, in turn changing the resistance of the film. When a positive charge is applied, the oxygen atoms spread out to the second layer increasing the resistance; according to Williams, by a thousand-fold or more. When the charge is reversed, the atoms return to the first layer, decreasing resistance. Most importantly of all, the atoms remain in whatever state they are in when the charge is removed, and with each 'memristor' capable of representing '1' or '0' through its level of resistance, you have the building blocks for non-volatile memory. While obviously not tested, the physics model suggests a memristor should be able to hold its state for years.

It's predicted that the energy use to switch a nanoscale memristor compares to that of flash memory, but with lower energy requirements to read it. HP has already applied its prototype memristors in its 'ultra-high-density crossbar switches' using nanowires to compress 100 gigabits into the same space that current flash memory can use to store only 16 gigabits. That's six times the space efficiency, while using less power; and it's still only in the labs testing phase. The implications for SSDs (solid-state drives) could be immense – right now SSDs are

“...the physics suggests a memristor should be able to hold its state for years.”



Memristors could lead to high-power, low heat devices. Hands up who's tired of having a tornado strapped to their GPU?



exceedingly fast and use very little power compared to hard drives, but can't match hard drive densities. Memristors could change that.

Aside from memory, the memristor, given its non-volatile properties, could also lend itself well to FPGA (Field Programmable Gate Array) designs. Williams sees a combination of transistor and memristor packages in the future that could allow high-efficiency, low-power and low-heat devices perfect for mobile applications.

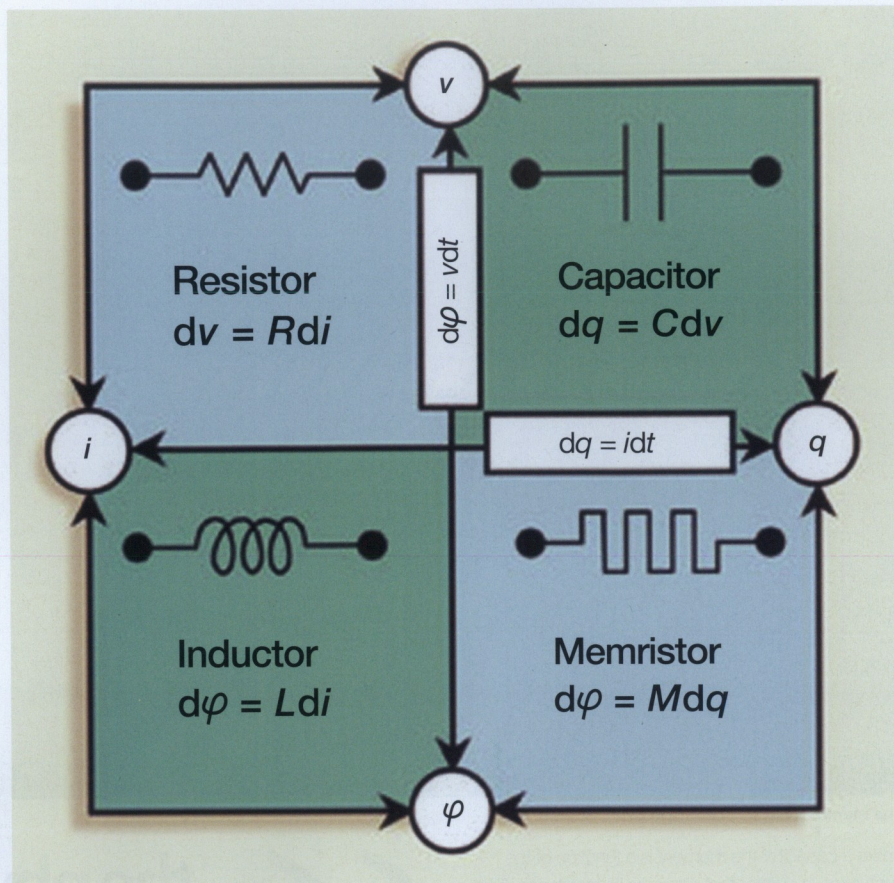
Indeed, the addition of memristors could revolutionise traditional transistor heavy designs. "Instead of increasing the number of transistors on a circuit, we could create a hybrid circuit with fewer transistors but the addition of memristors – and more functionality," Williams says.

As some are saying – not the least Williams and Chua – the memristor is a revolution. Getting it to manufacturing, however, could be a way off yet – especially if, as the pair suggest, memristors are throwing current theory out the window and textbooks need to be rewritten. Established technology vendors like Intel, AMD, and NVIDIA have their entire business models built around the transistor; re-inventing that will take time, if indeed they are inclined to do so at all.

## Use and the future

If we assume, and hope, that the memristor is here to stay just what could it mean for future of the technology we know and love?

Williams suggests we haven't even scraped the surface of what's possible. Aside from nanoscale devices using very little power – key to a mobile



The four key elements of circuit theory. Each one provides a unique property not possible by any combination of the other three

“... memristors could be used to remember and associate patterns...”

revolution (and we honestly haven't touched the tip of what mobile computing is really about yet) – low-power, high-performance, non-volatile memory appears to be the immediate focus.

While not tested, it's expected memristors will perform at about 1/10th the speed of current DDR memory. Granted, this may not be as fast as your beloved Corsair or Patriot sticks, but consider this – with memristors your machine could truly be 'instant-on', reviving in exactly the state you left it in. This may sound like 'hibernation' under Windows and Linux, but hibernation uses a swapfile to store memory state information that's loaded back from disk into RAM when you 'wake' the machine up. With memristors, you don't need no stinkin' hard drives – your memory can keep its state when you switch the machine off.

That's fricken hot.

Indeed – if we can dream of cheap manufacturing costs – memristors could signal the death of the

hard drive altogether. Remember, a hard drive is simply non-volatile storage for your data, and your RAM is the 'working set' of data you need at the time, loaded in from said hard drive. With memristors, they can become one and the same.

And that's even hotter.

Chua postulates other possibilities. One of the problems that plague current electrical engineering is that the more transistors packed into higher and higher densities, the higher the power and generated heat, making it harder to produce high-performance, low heat output devices. Memristors, it is thought, will be able to solve problems with scaling here. Think mobile phones, portable gadgets like iPods, and even laptops using less power than they do now, extending battery life, and without sacrificing performance. "Memristors will enable very small nanoscale devices to be made without generating all the excess heat that scaling down transistors is causing today."

A more esoteric possibility is the creation of 'human-brain' like characteristics, with memristors being used to remember and associate patterns, and learn from experience, the way that people do. Williams believes the very nature of memristors is similar to the way neurons work in the brain, and could thus be the building blocks of neural nets.

This is just theorising what's possible based on this very early implementation of the memristor, but perhaps Chua and Williams are right and this is a revolution. And if it is, how incredible to think we are still discovering these innate facets of our universe – and that we're also here to experience them.

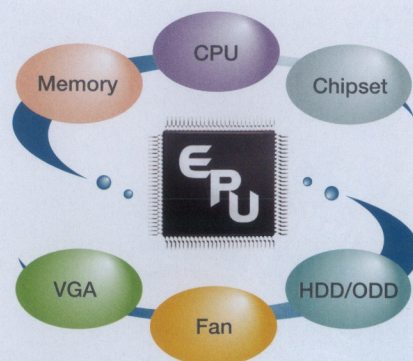


Packing in transistors at 45nm makes an awful lot of heat. Memristors could allow smaller manufacturing processes while delivering less heat.



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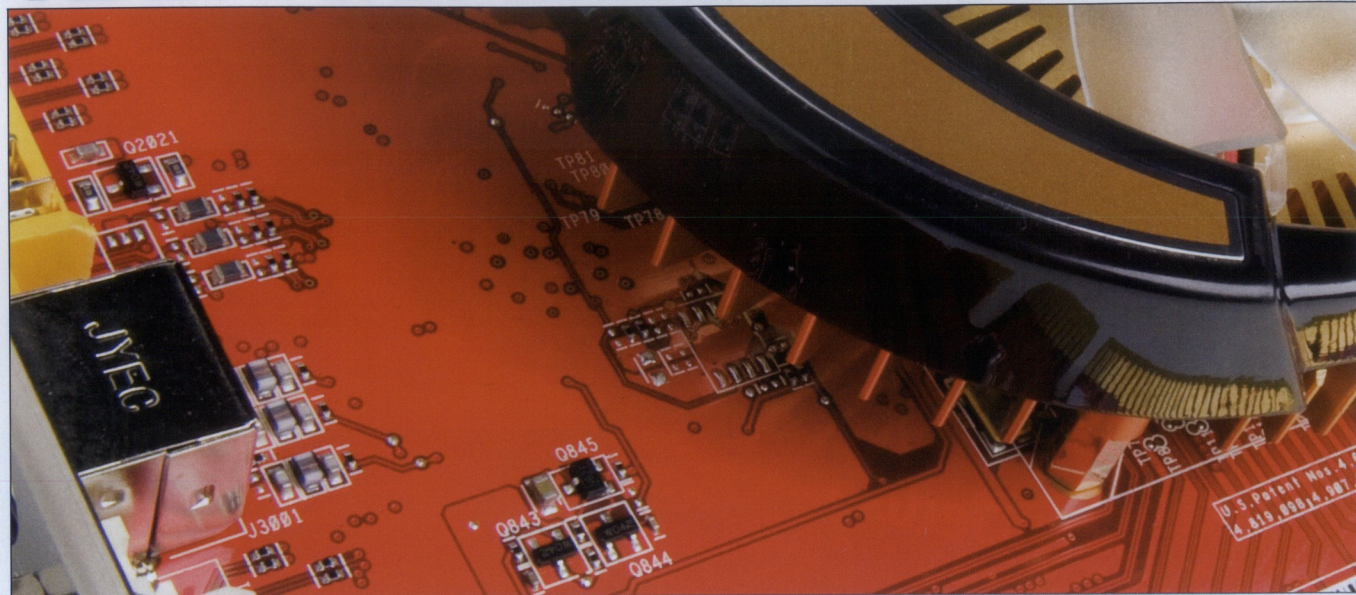
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# The open call

## Linux rant alert! Linux rant alert!

Inevitably as Linux has gained traction it's attracted more and more attention. From Dell selling Ubuntu PCs to ASUS choosing Xandros for the EeePC, it's become almost trendy to add Tux to a product.

And key to this, of course, is open source. As a philosophy and a development model, it's given us everything from Firefox to Ogg Vorbis and a whole shebang in between. Building, and using, open source software is becoming an increasingly recognised business model. Used well it can help the bottom line, or play a part in a strategic play – much like Nokia's recent announcement of the Symbian Foundation releasing Symbian OS (which runs a majority of the world's mobile phones) as open source.

It's a rather interesting debate for some companies of what to open source, when to open source, and how to open source – if indeed at all. But increasingly, with the popularity of Linux, it's becoming front and center for many.

Especially in the PC space. So it's quite interesting when, at the time of writing, a rather large group of Linux kernel developers banded together to release a statement ([www.linuxfoundation.org/en/Kernel\\_Driver\\_Statement](http://www.linuxfoundation.org/en/Kernel_Driver_Statement)) to the world: help us help you – open up a little.

The issue here is about drivers; while Linux has a veritable Death-Star sized metric of hardware support with drivers, of which almost all are open source, it's that remaining percentage that has the developers bugged, as it were.

It's not about a philosophical standpoint, either. It's about functionality, flexibility, and support. If not the code, then at least the specifications, allow the kernel developers to write, improve, fix, and maintain drivers for the kernel. Closed source drivers, or hardware with no driver support at all, makes it hard for developers to provide Linux support.

And while the developers are going in to bat for themselves and, ultimately, users like you and I it's not a one-sided motivation. For the vendors there's a monetary bonus: opening up the specifications, releasing

source code, or actively working with kernel developers means your hardware is better supported, better maintained, and at a fraction of the cost of doing it in-house. The bottom line is simple: save more money, make more money.

I'm a good example of the latter – for the past eight years every one of my GPU purchases has been made on the basis of which vendor had the better Linux support. I use Windows too, yes, but Windows support was a given for NVIDIA, AMD (then ATI), and Intel products. But not all of them fared as well for Linux.

My money up until now has been going to NVIDIA. Its binary drivers haven't exactly been great, but they were always better than AMD's.

But that's just about to change – the inevitable Tux tide has already won over Intel in this regard, and now AMD is joining in, releasing specifications for its latest GPUs and working with open source developers, leaving just NVIDIA now to lag behind. This was one aspect of a recent announcement from AMD, along with more fully featured drivers and, to boot, the inclusion of Linux drivers and Windows drivers on the same driver CD for its upcoming cards. Rumour has it the company is even encouraging third parties to put a Tux logo on the box to indicate support.

I think I know where my next purchase is going.

So the times, they are a changin'. The pull and growth of Linux, its veritable goldmine of a user

base for hardware purchases, and perhaps even simple moves like developers calling for a more open approach are all creating better Linux support and a good return for vendors who play the game. And when they do, everybody wins.

Do you like Linux?

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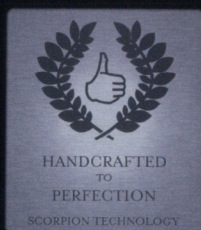
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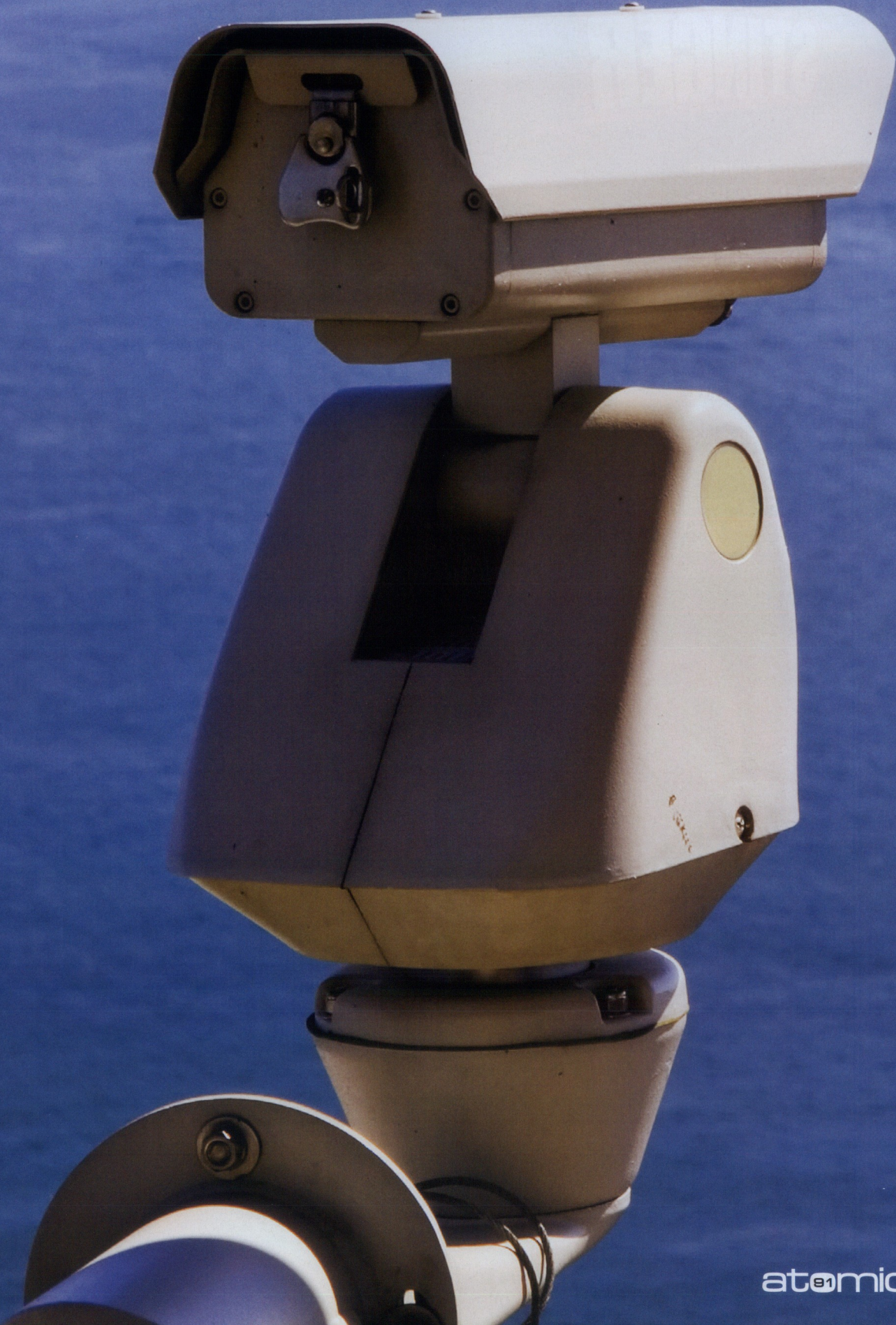
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# Who are you?

**Christopher Taylor puts recent and increasingly common developments in biometrics and security under surveillance.**

**W**alk around London and you're going to be caught on a camera somewhere in the realm of 300 times in a *single day*. Remember, this is the capital city of a country in which at least 4.2 million closed-circuit television (CCTV) cameras have been installed in the past few years in a move to combat anti-social behaviour. While arguably the Britons might've gone a tad overboard in their use of CCTV technology – there is now, after all, roughly one CCTV camera in the UK for every 14 residents – they're not alone in adopting modern technologies to combat crime and supposedly provide their

citizens with a sense of security.

Increasingly, governments, law enforcement agencies and private organisations are relying on security and surveillance technologies – which are getting more and more advanced, as you can imagine – for all manner of purposes. In a move to prevent visitors scalping passes they no longer needed, for instance, Florida's Disney World introduced fingerprint scanners. While the only 'crime' the system is capable of preventing is scalping – it's just a fingerprint scanner – surveys conducted on behalf of the park have shown that visitors feel more secure since its introduction.



## My voice is my passport

Post-11 September 2001, many airports around the world have rolled out facial recognition systems – quite often concurrently with ‘e-passports’. Essentially, the e-passport has an RFID chip embedded in the centre page that contains a digital copy of your photograph – which, as you’d imagine, gets run through a facial recognition system – and your biographical information. The RFID can only be read by the airport’s chip readers from a maximum distance of ten centimetres. The covers of the passport – at least with the one the Americans are using, anyway – are shielded so as to prevent the chip from being read while the passport is closed. The members of the European Union have been gradually phasing in e-passports for the past three years. In the near future they’ll be going a step further – the RFID will contain, along with the biographical information and the photograph of your ugly mug, your fingerprints. Other nations that have made the move to e-passports include Australia, Brunei, Canada, the Dominican Republic,



“ In popular entertainment, like CSI, facial recognition systems and video surveillance often serve as handy plot devices...”

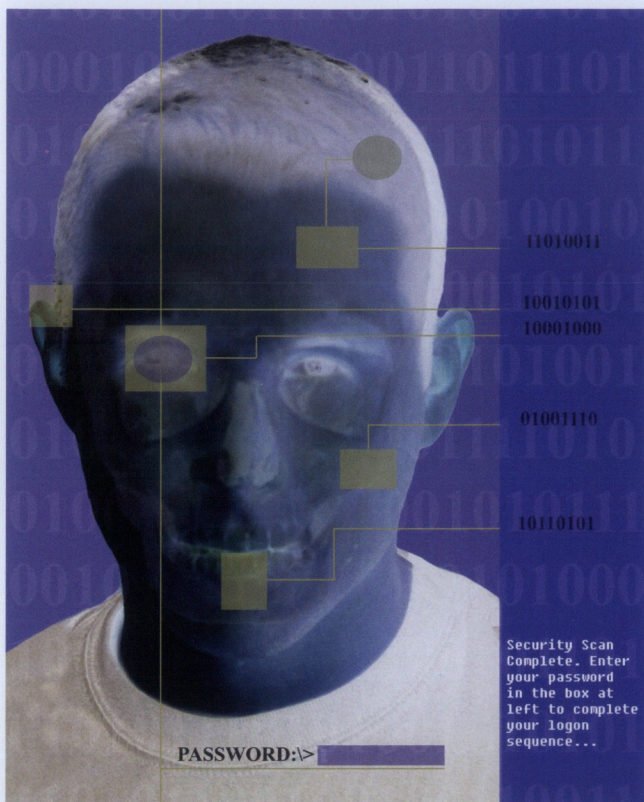
Iran and the United States. Oh yes, and everybody’s favourite failed state, Somalia. They might not have had anybody to test for and hand out drivers’ licences to for maybe a decade and a half, but they do have snazzy RFID passports.

In popular entertainment like the programme *CSI* and its various spin-offs, facial recognition systems and video surveillance often serve as handy plot devices – a sort of magic wand that makes solving crimes easy, so the detectives don’t have to waste time canvassing the area and instead stand around looking awesome and saying cool shit. *The Wire* is a bit more realistic in how it shows surveillance technologies being used – in practical as well as legal and ethical terms. Indeed, the video analysis



The modern passport, chip and all. This ain't your grand-daddy's passport!





software and cameras seen being used in this show are the very same ones being used in the US to tackle terrorist organisations and drug cartels. Of course, *The Wire* highlights that no technology has yet to replace good old-fashioned poh-leece work and that's a point we'd like to make – this technology isn't magic. In the case of facial recognition software, it's still pretty immature. It's by no means a final solution to law enforcement or security.

So yes, security and surveillance technology is now used a fair bit. But how does it all work, you ask? That's what we've spent the past month investigating.

## ... and all the pieces matter

On television, facial recognition software is the ultimate bullshit plot device – super-effective, meaning the detectives get even more time to just be rad bastards than they would if they were just using their black and white surveillance cameras that let them catch a suspect's reflection off a dessert spoon through a tinted window from a distance of 60 metres. In reality, though, facial recognition software is very immature and highly flawed.

A few police departments in the US have installed cameras featuring facial recognition technology in high-crime districts, but have found them to be incredibly ineffective. They rarely, if ever, make a match between some thug seen on camera and the photograph of them on the system's list of dodgy folks. Furthermore, they haven't even prevented crimes – the thugs just wear masks. The systems in use at airports aren't much better.

A few years ago, Logan Airport in the US city of Boston ran trials of facial recognition systems over a three month period. The success rate – meaning, the rate at which the system was able to identify volunteers who had photos on the system's 'undesirables' list – was an unimpressive 61.4 per cent. Since then, Logan Airport has given up on facial recognition software and has been investigating other means of ensuring security. Facial recognition technology has come a long way since it was conceived back in the 60s, but clearly it hasn't evolved far enough to be used for vitally important situations just yet.

The theory behind facial recognition is as follows: on each and every human face, there are 80 or so clearly identifiable points or nodes. Facial recognition software will take a photo of an individual, comparing the data

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of the individual's face to a list of photographs in the system. The system only works with some of these nodes. Of primary concern to most facial recognition suites are things like the distance between an individual's eyes, the width of their nose and the shape of the cheekbones. If you were trying to prevent convicted or suspected international terrorists from getting into Australia, you could install the software at all our international airports and seaports – an expensive exercise, but let us ignore that for the sake of making an example – and feed it a collection of their photographs, flagging them as undesirables. And so, if Osama bin Laden decides to pop down from his cave from North-West Pakistan to get himself a bit of barely

**“Rarely, if ever, would these systems be able to pick someone out of a crowd, which is exactly what they are tasked with doing...”**

legal tail at Schoolies '08, he'll be captured on camera numerous times upon entering the airport. The photographs will be passed on to the facial recognition software, which in turn will look at the nodes on his face and compare them to the nodes

on the portraits stored within its database. Even if he dyed his hair blonde before travelling, the system will match the points of his face in the new photograph to the points of his face in the old photograph sitting in the system's database. Even if he's undergone rhinoplasty since the old photograph was taken, the system will theoretically still point him out to security personnel as being a person of interest. The match doesn't need to be 100 per cent, either. It just needs to be really close.

As well as the nodes, some facial recognition systems out there would also compare bin Laden's skin to data on that system through what's known as a 'skinprint'. Essentially, he'd have a photo of an area of skin taken. The photo would then be analysed by the software, which would compare the skin's texture and pores to what was stored on the database. This recent advent is so effective that it can, unlike regular facial recognition software, tell identical twins apart from each other.

Part of the reason Logan Airport had a lot of issues with facial recognition software was because, in the past, facial recognition software really needed photographs that were taken in carefully controlled environments if it was to be able to do its job properly. Lighting, angle and facial expression could all throw off older facial recognition systems. Rarely, if ever, would these systems be able to just pick someone out of a crowd, which is exactly what they're tasked with doing in a crowded environment like an airport or seaport. The same 'rule' applied to the photographs of undesirables fed into the system's database – if you weren't able to secure, say, a proper passport photo of Osama bin Laden where the photographer had ensured his expression was serious, the lightning was suitable and he was staring directly at the camera, you'd have issues spotting him even if you had airport security personnel wandering around the airport, manually taking 'ideal' shots of each and every traveller.

While not as much as back when Logan Airport's trial of facial recognition software was conducted, modern facial recognition systems can still have problems of this sort. Changes in expression and natural happenings, like a terrorist who has a photograph on the database acquiring glasses or losing his Santa Claus beard, confuse a lot of the facial recognition systems to varying extents. Some of the more advanced ones, such as *Facelt* and *FACEngine ID*, don't have their effectiveness

diminished by that much when faced with such situations, but most systems out there do.

Supposedly more accurate than 'old-fashioned', two-dimensional facial recognition is three-dimensional facial recognition. As the name of the



## FINGER THIEVES

Mexico City, like quite a number of large cities in the developing world – Johannesburg, anyone? – has a serious problem in the form of carjacking. It's quite common. Some well-to-do guy will be driving along, minding his own business, when some traffic lights turn red and he's forced to wait at an intersection. At night, when few people or vehicles are around. And sure enough, some thugs will come along, break the passenger side window and attempt to commandeer – nautical term – his car. Enter South Korean company Wintech, which is currently marketing special coatings for the windows of cars that render them difficult – albeit technically possible – to break. Another recent invention also intended for this and presumably other cities with a high rate of carjacking is the Touch-N-Drive. Essentially, it's a fingerprint reader that not only reads your fingerprints, but how warm your fingers are – meaning someone can't just snip off your index finger in order to steal your wheels. And that's something some thieves are, apparently, desperate enough to do. Just remember that when you're lying on the driveway, all bloodied up and cowering in front of a very angry thief, that while he might have stolen your fucking finger, he's not going to get your Commodore (not a nautical term -ed). Surely that'll make you feel better.

technology implies, three-dimensional facial recognition software works from three-dimensional images – gained by either fiddling with a two-dimensional image or using surveillance cameras to get a live feed of the suspect as the system gathers data on the structure of their face. Three-dimensional facial recognition software still works around the concept of mapping the nodes of the human's face, but it measures different nodes – for instance, the outside and inside of the eye socket or the tip of the nose. The suspect doesn't need to be looking directly at the camera for this to work. Once the 'faceprint' has been assembled, the system looks to its database of undesirables to see if it can find any matches. Probably the database contains only two-dimensional images, so the system needs to take the three-dimensional image it has of the suspect and convert it to a two-dimensional image before it can make accurate comparisons.

## Soft eyes

Growing ever more common in the US especially is iris scanning – as opposed to retinal scanning, which has faced criticism for causing discomfort in some individuals and being of questionable accuracy given that our retinas change with age and eye surgery. Central to the process of iris scanning is a simple digital camera that focuses automatically on your eye. Then, with the aid of two lights – one visible, one near-infrared – this camera snaps a clear, high-contrast image of your iris. In case you were curious, the near-infrared light is used to help the computer distinguish between the iris, the pupil and the other parts of the eye, which are considered irrelevant. Once it has the photo, the computer analyses the patterns in the iris and translates them into a code. The human iris is unique – providing some 200 points of reference or, again, nodes for the computer to work with, as opposed to the 70 a fingerprint offers. What does this mean in real terms? Well, there's a



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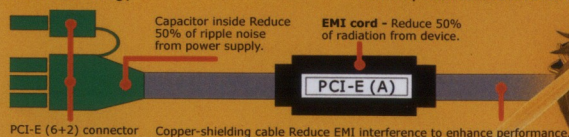


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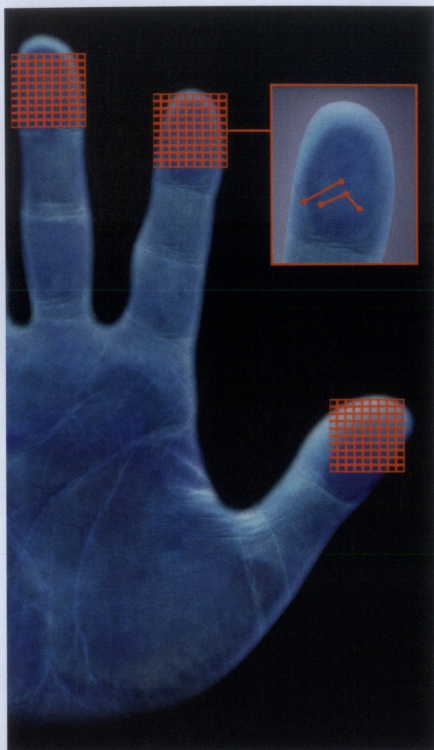


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one in  $10^{78}$  chance that your iris will be mistaken for someone else's. This is a technology that's truly effective – aging and most eye surgeries won't throw it off. Glasses and contact lenses shouldn't be an issue either. Hell, even if you're blind, you can use it so long as you have irises. Granted, the systems that don't automatically focus the camera – instead requiring you to line up your eyes through the use of a mirror – may prove a bit of a challenge. Also, unlike fingerprint scanning, a dead person – even if recently deceased – won't be able to gain access to a building if they're required to pass an iris scan. So when the seventh season of *24* screens, you'll be able to loudly call bullshit when a villain makes the obligatory infiltration into CTU headquarters by plugging some Red Shirt, sporking out said Red Shirt's left eye and placing said Red Shirt's freshly sporked eye on the iris scanner. Death is something that does mess with our irises and, for that matter, our retinas.

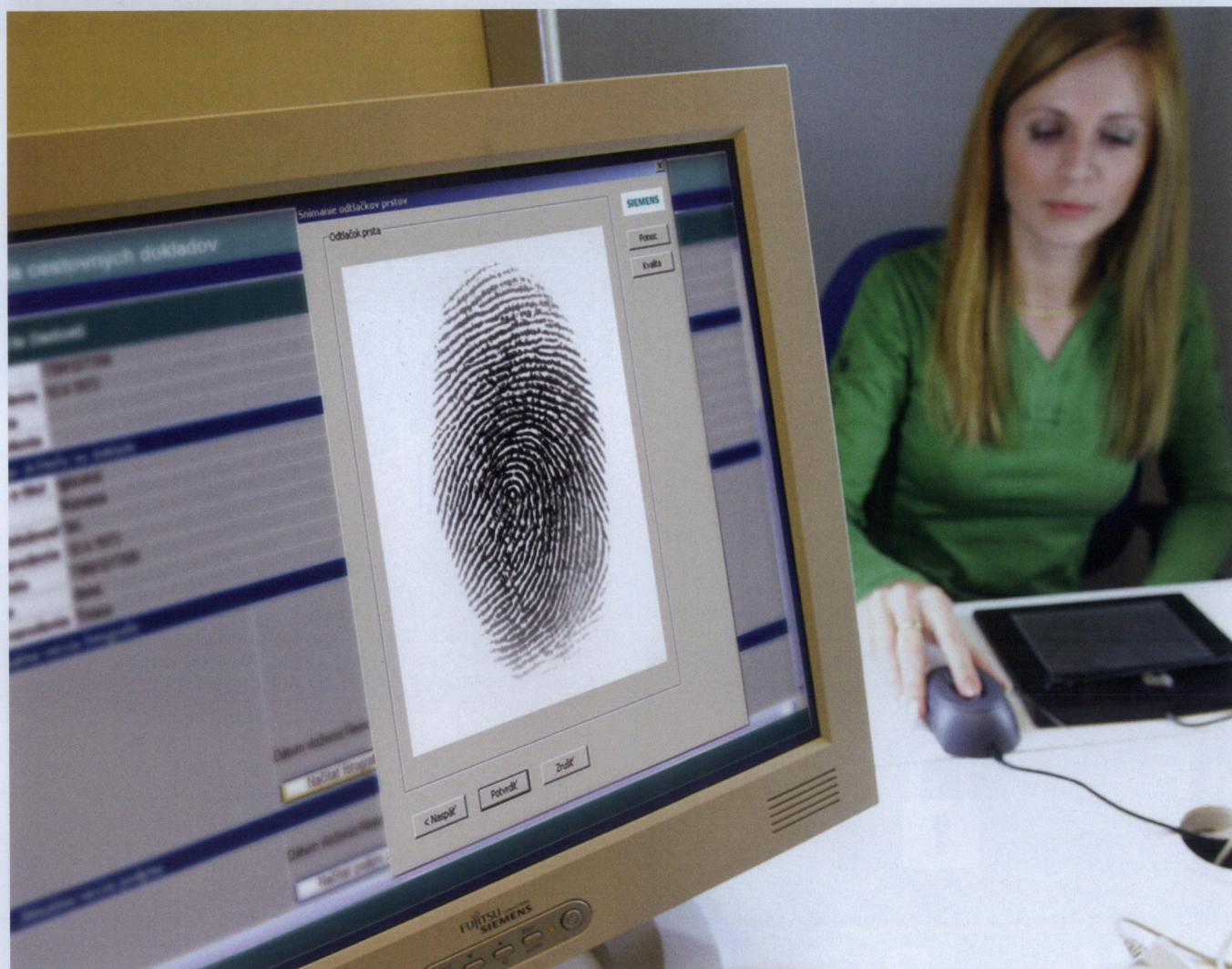
## Fingerprinting good

Despite what crime drama has told you, computerised fingerprint scanners – as in the ones Disney World now use – haven't been in use for all that long. Until recently, fingerprinting was an ungainly manual process involving ink. Like the iris,

the fingerprint is unique. Even between otherwise identical twins. A fingerprint scanner has a very simple job – it has to capture an image of your fingerprint and figure out if your fingerprint matches any of the fingerprints stored in its database. In fact, a fingerprint scanner isn't all that different to an iris scanner. It's powered by a charge-coupled device; in other words the fingerprint scanner, like the iris scanner, is but the bare bones of a digital camera. When you place your finger on the reader, a photograph is taken and an image is produced, showing the bumps of your fingerprint as being dark and the valleys as being light. The system automatically checks the image to ensure the level of contrast is suitable – if the contrast is too high or too low, the scanner will start the process all over again and snap another photograph. The system also ensures the image is suitably crisp.

Next, the system compares the fingerprint to what it has in its database. Now, unlike crime dramas, the system doesn't actually superimpose fingerprints over yours as it seeks a match. Rather, it identifies certain nodes – although in the case of fingerprints they're known as minutiae – and analyses those, comparing the data garnered from this analysis to the fingerprints on the database.

Whereas the nodes of a face might be used





“ Though this may sound like *Today Tonight* scare-mongering, the major threat with biometrics like fingerprinting is that of identity theft. ”

to map how wide someone's nose is or the size difference between the inside and the outside of their eye socket, minutiae are where a ridge of a fingerprint splits into two or where ridges end. There are somewhere in the realm of 70 minutiae in the average fingerprint. Like with iris scanning and facial recognition software, the comparison process doesn't need to keep going until it determines that there is a 100 per cent match – if it finds that two fingerprints have a few minutiae in common, it'll keep going for a while. If no discrepancies pop up but several minutiae match exactly, it'll accept that the fingerprints are the same.

There are numerous problems with fingerprinting technology. In some cases, a high resolution image of someone's finger is enough – you don't even need the actual finger. Furthermore, it's possible to gain access to a building or whatever it is the fingerprint scanner is protecting by finding someone who you know has access and, er, borrowing one of their fingers. Unless, that is, the fingerprint scanner also reads the amount of heat in the finger (see box out 'finger thieves'). Although you can get around that, even, by pulling a James Bond and using a gelatine mould of the dead man's finger over your own fingertip. Your fingertip provides the necessary heat reading, the mould provides the right fingerprint. These are issues that will need to be overcome, as like facial recognition and iris scanning, computerised fingerprint scanning is becoming increasingly common.

For too long we have been reliant on an ugly system of passwords – which are dangerously insecure given that people forget them and can mistakenly or, worse, intentionally give them out to undesirables – and tired airport security personnel, who are by no means infallible when it comes to comparing a traveller to the photograph in their passport. Biometrics is here to stay and will continue to evolve. It will work its way, sooner rather than later, into our everyday lives. Banks, no doubt, will eventually make use of biometrics as a



replacement for PINs and passwords, for instance.

Once perfected, or at least made considerably more effective than it currently is, facial recognition technology could potentially be employed in a wide variety of fields. Local police departments will surely start using it more in areas with high crime rates or gatherings where security could be a problem, such as protests and sporting events.

Similarly, it is likely that the near future will see more employers adopt the systems that a good many already use – having surveillance cameras and facial recognition technology clock employees on and off as they enter and exit the workplace, thereby making it impossible to be dishonest about one's attendance and departure times. Though this may sound like *Today Tonight*-esque

scaremongering, a major threat with biometrics – not so much with facial recognition, but with fingerprint and iris scanning – is that of identity theft. Developers may be able to engineer software and scanners that can determine if the eye or finger is, in fact, dead or attached to someone under duress, but what they're as yet unable to truly prevent is someone from gaining access to the system and stealing the data contained within. While it sucks if someone nabs your credit card number or PIN, it's possible to deal with that via a five minute phone call or quick trip to a bank. If someone has your fingerprint information and said information has replaced the old-fashioned bankcard and PIN as a means of accessing your bank account via an ATM, you're in a whole lot of trouble. (P)



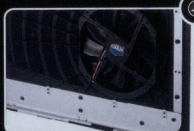


# COOLMasters

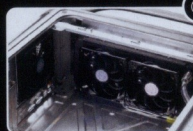
## ARM YOURSELF WITH THE BEST



### COOLING SYSTEM



Side panel comes with a 200mm fan (150 CFM) for maximum VGA cooling



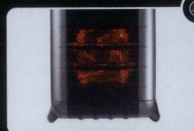
120mm x 3 radiator can be mounted inside the top of the case (radiator is optional)



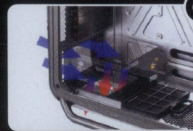
Hideable I/O panel featuring built-in touch sensor



Three fans can be mounted on the top for excellent air exhaust (fans are optional)



Meshed front panel with red LED fan to enhance airflow



Independent air intake designed for bottom-mounted PSU

[www.coolermaster.com.au](http://www.coolermaster.com.au)

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Centre Com 1300 007 600 [www.centrecom.com.au](http://www.centrecom.com.au)  
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Scorpion Technology 1300 726 770 [www.scorpnet.com.au](http://www.scorpnet.com.au)

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Capitol Computer  
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IT4US Computers & Media

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Dreamworks IT  
Umart Online  
**WA** Austin Computers  
Trinix Computers  
YNOT Computer Systems  
Netplus Micro Computers

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# HARDCORE

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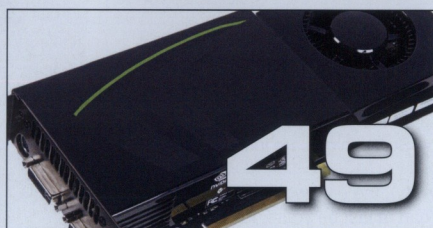
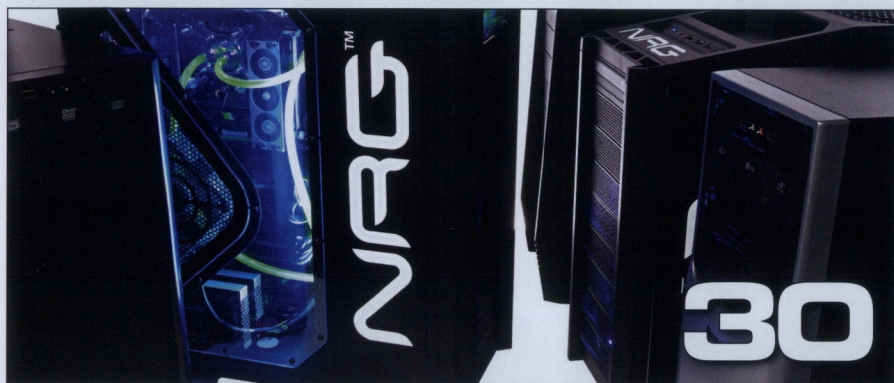
## NEWS, REVIEWS AND ROUNDPUPS ON THE LATEST HARDWARE

**T**his month, we kick things off – once you’ve had a giggle at Gearbox – with an actual PC round up! We might normally try to convince our readers that building from scratch and then upgrading is the way to go, but there are definitely times when you just want to lay down your hard-earned and get something pre-built. Aside from that, it’s also just nice to know what the current state-of-the-art, as it were, is in gaming machines. And that’s the focus of this Head2Head.

With that out of the way, we get on down to some component lovin’.

Josh has his work cut out for him in wrangling the latest Black Ops mobo into submission, though from his looks of joy reading the specs it really will be a labour of love.

We take a close look at a couple of gaming mice, including the oddly form-factored Zalman FPSgun, a remarkably good set of budget headphones from Creative, and spend some quality time with one what is fast becoming our favourite Lian Li case ever.



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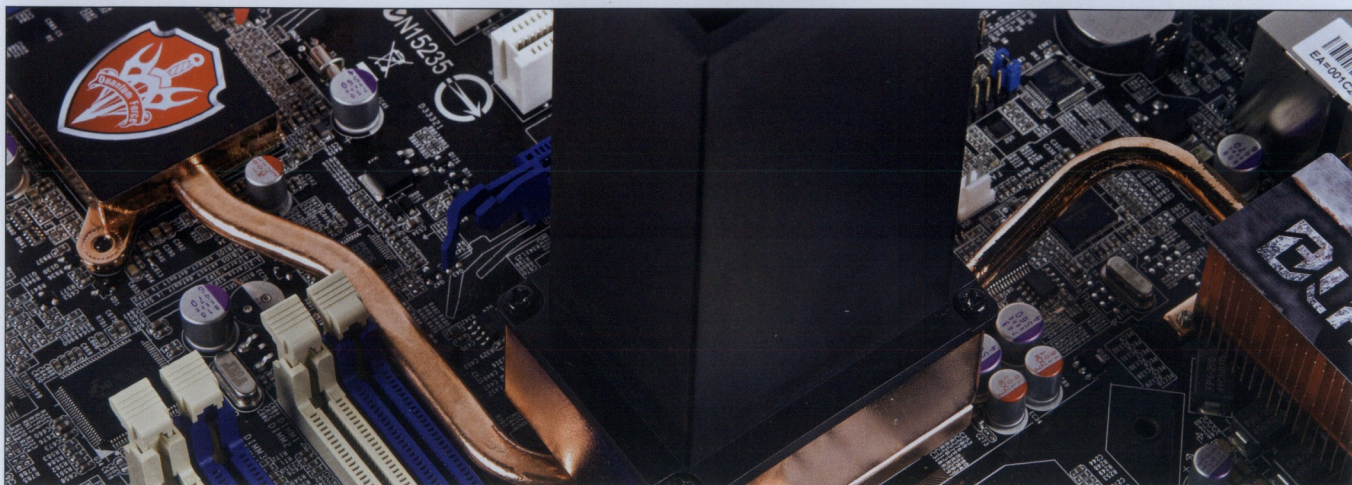
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## ◀ Gears of War action figures

Price TBC Website [www.necaonline.com](http://www.necaonline.com)

*Gears of War*: it was a game that had a lot going for it. Beefy protagonists with a dry action-hero wit; a plot revolving around a last-ditch battle against an implacable alien foe; some very big guns; some very big guns with MOTHER-LOVING CHAINSAWS GLUED ON!

It could also be argued that it's other big strength was that *Halo 3* had not yet been released on the 360. We're just sayin'.

But *Gears* now has another string to its bow – action figures! There are four in the range to start with: Augustus Cole, Marcus Fenix, a Locust Drone and a Locust Sniper, and series 2 is on the way. All have multiple points of articulation and come with a pistol and long-arm. We can't wait to send Marcus up against the Punisher and Conan, the two current heavy-weights of the Atomic HQ cubicle

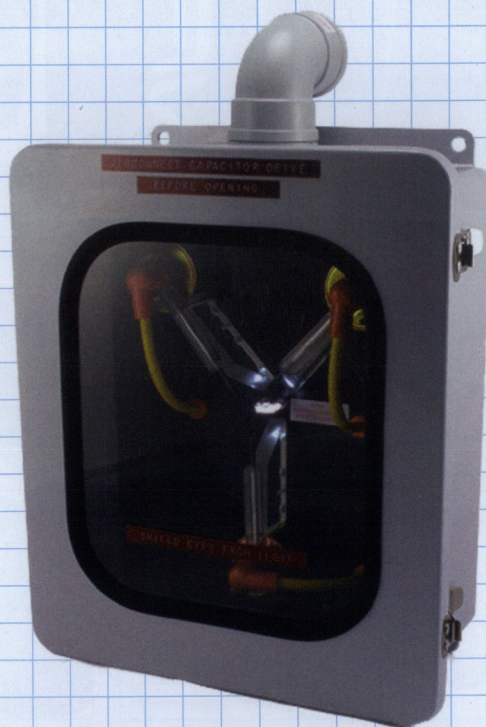
## Flux Capacitor ▶

Price \$425 Website [www.kingscomics.com.au](http://www.kingscomics.com.au)

There are some pieces of technological ephemera that simply have no real price. Sure, they may actually have a literal price-tag on them, but ask a fan of, say, the iPhone what value they put on their darling toy. Some things are just priceless.

Such is the lure of the flux capacitor.

Yes, this is the one (out of a thousand, anyway), the only work of Dr. Emmett Brown. This marvellous piece of engineering can at last be yours, to add to your DeLorean (or Ford or Holden, or, I don't know, Zil) to give it that last bit of bling. It lights up, it pulses, it in fact does everything short of actually zap you through time!



## ◀ Connect-a-desk laptop holder

Price \$US39.95 Website [www.thinkgeek.com](http://www.thinkgeek.com)

Now, the official word on this handy collection of straps says that it's the perfect tool for on the move worker types; ideal for any number of professional endeavours from archaeologists to architects. Pft! That's what we say to that idea!

No, the Connect-a-desk is merely the start of the 'gargoyle' movement from Neal Stephenson's *Snowcrash*! Sure, there have been wearable PCs for years, but they lack true computing power – this fixes that! Gaff on a webcam, wireless mic and you're practically there – gaff a couple of 'cams to yourself and Bob's your 24/7-wired-in uncle.

Of course, you could just use it so you can surf pr0n in front of the TV and not worry about losing momentum when you go on toilet breaks. True story.





## ▲ Channel Changer RayGun

Price £8.99 Website [www.play.com](http://www.play.com)

We all know the story about Elvis Presley getting ticked off and shooting his TV (and if you don't first hand, you've probably seen it riffed on in The Simpsons). Now you too can take aim and blast away at the boob tube – and with startlingly different results!

The Channel Changer RayGun is a great piece of retro-futurist design, and it's a TV remote to boot. In other words, it shoots REAL RAYS! Awesomez.



## PC Diagnostic Dice ▲

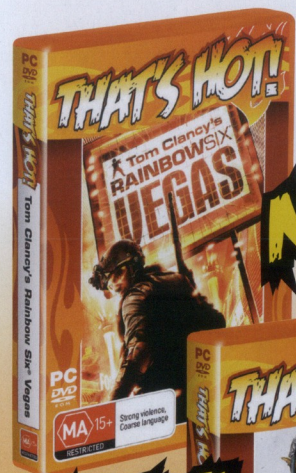
Price \$US21.99 Website [www.pcdice.com](http://www.pcdice.com)

Now here is the solution to every tech support problem. Whether you're a pro in the support industry, trying to help people who can barely button their shirts of a morning understand the intricacies of why they shouldn't spill coffee on their keyboard, or just prone to frequent phone calls from loved ones who can't work out why pointing their mouse at the computer screen does nothing, you need PC Diagnostic Dice.

The red die features the words Mix, Wired, Wireless, Linux and Unix; the green die Spyware, Virus, Modem, Network, Video and Reboot. Finally, the blue die has New PC, Upgrade, Install, No Idea, \$\$ and Quit.

So next time Mum calls and asks why her machine won't turn on, you simply tell her to \*clatter of dice\* reboot and install Linux. Problem solved!

# HOT PC!



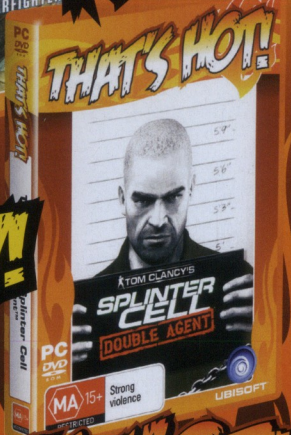
**NEW!**



**NEW!**



**NEW!**



**NEW!**

# THAT'S HOT!

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**HOT PC GAMES FOR JUST \$19.95\***

\*\$24.95 in NZ

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HEAD TO HEAD



# ATOMIC™

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# THE ULTIMATE GAMING SHOWDOWN

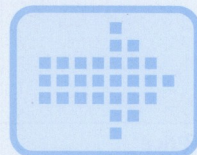
**David Hollingworth takes a look at the pre-built gaming PC market. Does a retail PC beat a custom made machine?**

**T**he white box PC market has undergone a lot of changes in the last few years. Power has increased and component costs have dropped, meaning the days of \$5,000-plus beasts are almost – with a few interesting exceptions – spent. On top of that, a lot more people have the skill to not only build their own PCs, but to customise, overclock and generally improve upon anything that you can get from either the big players (I me waves at Dell), or your friendly corner PC shop.

So where does that leave the big and small PC manufacturers?

Well, they're certainly still plugging away. Despite rumours of downturns and the end of PC gaming, new PCs are still being built and bought and in all manner of configurations. For this Head2Head we've got five very different machines and specs, from four very different suppliers. It's not a huge round-up by any means, but it's a great snapshot of the state of the pre-built market today, and offers a good guide to what shoppers can – and should – expect, while also letting enthusiast PC builders know what the big and little boys of the market are up to.

So, in this modern age, what does a gaming PC have to live up to to cut the mustard in the Atomic labs? And why have only five PCs found their way into the labs? For these answers, and oh so much more, all you have to do is turn the page...





# Ch-ch-changes

We'll readily admit – this is a smaller round-up than we would have liked. That said, there is a reason, and it says a lot about the state of the PC industry.

When we were formulating our list of possible contenders for this review, we decided early on that it was far more important to have a good spread of different types of PC builders. We feel that we've at least succeeded on this count. But there were a few vendors who were unsure about submitting product.

Essentially, with the component market moving so damned fast at the moment – just look at the amount of new cards NVIDIA's released in the last six months – it's easy for upgraders to fall into the trap of forever waiting for that next big thing. It's a trap, it appears, that even the manufacturers can fall into, as that's the very reason some vendor's wanted to hold product back. The launch of the new GTX280 and 260 from NVIDIA is also weighing on people's minds, though there are some reports that it may be a more problematic card than first thought.

It's a shame, as more machines would of course have made for a more competitive round-up. Still, what we have here does most certainly make for a true and representative snapshot of what the market has to offer. We've got machines from Enspire Digital, DCA Computers, Trinity Computers, and Altech – a pretty good spread of builders if ever there was one.

Another thing to note is that, where once

the thought of buying a PC without a monitor or other external peripherals was alien at best, there is a growing trend these days to supply just the tower itself. Even asking for a monitor and keyboard is met with consternation. For some companies it's just one more overhead that they don't want to deal with.

We've got a mix of vendors in this round up who do supply everything you need for your machine and those who just deal with the PC itself. It's not a deal breaker, by any means; the kind of people who are going to be shelling out money on machines of this grade will likely have a two or three monitors anyway, and monitors have always enjoyed a much slower upgrade cycle. But if you're looking for a total solution with all the gear, just be aware that some vendors won't play.

## How we tested

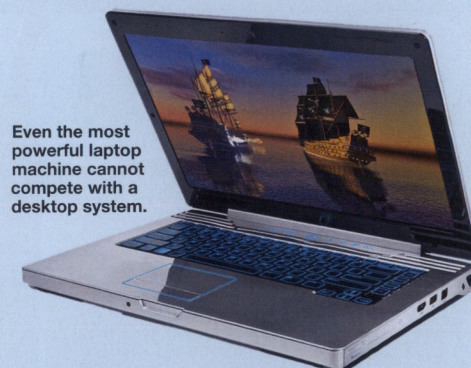
There's a mess of PC testing apps out there, but, as we always do, we're going to keep it to a minimum. We'll be rolling out our two usual testing apps – the *Crysis* demo and 3DMark06 – as we feel these, for gamers, are probably the most indicative of a machine's relative power in that department. We've also hauled out 3DMark03, as that scales very well with multiple GPUs – something that most of these machines boast.

All of that will give us three very good figures, of course, but there's more to a PC than just its performance. Build quality, from how well seated the components are

## MOBILE V. DESKTOP GAMING

There were a couple of vendors who wanted to submit laptops into this roundup. As far as gaming laptops have come in recent years, thanks to advances in both CPU and GPU technology, the fact remains that there is not a laptop yet built that can give a desktop machine of the same – or even cheaper! – price a run for its money.

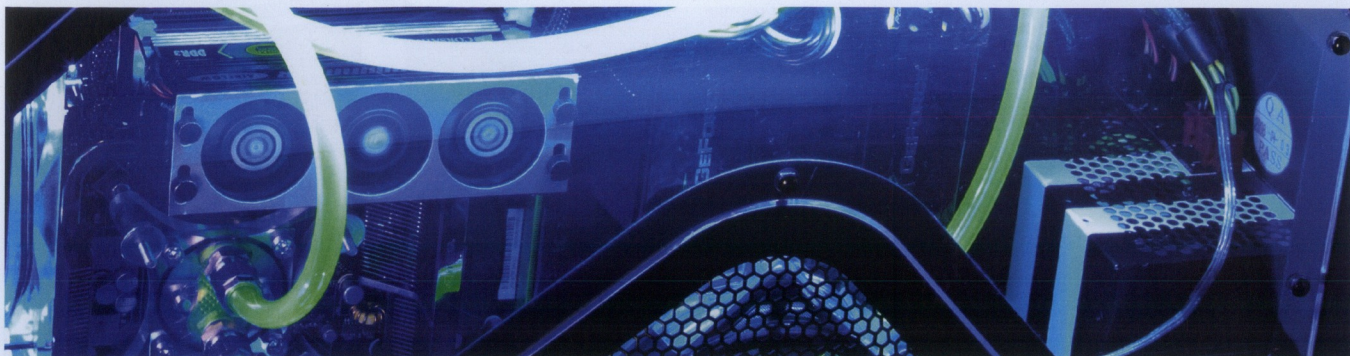
There's no doubting that a gaming machine you can take with you has its uses. Pro gamers, for one, could do a lot worse than an XPS or Alienware machine, and the ability to put your entire PC, screen and all, into a backpack to take to a mate's impromptu LAN party can never be underestimated. But, for true gaming power, and for the ability to not only play the latest games at best advantage but to keep upgrading your machine for years to come, you simply cannot beat the humble (or amazingly arrogant and pimped out) desktop PC. It will always have the all important advantage in heat management that is necessary to run the highest spec'd gear.



Even the most powerful laptop machine cannot compete with a desktop system.

	DCA Computers	NRG Tornado	NRG Storm
<b>Processor</b>	Intel Core 2 Quad Q9300 2.5GHz	Intel Core 2 Duo E8400 3GHz	Intel Core 2 Extreme QX9650 3GHz
<b>Motherboard</b>	750i SLI FTW	nForce 780i	790i Ultra SLI
<b>RAM</b>	2x 2GB Corsair OCZ Reaper	2x 1GB Corsair DDR2-8500	2x Corsair 1GB DDR3-1600
<b>Graphics card/s</b>	2x Galaxy 9800GTX 512MB	2x 9800GTX SSC Edition	2x Galaxy 9800GX2 1GB
<b>Hard-drive/s</b>	2x Western Digital 500GB	2x Samsung 500GB	2x Hitachi DeskStar 500GB
<b>Optical drive/s</b>	Pioneer DVD+-RW	Samsung DVD RW	Sony Blu-Ray BDR0M
<b>PSU</b>	Seasonic M12 700W PSU	Antec TruePower Quattro 850W	Antec TruePower Quattro 1000W
<b>Case</b>	I-Cute ATX S901	Antec 900	Antec 1200
<b>Operating system</b>	Windows Vista Home Premium 32b	Windows Vista Home Premium 32b	Windows Vista Ultimate 32b
<b>Warranty</b>	Three years on CPU, HDD, Monitor Five years on labour RTB One year on everything else	One year RTB	One year RTB
<b>Extras</b>	ASUS VW222 22in Widescreen LCD Logitech X-240 speakers Logitech G15 gaming keyboard Logitech G5 gaming mouse Overclocked to 3.2GHz	Benq T221W 22in widescreen LCD Razer Mantis mousemat Razer Copperhead mouse Razer Lycosa gaming keyboard Overclocked to 4GHz	Benq G2400W 24in widescreen LCD Razer ExtractMat bundle Razer Lachesis Precision mouse Razer Lycosa gaming keyboard Alphacool watercooling kit Overclocked to 4.2GHz
<b>Price</b>	\$2,899	\$3,299	\$5,949





## BUILD V. BUY

If you've ever wondered why a pre-built system can be so damned expensive compared to the last PC you put together, we've got one phrase you should understand – parts *and* labour.

Essentially, the value of a retail PC is far greater than the sum of its parts, and for good reason. Someone else has slaved over the cable management, finessed all the cards into their slots, made sure all the connections are secure, and then gone through the often tedious process of installing and testing an OS. Throw in companies that even overclock a water-cooled PC for the retail market, and you have some serious pre-sale sweat and effort.

None of this should be underestimated. As people who frequently peer inside the neon-lit interiors of high-end PCs, we know there is much to be appreciated in a fine case build. We know just how much patience is necessary to bundle all the relevant power cables in a machine, sectioned together every inch with neatly clipped cable-ties, and stowed away into

the corners and recesses with military precision.

Then there's the warranty. Any PC bought at retail should include some insurance for your expensive product. This might range from a 'return to base' warranty for faulty parts (though check if that returning has to be done by you), to onsite replacement and installation of faulty parts.

Of course, the counter to that argument is what value you place on that. For instance, if you run the numbers on our Performance PC in KitLog, you'll note that for a mere \$1,600, give or take, you'll be able to put together quite a hefty little machine – so long as you're willing to do the work of building the thing yourself.

Ultimately, this is a choice for each individual. Most enthusiasts will be quite happy to build their own system from scratch; indeed, that is part of the joy of the hobby for them. But for others, the enjoyment of owning a kick-arse PC is more in what can be done with it, than with actually building it.

to such ephemera as cable management and case design also comes into the picture. These are powerful machines, so how the vendors have chosen to keep their gear cool, and the efforts they've made in terms of clean air-flow, is of paramount importance.

Then, of course, there's the budget angle, and to that end we'll be coming up with a comparison of performance to price (that, of course, only compares the actual PC, not any peripherals like monitor or keyboard). This figure is a simple one to arrive at – we'll simply divide each machine's results in 3DMark06 by its cost in dollars. Call it DollarMarks, if you will.

There's a range of price-points on test, so it may make for some uncomfortable comparisons. We intentionally did not set a price-point for this test, rather leaving it up to each vendor to play to their strengths. We also feel that this makes for greater insight into just what you're paying for, and illustrates the performance differences between a sub-\$3,000 machine and a \$6,000 beast. In other

“With the component market moving so fast, it's easy for upgraders to fall into the trap of waiting for the next big thing.”

words – is the extra performance actually worth the money?

All of these scores will go together, with the most weight going to a machine's raw performance – this is a performance round-up, after all – to ascertain just how well each PC has performed.

All that remains now is to get on with the show!

### Enspire Computers

### Trinity Computers

Intel Core 2 Duo E8500 3.16GHz	Intel Core 2 Duo E8500 3.16GHz
Asus P5K Pro	GA EP35 DS3
2GB Patriot DDR2-800	2GB Gskill DDR2-800
GeForce 9800GX2 1GB	BFG 9800GTX 512MB
Western Digital 500GB	2x Samsung 1000GB
20X DVD+-RW	LG DVD+-RW
Cooler Master Real Power 700W	Coolermaster 600W
Antec 300	TI Deluxe case
Windows Vista Home Premium 64b	Windows Vista Home Premium 32b
One year parts and labour on-site	Two year parts (limited RTB) Five year labour (limited RTB) Three year on-site \$99 extra
	22in ASUS VW222 widescreen LCD Logitech keyboard Logitech mouse
\$1,949	\$1,980



## TI Deluxe 9800

Unrivalled value, but at what cost to performance and quality?

**Price** \$1,980

**Supplier** Trinity Computers

**Website** [www.ticomputers.com.au](http://www.ticomputers.com.au)

This lower end machine from Trinity Computers may well sit at the lower end of performance, but for a very reasonable price you're getting one hell of a complete computing package.

For less than \$2,000 you're getting a solid 22in display from ASUS, and good Logitech models for the keyboard and mouse. Nothing to write home about, mind you, but they get the interfacing job done.

It comes in a solid if uninspiring case; again, one of a lower end model, but still more than capable of protecting all the gear that Enspire's bundled in this PC.

It's a pretty well designed little beast, too, with a still strong 9800GTX the central star. It's supported by 2GB of Gskill DDR2 RAM, and a whopping two 1TB Samsung hard drives, all plugged into a P35-based mobo with an E8500 CPU. It's an aging system, now, to be sure, but still more than serviceable for the majority of games and applications. It's no beast, and it struggled with *Crysis* and failed outright in our 8x anti-aliasing testing, but for pure bang for buck this machine is quite literally peerless in this roundup.

The build could have been cabled a little more efficiently. As it is while the various cabling runs have been tied off, they're left obscuring the RAM slots, and a set of rather overly long SATA cables are even at risk of fouling the fan on the GTX card. It's



unlikely, but is it a risk you really want to take?

All this loose cabling also inhibits the airflow of the case, and with nearly all the cooling options being stock choices throughout, that could be an issue if you don't keep the case well-cleaned and ventilated. On top of that, the PSU was poorly installed, with loose screws leading to it sliding around in its brackets as the power cord was unplugged. Sure, you're not paying the earth for this box, but that's not really an excuse for sloppy work like this. Still, we guess you do get what you pay for, and it does come with a pretty generous warranty, and options for three-year on-site repair. Great if this is a computer you're getting for someone you don't want to act as IT support for.

As a complete bundle it's hard not to be impressed, and it's worth noting that while this machine did bottom out in the performance stakes, it's still better than any gaming laptop by a long margin.

**SCORE** **7.5**  
OUT OF 10



## Enspire Vitesse GX

The PC, and nothing but the PC.

**Supplier** Enspire  
**Website** [www.enspiredigital.com.au](http://www.enspiredigital.com.au)  
**Price** \$1,949

The Vitesse comes to us with an almost identical price-point to the TI machine, but it comes by itself – no monitor, no keyboard or mouse.

This is no bad thing, really, as what modern gamer or enthusiast doesn't have a spare dozen of each lying about their house from previous machines? Monitors, especially, have a slow product cycle, and in the end, the money you're saving on possibly redundant peripherals has in this case been very well spent.

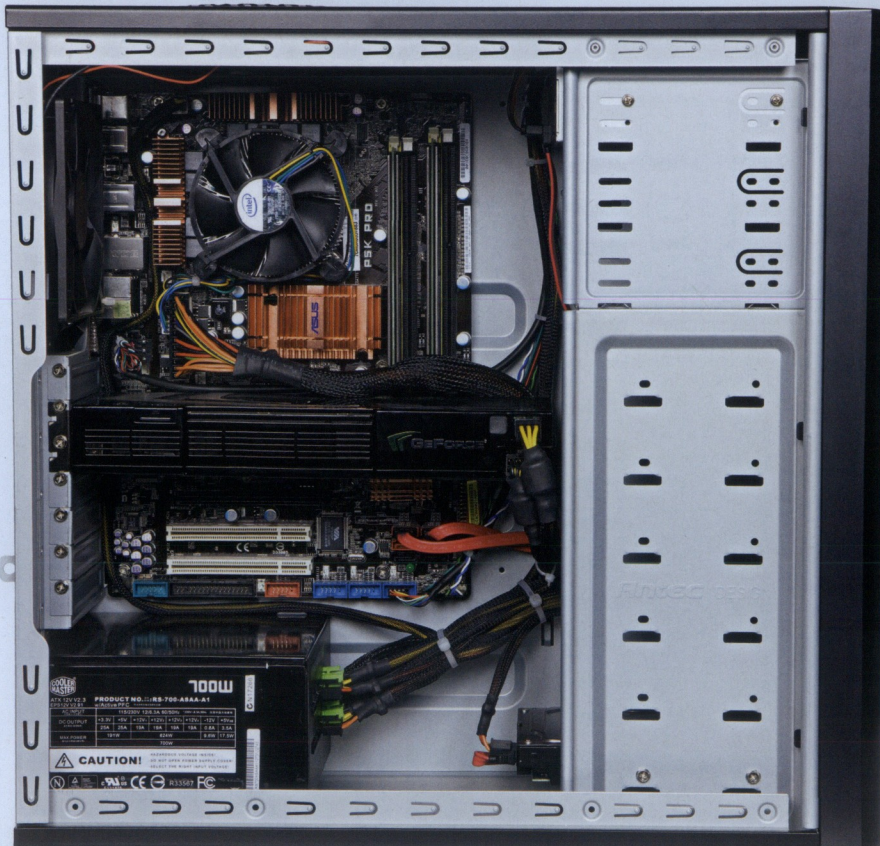
The Vitesse is built around a good ASUS mobo, 2GB of Patriot RAM and a 9800GX2 graphics card. We may not be all that fond of this card as an upgrade, but if you're getting a new machine outright, then it's still a good choice. A single Western Digital 500GB drive leaves the machine with the least storage in this roundup, but 500GB is still impressive. The Vitesse also sports a beefier power supply than the TI machine, a Coolermaster 700W Real Power. On top of all that you get a 64bit version of Vista, too, which is handy for when you'll inevitably want to upgrade your RAM. Now if only more people would write 64bit code...

It's all packed into an Antec 300, and everything's well-installed and nicely cabled. Airflow is good – as with all Antec cases – but it would have been nice to see non-stock cooling on the CPU. In our experience, the stock options are not the most efficient by a long shot.

Still, the Vitesse did have some issues; some odd, some quite



HEAD TO HEAD



annoying. On the odd hand, the display was set to an old-fashioned 1024 x 768 – hardly de rigueur. More annoying was the fact that for some reason we just couldn't get the Crysis demo to unpack and install until the umpteenth attempt. We've no idea if this is just one of those wobbly hardware issues, but it only affected Crysis, not any of our other benchmarks.

Speaking of benchmarks, the inclusion of the GX2 pushed performance over the TI machine quite significantly. 3DMark03 in particular, which scales far better with multiple GPUs, saw a huge boost, and Crysis performance was similarly improved. The Vitesse could even manage the challenging 8x AA run.

Not well, to be sure, but that's a lot of pretty pixels to push around. About the only other bugbear we can think of is that the CPU fan tends to whine rather loudly under load. It's not going to wake anyone up, but this is another reason we prefer non-stock cooling options – they're generally quieter.

**SCORE** **7.0**  
OUT OF 10



## DCA Computers

Well-specced and boasting solid performance, but let down a little by shoddy build choices.

Supplier DCA Computers

Website [www.dcacomputers.com.au](http://www.dcacomputers.com.au)

Price \$2,899

As you approach the \$3,000 mark you start to see a whole other breed of PC. In both of the samples on test there's a dual-card SLI solution, overclocked CPUs, and, of course, a huge boost in performance. These are classic gaming machines.

DCA Computers' entry sports two Galaxy 9800 GTX cards and a Q9300 CPU overclocked from its stock frequency of 2.5GHz to a far juicier 3.2GHz. DCA does extensive stability testing on its overclocks, and with a few exceptions this rig was able to handle our benching with aplomb. The only sour note at the this stage of the game is the 4GB of RAM the machine comes with; this machine only sports the 32bit version of Vista, and so with two 512MB graphics solutions, a large portion of that RAM lies unaddressed. When, oh when, will people realise that building a PC isn't just about the biggest numbers!

The DCA PC's build quality was similarly bit of a mixed bag. The case is a little on the twee side, and two out of four of the front USB ports were simply not working. It's a neat build other than that, with the cabling nicely tied off and the bulk of it stored behind the mobo mounting plate. Airflow was therefore pretty good, though another fan may not have hurt too much. Certainly, it would have been a wiser choice than the extra un-used RAM.

You're at least getting a very good bundle aside from the PC itself. DCA has managed to package a mess of Logitech peripherals into this sub-\$3,000 kit. There's a G5 mouse and a chunky G15



keyboard (which WoW players swear by, apparently), and X-240 speakers as well. The speakers in particular are a nice touch, and sound surprisingly strong for a mere 2.1 set-up. The PC is rounded out by a 22in ASUS VW222 LCD display.

It's a hard choice to split this machine and the Trinity entry in terms of excellent value. There's a \$1,000 difference, of course, but you do get a lot of performance for that extra cost. In the end, given the completeness of this kit on top of the overclocking, we think DCA just pips the Trinity. Similarly, while the NRG Tornado system performs better again for slightly more, DCA's entry did managed to pip it in 8x AA *Crysis* testing. Even in this price bracket, it still has a slight edge over its competitors, though it is held back by some poor build choices and a lack of quality control in some areas.

SCORE **7.5**  
OUT OF 10



## NRG Tornado

A solid performer with a great selection of components and hefty overclock.

**Supplier** Altech  
**Website** [www.altech.com.au](http://www.altech.com.au)  
**Price** \$3,299

Both NRG systems were an absolute joy to work with, and the Tornado is a near-perfect display of careful building, well-chosen components and serious performance.

On paper there are a lot of similarities between this PC and the entry from DCA, but when you get down to the details the NRG is just a touch better in almost every way. You pay for that, of course, and you technically end up with less 'stuff' for it, too, but in the end this is a superior system.

To start with you get a very compact Antec 900 case, which, though not to everyone's taste, is still a solid component. The powersupply is, unsurprisingly, an Antec model, and more powerful to boot; similarly, you get a better processor, with an even better overclock – and E8400 sporting a 1GHz improvement over its stock-rated 3GHz. Impressive stuff, and you get a good after-market CPU cooling solution to make sure the all important silicon doesn't cook itself into the grave. On top of all that you've got a terabyte of storage in RAID 0, so you've got spaciousness and data security nicely taken care of.

Better gear aside, the DCA and NRG Tornado are very similar, but the NRG definitely has the performance edge. What we're now seeing in higher end machines like these – and it's even more obvious in higher-specced PCs – is that the CPU is the main bottleneck in any system. Thankfully, the SLI GTXs are really able to stretch their legs when backed up by a 4GHz



clock-speed; 3DMark performance is well ahead of the DCA entry, as is normal 4x AA Crysis. DCA does have the edge in 8x AA (where the Tornado actually dropped to 0fps at one point), though, which means you may get overall smoother performance. Your mileage, of course, may vary.

The Tornado is very well put together, though it is a little cramped inside the Antec 900. For instance, the hard drives are quite inaccessible thanks to their placement in line with the SLIed GTXs. This does make for more efficient airflow, but it also means that any hard drive maintenance requires the removal of the graphics cards. Aside from that, this is a picture of good cable management, and every component is securely installed.

About our only complaint, apart from the price to performance issue we addressed earlier, is the tacky-feeling DVD writer. A nice touchy-feely Razer keyboard and mouse more than makes up for that, though.

**SCORE** **8.0**  
OUT OF 10



## NRG Storm

## A beast of a machine, but at what cost? A lot...

**Supplier:** Altech Computers  
**Website:** [www.altech.com.au](http://www.altech.com.au)  
**Price:** \$5,949

If you've got money to burn, then there's no doubt that the NRG Storm is the leader of the gaming PC pack. There are very few things that you could throw at this machine that might phase it – though we did find some, of course – and it has an excellent set of features and peripherals that will please even the most discerning enthusiast.

And you know what? It looks like a \$6,000 machine, too. With a blacklight and UV reactive cooling fluid – did we mention it's watercooled? – this is a machine that actually deserves a side-window. In a darkened room, accompanied by the slight bubbling of the cooling apparatus this is a machine to be respected before you've even sat down to game.

From the 1000 Watt power supply to the 790i board with DDR3 RAM, it's a well specced machine too. You'll need that power, too,

when you consider that the Storm sports twin GX2s in SLI – that's effectively quad SLI right there. To help keep those pixels pumping, the CPU – an already feisty QX9650 – has been overclocked to 4.2GHz. Still, the Storm is easily the loser in the pure bang for buck stakes. The law of diminishing returns is a harsh mistress.

Like the Tornado system, you've got a terabyte of storage in RAID 0. On top of that you've also got a Blu-ray drive and spacious 24in Benq monitor so that you can enjoy HD media in its proper glory. The only thing you'll be missing is sound...

On the other hand, you do have more performance than God – the Storm even manages 15fps in 8x AA *Crysis*. Still, there are some issues worth nothing. For one thing, the Storm returned a lower minimum result in 4x AA *Crysis* testing than some of the less powerful and

**“In a quiet room, accompanied by the bubbling of the watercooling, this is a machine to respect.”**

cheaper systems. Its average performance in *Crysis* is of course through the roof, but we think there's likely an issue with the quad SLI settings that leaves a few frames bloodied and bruised in the rush to be rendered. We also noticed some random screen flickers when under load – whether that's more quad issues, or possible problems with the stability of the CPU we're not certain. They're not going to stop you enjoying a game, though.

There's also a lot of room in the case for future upgrades or adding other drives and gear, but the presence of the water cooling block may make that a more difficult proposition. Water cooling is great, trust us, but you're going to have to dismantle the Storm eventually so it'll pay to be certain you know what you're doing. Regardless, the Storm is a wonderfully put together system – neat and tidy.

Still, you really need to justify a machine at this price point. When you consider that for the cost of this one PC you can buy three of the Trinity entry, it certainly makes you think.



SCORE

8.5  
OUT OF 10





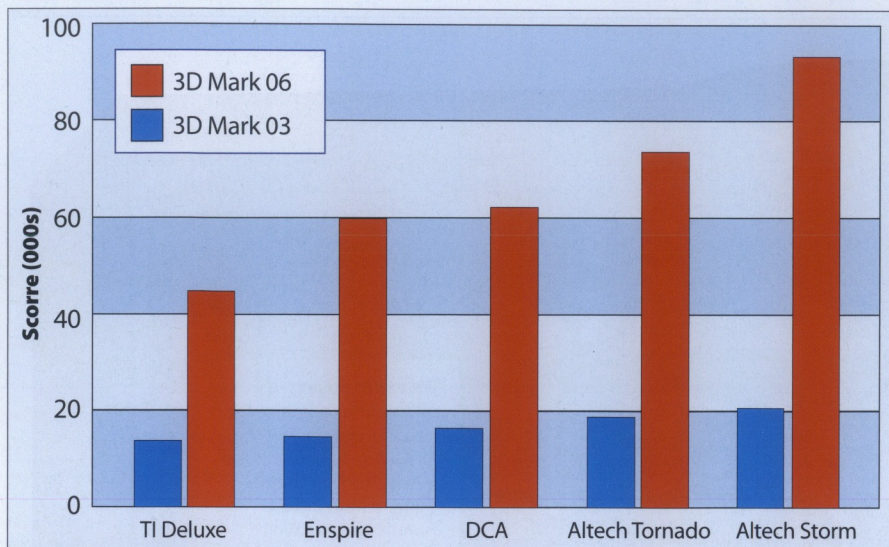
It's worth paying attention to some of the neat flourishes that the NRG lads have included in the Storm. For one thing, all the drive peripherals are well secured, and the hard drives are secured by thumb screws – a nice touch if you frequently swap drives.

Ah, the beauty of a watercooled CPU. There is an argument for securing the pipes a bit more neatly, but then they would not be so prominent. When you've got UV lighting and reactive coolant, you want to show off!

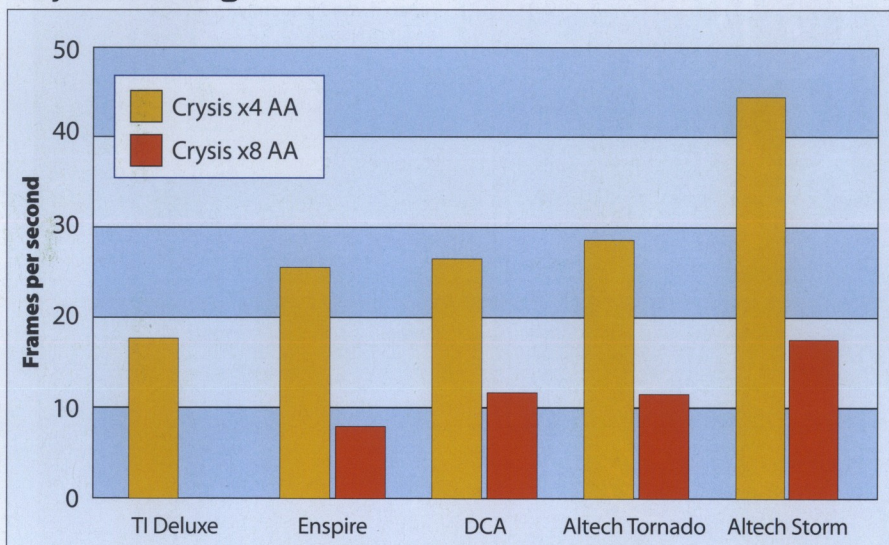
This is just one part of the great cabling in the Storm. You can just see it snaking away behind the backplate, and emerging from above the mobo. Great stuff.



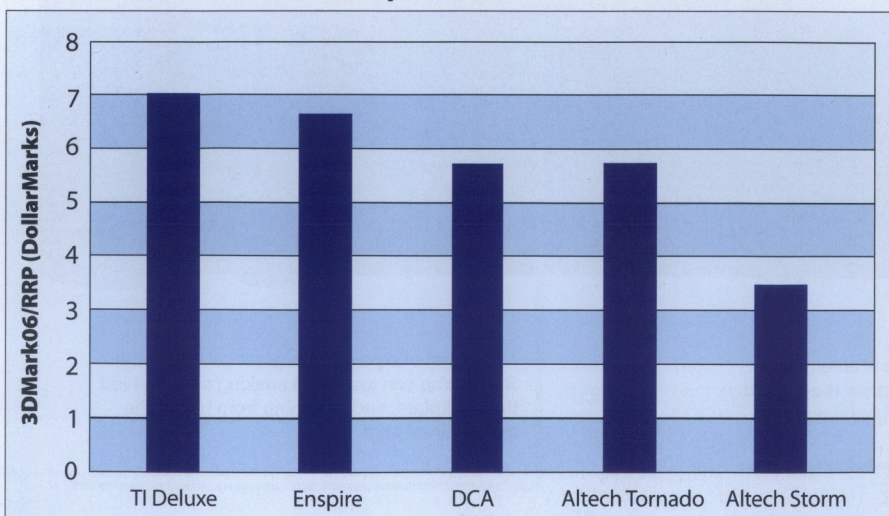
## 3D Mark testing



## Crysis testing



## Performance/Price comparison



## The wrap

The PC industry seems to be forever at a crossroads these days. If it's not the looming threat and popularity of consoles, it's the rapid double-time of vicious product release cycles that can relegate yesterday's cutting edge to tomorrow's dumpster. Consider that, even as this test was being written, a whole new GPU core has been released by NVIDIA. Atomic has been pretty harsh when it comes to the GX2, but even we're feeling sorry for a card that was so obviously put to market purely to keep punters happy until the next big thing.

Still, that's the point, really. You can only ever take a snapshot of the market, as it's simply moving too fast – too blurred by speed – to study in more detail.


So what have we learnt from this?

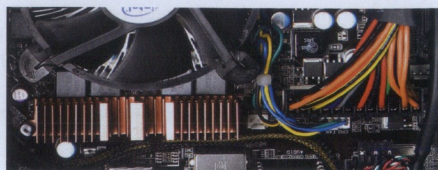
Well, to put it simply, \$3,000 sure buys a lot more computer these days than it did even a year ago. The DCA and NRG Tornado systems are regular powerhouses, and come with almost everything you need to play pretty much every game on the market. They boast room to upgrade, and are more powerful by far than the Alienware super-system we reviewed back in issue 86. And for more than half the price!

We've also discovered that overclocking is pretty much common practice when it comes to performance systems – only the most budget-oriented machines were running at stock speeds. Similarly, you'll find a lot of thought put overall into component choices and build quality these days. Quite possibly the threat of consoles is – at the moment, at least – making PC makers more mindful of the importance of delivering a solid product. Never a bad thing.

It's also nice to be reminded that, as more and more companies are making gaming laptops, the desktop is still far and away the superior platform. Referring again to the Alienware M15X – itself \$6,000 – even the cheapest machine on test in this round-up gave it a serious bench-kicking. Makes an old PC gamer proud.

But we're also reminded of another thing – if you want a machine made your way, make it yourself. Even the cheapest machine on test here is still a far more expensive proposition than simply buying high end parts yourself and putting it together. We estimated earlier that the performance machine in our KitLog would only cost about \$1600 by itself, and something like \$2500 if you threw in everything else. That's an incredible difference right there, so if you have the skills to overclock and fiddle around with watercooling, self-building is absolutely the way to go.

But if that's too much effort, there are some great machines out there to suit almost every budget. 

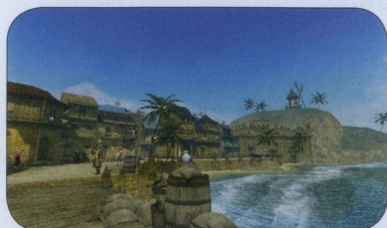




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# Foxconn X48 BlackOps [Preview]

Is this a board that truly meets the enthusiast need?  
Josh Collins finds out.

## SPECS

Price TBA  
Supplier Foxconn  
Website [www.quantum-force.net](http://www.quantum-force.net)  
Specifications Socket 775;  
Intel X48 northbridge; ICH9R  
southbridge; ATX form factor;  
SONAR Audio add-in card;  
3x PCIe x16; 3x PCI;  
1x EIDE; 6x SATA;  
1600MHz FSB; DDR3-

First and foremost, this isn't quite the review we expected to be writing.

An odd way to open a review for sure and we'll get to that later; first we'll dive into the background of this groovy looking motherboard and then we'll get into why this review ended up more of a preview rather than a full blown review.

## Maker's mark

For many, it's been a huge surprise to see Foxconn go from zero to hero quite so quickly within the enthusiast space.

Such a spike in popularity only comes with product capability (read: bloody hard work at the back end). But just how did Foxconn manage to open a line such as the Quantum Force range? Well it's simple really. If you're going to make a product line for enthusiasts, why not have the mission lead by an enthusiast?

Seeing the need, the folk at Foxconn brought in the help of overclocking legend Peter 'Shamino' Tan. Shamino is a man so proud of his roots that his business card literally reads 'Overclocking Evangelist' as his position within the company. With such a strong knowledge-base not only at hand, but also driving the concept, it's no surprise the brand and company as a whole has made such an impact on the enthusiast scene.

The first big impact was the shock that was the P35 Mars, and the X48 BlackOps is following those impressive footprints. Moving forward from that, the 790i Dreadnaught, P45 Avenger and 780a Destroyer are all busily in development.

## Tested by overclockers, for overclockers

Knowing he had a huge task ahead of him, Shamino stepped up to the plate and organised what can only be described as an army of overclockers.

This army includes some of the best overclockers in the world. From Hlpro5 in Greece, all the way to down-under (Australia's beta testing position was represented by the talented youngpro). With an ever growing list of gifted and enthusiastic hardware nuts testing, torturing and pushing to the

limit the new creations from Shamino and his Foxconn engineering team, the outcome to date has been a string of world records, well designed and functioning motherboards and a buzz that no traditional marketing campaign could hope to achieve.

These individuals behind the motherboard beta testing carry the name of 'Quantum Force Scholars' (okay, that's kinda cool -ed).

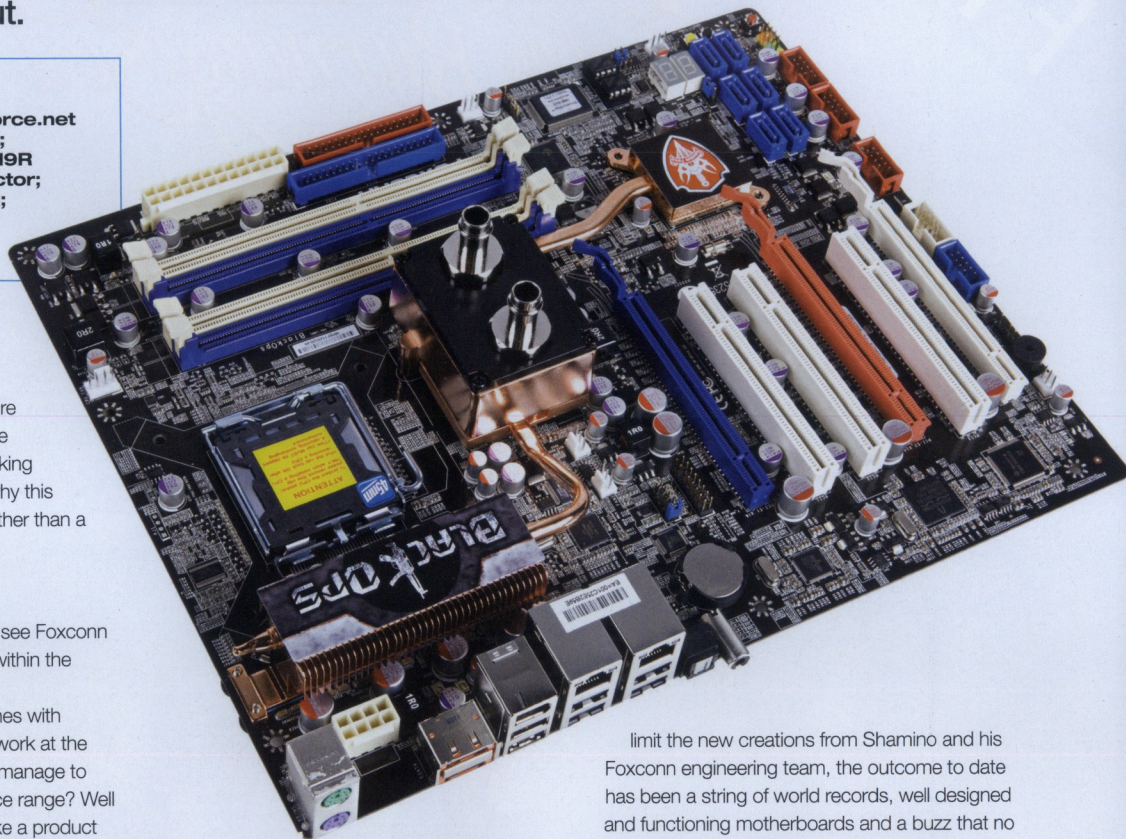
The large majority of the individuals testing were hand-picked by Shamino himself. But if you think you're up to the task of being a Quantum Force Scholar, Foxconn provide an application form available on the Quantum Force website.

The senior Scholars, such as kngp|n, giorgioprino and dimas were even flown in by Foxconn to present overclocking to the audiences wandering the halls of Computex (for more info on this see Josh's Chippery column).

This close relationship with the enthusiast community has allowed for features to be added to the motherboards that would otherwise be overlooked. One example is the CPU Cold Bug option in the BIOS that allows the board to avoid cold bug boot issues; of course, to even use this the board must be at -50 degrees Celsius. Other features include sufficient voltage levels and serious granularity within the voltage steps. Furthermore, the heavy overclocking influence has lead to one hell of an interesting bundle to accompany the motherboard itself.

## Extreme bundle for an extreme board

One of the huge draw cards of this motherboard is



45nm Quad	333x9; DDR3-1333 8-8-8-21 1T*
Super Pi 4M	1m 25.550s
wPrime 32M	12.681s
Hexus Pi Fast	30.89s
Everest read	8564MB/s
Everest write	7105MB/s
Everest latency	65.3ns
CineBench R10 - Single Thread	3712
CineBench R10 - Multi Thread	13415

\*Note: System was run at CMOS cleared BIOS defaults due to a BIOS level issue not allowing overlocks.



the sheer level of awesomeness bundled and built into the board.

The first and most prominent feature that caught enthusiast attention was the North Bridge cooling solution. While at first it just looks like yet another heatpipe-based routine, it becomes apparent rather quickly that the BlackOps provides something a bit different – something many of us have been craving.

This is the inclusion of a properly adjustable, configurable and generally customisable North Bridge cooling system. With what can only be described as a chunk of copper milled out of God's own copper-mill, the design lends itself to be flexible with many categories of cooling.

The cooling solution supports passive air cooling, active air cooling (fan assisted), water cooling (with two sizes of barbs bundled) and extreme cooling (dry ice and LN2). This support is made available by a very simple yet elegant modular design.

At the heart of this customisable design is a chunk of copper that is essentially the base of a simple dice/LN2 pot. With four threaded holes and an O-ring around the edges, this base allows for

By now, we feel like we've become one of those infomercials going along the lines of 'but wait, there's more!', but rounding out the notables within the motherboard bundle is the inclusion of two trim-pots, ready to be used in volt mods. Although many of the top overclockers – and indeed Scholars like youngpro – believe that all the necessary voltage levels are already available and functional, the sheer fact that they are included in the bundle is proof that Foxconn knows its market and is working to provide a product that meets the end user's needs – however extreme it may be.

## Atomica Frustrata – the science of tech testing

So we've talked this board up to the Nth degree and now it's time to get to the testing. Unfortunately, this is the commanding reason as to why this review has morphed into a preview.

It's a known fact that these boards are not only extremely powerful overclockers but are also very stable throughout the whole process. We certainly experienced some stability, though let's just say it

“By simply screwing on an appropriately-sized rectangular pot, the North Bridge cooling solution is ready for dry ice...”

additional add-ons to convert this otherwise passive solution all the way to an extreme-cooling-ready beast.

These add-ons are very simple. The first is a small 40mm fan that bolts onto the passive heatsink, thus making it an active solution. Thankfully, thought has been put into the size of this fan and an ultra whiny result avoided by using a quality 20mm thick fan with sizeable blades. The next option is a water cooling solution. This option is as simple as using the four tapped holes to screw the top plate featuring the barbs down onto the heatsink. The aforementioned O-ring running around the edges then assures a leak-proof implementation.

The final solution, the big daddy of them all, and the option that created the biggest stir amongst the enthusiast community, is a sub-zero-ready option. By simply screwing on an appropriately-sized rectangular pot, the North Bridge cooling solution is ready to house dry ice and liquid nitrogen (LN2) to achieve that super clocking frozen touch.

Not stopping with North Bridge cooling, the motherboard also comes bundled with a special bracket that allows for a 120mm fan – also bundled – to be attached to the GPU(s) and provide cross-ventilation for the card(s).

For many, these options would be enough, but Shamino and his team went even further.

The motherboard also features a neat toy which is the first of its kind to be bundled with an enthusiast level mobo – a table top benching platform for open case testing. Wicked.

atomic

was all too stable.

While we cruised through the operating system installation, driver installation and very quickly adapted to the well laid out and feature-rich BIOS, we came to a rather sudden and shuddering halt. The reason behind this screaming stop was the inability to change the value for a setting known as 'Over Clock Phase Select'.

This option was greyed out and not possible to select. Unfortunately, this is the option that needs to be initialised to a 'manual' value to allow system overclocking and tweaking. So as it stood we were stuck with an overclocking beast that, unfortunately, could not be overclocked.

Not deterred, we went to the Quantum Force website and downloaded the latest full-release BIOS. This was version G26. Unfortunately for us, this did not solve our problem. Next we tried the latest beta BIOS, G27 – this also gave us nothing. We went on to try a selection of beta and full-release BIOS, including G27, G26, G25, G18 and P04. Heck, G18 was obtained straight from a Quantum Force Scholar who had used that very BIOS to produce a number of huge results and bench in the mid to high 5.x GHz CPU frequencies.

As absurd as it felt thinking about it, we wondered whether the QX9770 engineering sample wasn't playing well with the retail sample motherboard – we've never had this issue in the past, but stranger things happen. So we swapped in a spare retail E6700; yet we once again did not have access to the 'Over Clock Phase

Select' option.

Not content, we tried two more QX9650 engineering samples and an E8500 engineering sample. Interestingly, the E8500 ES wouldn't even boot. Instead, the E8500 would hang on the FF error code on the POST code display. This error is related to CPU Initialisation.

So far, we'd tested five BIOS versions and five CPUs. Next was to see whether memory was an issue.

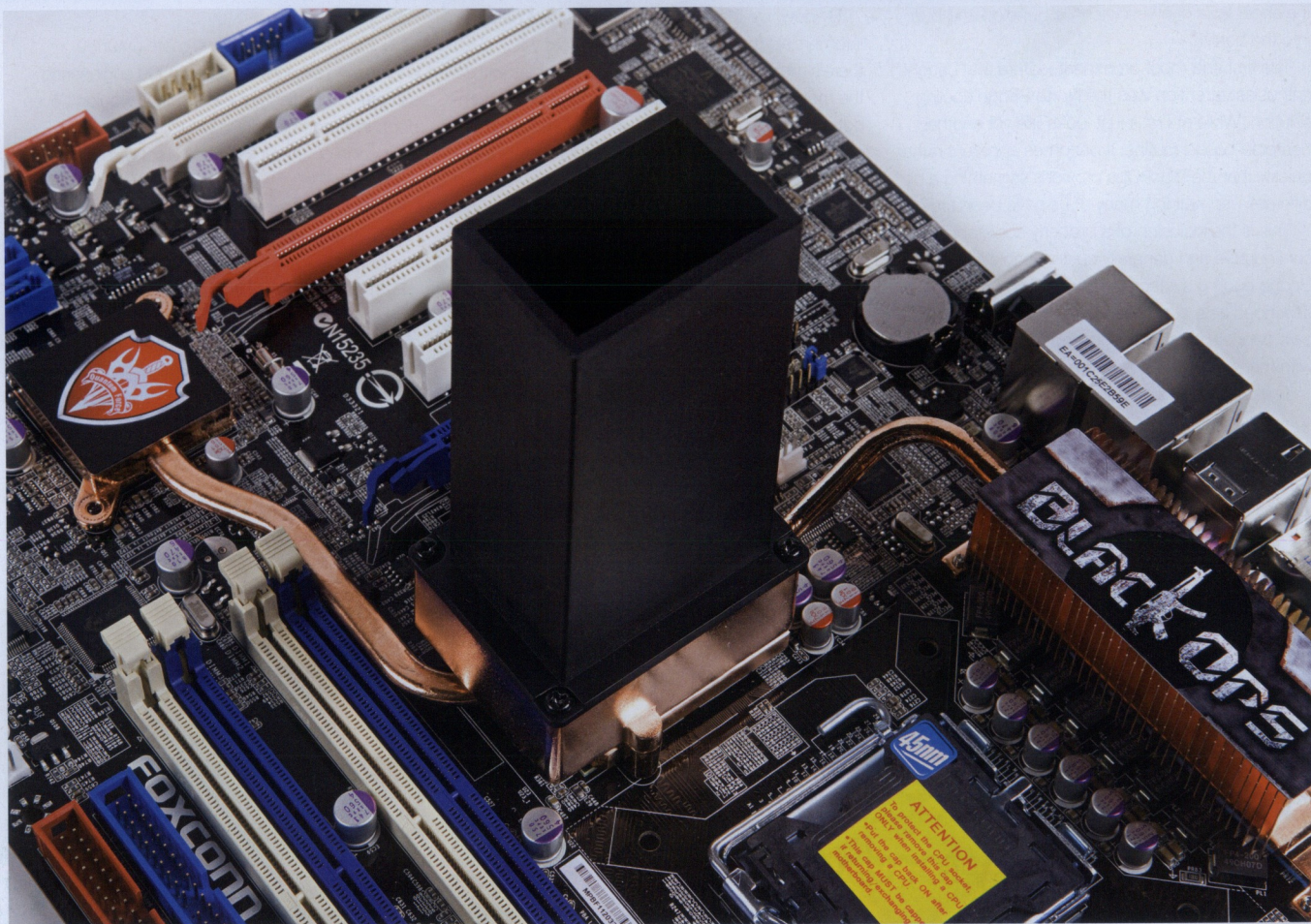
The initial kit used during testing was the usual Corsair Dominator DDR3-1800 C7 2x 1GB kit we love so much. This kit would allow the system to happily boot into Windows Vista 64bit but obviously we had did not have the key overclocking option in the BIOS, effectively leaving us with no control over the voltages, memory settings and other such options.

We went on to try a variety of memory configurations. The 2x 1GB solutions that worked without a hitch included the likes of Patriot LL DDR3-1866 C8, OCZ Platinum DDR3-1600 C8, Gell Evo-One DDR3-1600 C7.

On the not-so-cheery side of the 2x 1GB fence were two kits from Kingston from the HyperX range. We tested the HyperX DDR3-1625 C7 and DDR3-1800 C8 kits.







The DDR3-1625 C7 returned a POST code of 54 with beeping. This error indicates that the board has finished Memory Sizing Code and is stuck at the Memory Test stage of the POST. This is can be a common issue when overclocking and pushing very hard to hit a high and tight memory overclock.

POST before stalling on code 40 (Memory Sizing code) before proceeding onto C3 and immediately rebooting. After another discussion with a Quantum Force Scholar we learn that the BlackOps currently has issues with 2x 2GB memory configurations and for the time being, BIOS development of the 790i

can quite openly and authoritatively state that the situation we've experienced is a one-in-a-very-large-number ratio of bad to good experiences.

Even still, the actual experience of testing this motherboard was not one of annoyance, despite our many issues. Instead, it was as if the motherboard talks to the user, always informing them as to what is going on, how things are operating and what to expect next. This in itself leaves us wanting more time to experience some overclocking with the BlackOps.

While our testing in the labs was not successful, we did get a chance to bench one of the early engineering samples with youngpro. During this he experienced a board that, while still in an early stage of development, that was capable of testing through extreme temperatures, frequencies and general tweaking for upwards, and likely over, eight hours straight.

While the BlackOps is known around enthusiast circles as the little board that could, and indeed has delivered the goods with overclocking destruction, our sample ultimately felt like the little board that should.

It was an oddly enjoyable experience testing the BlackOps, though, and due to the uniqueness of the situation, we would have liked to obtain another sample. Unfortunately, magazines are created to a very strict and rigid deadline, so we felt we'd still like to share our thoughts and experiences with this board but sadly cannot give a score for this product at this stage.

“...the actual experience of testing this motherboard was not one of annoyance despite our many issues.”

Unfortunately, we were simply trying to boot in at stock CMOS cleared defaults – what the deuce?

Next up was the DDR3-1800 C8 HyperX kit from Kingston. While we mentioned the FF POST code indicated CPU Initialisation issues, it also flashes just prior to entering the operating system. With this kit we were able to make it through the POST and to the point that Vista begins to load, but unfortunately this poor soul never got through the 'Black Screen of Wait' and is lost within the abyss. Rest in peace, soldier.

At this point we'd tested six kits of memory but felt there was one more kit worth testing. This was a 2x 2GB kit from Corsair's DHX range that supports Intel XMP. For this kit, the system would begin to

Dreadnaught has been frozen until this issue with the BlackOps is resolved.

At this point, we'd tried five CPUs, five BIOS versions and seven kits of DDR3 memory.

While we haven't obtained any performance results or even access to the one BIOS option we want and need, we have certainly learnt a lot about our problematic sample – welcome to the world of hardware testing.

## The little board that could should

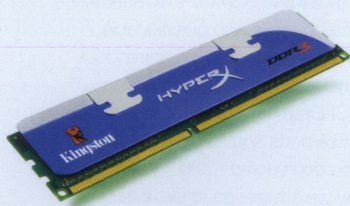
With so many positive and stable results utterly overwhelming our unique situation, we feel we





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# Asrock X48TurboTwins-WiFi

Asrock manages to scare Josh Collins, but for all the wrong reasons.

## SPECS

**Price** TBA  
**Supplier** Asrock  
**Website** [www.asrock.com](http://www.asrock.com)  
**Specifications** Socket 775;  
 Intel X48 northbridge; ICH9R  
 southbridge; ATX form factor; 2x  
 PCIe x16; 3x PCI; 1x PCIe x1; 1x  
 EIDE; 8x SATA; 1600MHz FSB;  
 DDR2-1066 and DDR3-1600.

Asrock is well known for supplying the market with cheap, cost efficient budget-grade motherboards.

It's been responsible for Frankensteining some of the most polar opposite technologies onto the same board, too. In the past the company has produced motherboards with both AGP and PCI-Express graphics slots and even a board with two different CPU sockets, by supply an add-in card for those who really desperately crave options.

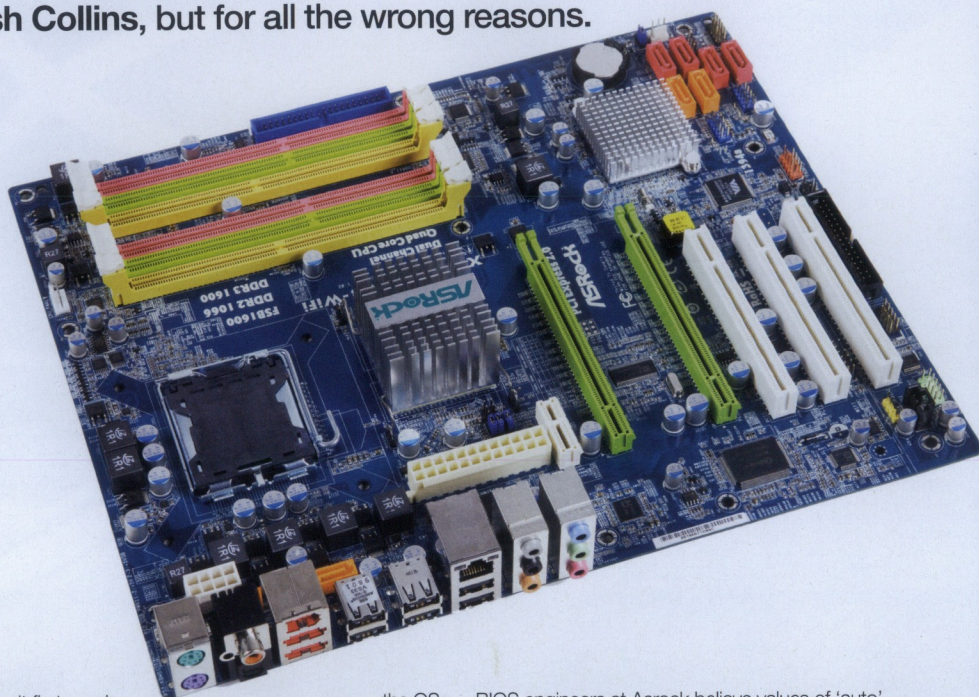
With this history, it is no surprise to see DDR2 and DDR3 on the same board. Then again, a number of manufacturers have been providing this to the market, such as the big players GIGABYTE, ASUS and MSI.

Asrock is now, more than ever, competing with some of the largest manufacturers in the world. Surprising to some and unsurprising to others, the company has decided to do battle by making a shift towards a focus on overclocking.

Those keeping their overclocking ear to the ground would have heard of Biostar's recent rebirth as the producer of an overclocking monster, the TPower I45, which appears to rather effortlessly pass 600MHz FSB and even 700MHz FSB.

While the Biostar board does have the advantage of the new P45 chipset, what the situation as a whole proves is the ability for a small player in the manufacturing business to provide a rather stunning board. Unfortunately for the peeps at Asrock, its recent efforts have left much to be desired.

To put a board through a gruelling test scheme,



it first needs drivers and applications installed. To do this, we load the optimised defaults within the BIOS to assure the utmost stability. Sadly, the crew of BIOS engineers at Asrock seem to have had their silly caps on when they set some of these optimised values.

The optimised defaults had settings such as the LAN, 1394a FireWire and HD audio all disabled. Furthermore the primary GPU is set as PCI rather than the far more common PCI-Express and, perhaps the most frustrating of all, the USB controller is disabled; this effectively includes all USB legacy support. As a result, even though you've booted into the BIOS and set the optical drive as primary boot device, if you're using a USB keyboard you won't be able to hit a key to start the installation of the OS! We hope the BIOS engineers slap themselves if/when they read this.

After finally getting the OS installed, we set out to optimise the platform wherever possible. Unfortunately, when operating with a 333MHz FSB, the maximum memory frequency possible through a divider is DDR3-1333. Furthermore, this divider doesn't even allow the platform to boot into the OS when voltage options are set to 'auto'. This meant for the first bout of testing we were restricted to a lowly DDR3-1066 – we may as well have been using DDR2 memory!

This could have been rectified with some voltage tweaking but to say this motherboard left a big 'WTF!?' stamped on our forehead is an understatement when it comes to the motherboard voltages.

Anyone used to using any motherboard of at least some decent quality, and with a clue about system setup, would want to know exactly what values the system voltages are at. Regrettably, the

BIOS engineers at Asrock believe values of 'auto', 'low', 'middle', 'high' and 'highest' are appropriate for settings such as NB vcore, SB vcore and VTT. This in itself was the single reason why we would not overclock this motherboard – who knows how many volts these settings put through to your precious memory and CPU!

Further BIOS level discrepancies include the GTLREF being decided by a decimal value multiplied by the VTT. This in itself is fine but as already mentioned, we have no way in knowing the VTT voltage.

This also leads to another issue; we can't even check NB vcore, SB vcore, VTT or vDIMM because the BIOS only allows voltage monitoring for CPU vcore, 12v rail, 5v rail and 3.3v rail – whether these are accurately calibrated is also questionable.

Pair this BIOS-level misery with a horrendous motherboard layout – just check the spacing between the PCI-Express slots or the positioning of two of the SATA ports and the ATX 24-pin connection if you don't agree – and you'll understand why we advise you to avoid this motherboard.

We're yet to get a street price for this Asrock board in the Australian market but considering there are solidly featured, well laid out options at a number of price points from the likes of ASUS and GIGABYTE that also have a better engineered BIOS, the only redeeming feature for the Asrock is the fact it uses solid state capacitors. But then, so do the ASUS and GIGABYTE options. (D)

45nm Quad	333x9; DDR3-1066* 5-5-5-15 1T
Super Pi 4M	1m 24.786s
wPrime 32M	12.792sec
Hexus Pi Fast	30.53sec
Everest read	8665MB/s
Everest write	7106MB/s
Everest latency	62.3ns
CineBench R10 – Single Thread	3713
CineBench R10 – Multi Thread	12908

\* Note: The memory was set to DDR3-1066 C5 due to the highest settable divider for DDR3-1333 simply does not boot

SCORE **4.0** OUT OF 10

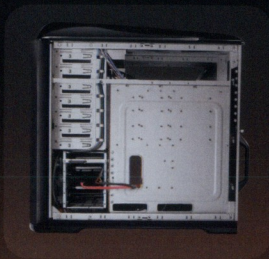


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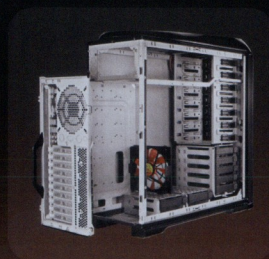
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Recommended PC hardware



Recommended Operating System





# Nvidia GeForce GTX 280

Our first, very special – and quite possibly excited – look at the GTX 280.

SPECS

**Price** \$999  
**Supplier** NVIDIA  
**Website** [www.nvidia.com](http://www.nvidia.com)  
**Specifications** 602MHz core clock, 1296MHz shader clock, 240 processing cores, 1GB GDDR3 RAM, 2214 MHz memory clock, 19.3 billion pixels peak fillrate, 141.7GB/s max memory clock 933 Gigaflop theoretical shader processing core

It seems that barely a fortnight goes by recently without the launch of a new GPU. Alongside the recently launched GeForce 9 series, there's the promise of some ferocious power from ATI's Radeon HD 4000 series. We're looking forward to doing some serious work on that board next month.

But this could be the big one: the Nvidia GeForce GTX 280 promises massive frame-rates and a significant jump in performance – and price, it should be noted – over the previous NVIDIA standard bearers, the GeForce 9800 GTX and 9800 GX2.

Numerous architectural changes set the GTX 280 apart from NVIDIA's previous cards. On first glance, though, they're not too impressive. The core clock, for instance, now stands at 602MHz – lower than the 675MHz of the 9800 GTX. The memory clock is virtually the same as the older 9800 GTX – 1107MHz in the newer card compared to 1100MHz in the older GPU.

But while clock frequencies are similar to older parts, the number of stream processors has nearly doubled: the GTX 280 has 240 compared to a mere 128 in the 9800 GTX, which suddenly seems a little paltry by comparison.

Given the importance of this new release, we decided a wider range of testing (in terms of both settings and applications) was appropriate to truly observe just where this new card excels – or doesn't! We also ran comparison tests with a 9800GTX and GX2. Thankfully, our testing laid to rest any worries about the GTX 280's performance. The monstrous card scythed through low and medium-detail Crysis tests with scores of 138fps and 84fps respectively, compared to 99fps and 60fps from the 9800 GTX.

Even the high benchmark at 1,600 x 1,200 was dispatched with little fuss: the GTX 280's score of

“Of course this performance comes with a major caveat: at \$999, the GTX 280 is going to leave a major dent in – a crater, even – your wallet.”

45fps compares extremely favourably to the 33fps of the 9800GTX.

After seeing this level of performance, we upped the ante to see just how far we could push the new GPU. With Crysis' quality settings maxed out and the resolution at 1920 x 1200, it still hit a stunning score of 23fps – four frames quicker than the 9800 GTX could manage at a lower resolution of 1600 x 1200 and the same quality settings.

In fact, the only card that we could find to outperform the GTX 280 in Crysis was the 9800 GX2 – and that's got two GPUs on one PCB. The GTX 280 still outperformed the GX2 at lower quality

settings, but the high-detail benchmark saw an 11fps improvement over the new card, with the GX2 romping through at 54fps. The very high test, again, saw the GX2 beating the GTX 280, but not by a huge performance – the GX2 scored 34fps to the GTX 280's 28fps.

This superb performance was carried through to Call of Duty 4. Even in the demanding high-quality benchmark, the GTX 280 scored 98fps, a full 32fps faster than the 9800 GTX could manage – and 29fps quicker than the dual-GPU 9800 GX2.

The Call of Juarez benchmark, which is full of demanding DirectX10 effects, again showed how capable the GTX 280 is. In the medium test it averaged 46fps – 14fps higher than the 9800 GTX. The high benchmark too showed off the difference between NVIDIA's former flagship GPU and the new card, with the GTX 280 comfortably averaging 37fps, against the 9800 GTX's at 21fps.

Of course, this performance comes with a major caveat: at \$999, the GTX 280 is going to leave a



NVIDIA GEFORCE GTX 280

	Crysis			3DMark06	3DMark03
	Average	Minimum	Maximum		
GIGABYTE 9800GX2	38.74	22.66	43.64	19640	65188
GTX280 reference	32.54	23.30	38.00	18058	55201



## STOP THE PRESSES

It's a sharp reminder of just how fast the market – and NVIDIA in particular – is moving that on practically the eve of deadline we were able to get some new and very interesting scores for the GTX 280. New drivers have added proper PhysX support, plus further optimisation.

Performance is closing in fast on the GX2 at higher settings, and we expect this trend to continue.

In a very real sense, this is a card that will hit its stride in the month's to come. It's already a killer card, and it's only going to get better. Still, the price gap has, if anything, worsened! NVIDIA, quite possibly a little concerned by ATI's upcoming 4-series, has dropped prices significantly on the GTX – you can get one for as little as \$300.

major dent – or should that be crater – in your wallet.

Every alternative is significantly cheaper: the GX2 can be picked up for around \$700, while the 9800 GTX has fallen as low as \$350 at some online retailers. And both, unless you demand the absolute pinnacle of performance, will still handle modern games with ease.

The GTX 280's power also raises questions of power consumption and heat generation under stress. However, the GTX 280 isn't too bad: at 66 degrees Centigrade it's only a couple of degrees hotter than the 9800 GTX at full pelt, and 12 degrees cooler than the 9800 GX2. The power consumption of our test rig at full load is high at 273W – the 9800 GTX drew a mere 216W in the same system – but nowhere near to the 325W draw of the 9800 GX2.

If you're prepared to pay the price – and it is a hefty one indeed – you'll be getting some of the best graphical performance on the market today. Almost every test we've run shows the GTX 280 demolishing the competition, with only dual-GPU offerings managing to dent it.

Price aside, our only concern is that when the new ATI cards arrive they may be even better. We'll

## TALES OF WOE FROM THE ATOMIC LABS

Josh Collins shares his initial – and frustrating – benching sessions with the GTX

The test bed for this session was as follows:

790i Ultra SLI reference w/ P05 BIOS  
Intel Core 2 Extreme QX9650/QX9770 @ 4GHz cooled by Noctua NH-C12P  
Corsair Dominator DDR3-1800 7-7-7-20 1T  
Reference/XFX/Leadtek GTX280  
Silverstone OP1000  
80GB SATA HDD  
Windows Vista 64-bit

So, I get home and start benching at 9pm. The idea was to run through some numbers and give our website visitors a sneak peak at some of the coverage for this issue. By 1am I simply had to give up due to exhaustion, knowing I had to get up in five hours time to assure I still made it to work.

There didn't seem to be a problem initially. I've got the 790i Ultra SLI test bench setup at home to mimic the GPU test platform at work. This meant the usual 4GHz quad core with all the usual stuff and up until now I've never had any issues.

I un-installed the drivers and the 9800GX2 that was sitting in the system, downloaded the 177.34 drivers from the NVIDIA FTP and also installed 3DMark06; I only had memory related apps installed at this point. While it's time consuming to get this tedious stuff done, I finally got my kit running smoothly and ready to go.

After discussions with some of my fellow overclockers – under the same NDA for the past couple weeks – I knew that we were all in for a treat. And rightly so, as the benchmark finished it popped up an 18.1k 3DMarks – nice for a single core, single PCB GPU solution.

Next up was the usual opening salvo of CPU-Z and GPU-Z windows. This is where my nightmare began.

As the final CPU-Z window opened the system crashed. A complete black screen reset. WTF!?

To say I was a little pissed off was an understatement; I figured I'd just re-run the benchmark. Remember, the system being used has run these benchmarks effortlessly at these system settings for all recent GPUs, both NVIDIA and ATI flavoured.

This game of cat and mouse with benchmarking went on for a number of hours. The system was hanging and rebooting at every stage possible. At the very start of the benchmark, at the very end, as the result appeared, between loading tests... there just was no rhyme or reason behind this madness.

I tried everything I could think of; this became increasingly difficult as I could feel myself not only getting more tired with every passing moment but also slipping back into the ill state I was in last week – screw that for a game of soldiers.

I tried upping different voltages, from CPU vcore to vfsb, and played extensively with the MCP and SPP voltages. I tried more volts, I tried less volts, but in the end though the system was just plain frustrating.

(Thankfully, as has been mentioned the steady march of driver releases eventually allowed Josh to complete testing, but this serves as nice little insight into the kinds of hoops early adopters of tech sometimes have to leap through –ed)



have to wait and see in the next few weeks, but for the moment at least, this is simply the most powerful card on the market. Whether that's enough of a recommendation depends entirely on the state of your bank balance. (P)

SCORE **8.5** OUT OF 10



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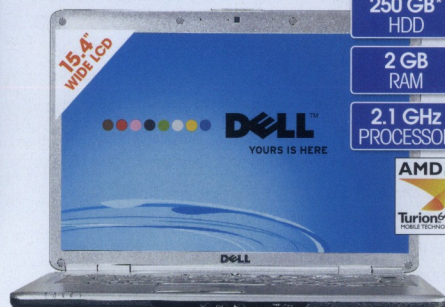
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# Creative Soundblaster X-Fi 5.1 USB

Jake Carroll sets his testing gear for stun and takes no prisoners.

Price \$149.95

Supplier Creative

Website [au.creative.com](http://au.creative.com)

Specifications X-Fi Crystalizer;  
X-Fi CMSS-3D Virtual; X-Fi CMSS-3D Headphone; X-Fi CMSS-3D Surround; microphone in (1/8in mini jack); stereo line in (1/8in mini jack); headphone out (1/8in mini jack); left/right speaker out (2x rca jacks); rear-left/rear-right out (1/8in mini jack); center/subwoofer out (1/8in mini jack); optical out (toslink); optical out supports stereo spdif out and pass through of multichannel dvd sound.

## SPECS

Something that has always been missing in the mobile computing market is serious sound. The Creative Soundblaster X-Fi 5.1 USB aims to provide a market-filler, addressing:

- A 5.1 channel surround decoder solution.
- Sonic enhancement of lossy audio with Creative's Crystalizer technology.

This month, we test the Creative Soundblaster 5.1 X-Fi USB, comparing the Crystalizer output with a non-processed signal on 128Kbps encoded MP3 audio. In theory, the Crystalizer technology should even out some of the inconsistencies in highly compressed audio, making it more pleasing to the human ear.

Our test system this month consisted of a MacBook Pro running Windows Vista Ultimate Edition Service Pack 1. We hooked up a set of Sennheiser HD457 headphones as well as the usual collection of speakers from Altec Lansing (U-621s) and Logitech (z-5500s).

The slider in Figure 1 allows the user to affect the signal processing to a lesser or greater extent. In practicality, we found this to make the 128Kbps audio sound louder, with accentuated high and low



frequencies, or the opposite if the function was turned off. As to whether or not it improves the quality of the audio itself, the best we can say is that the function 'fills out' the potentially cut frequencies. This isn't so much intelligent psycho-acoustic

me, baby! –ed) of the sample audio with and without the Crystalizer.

Unfortunately, it appears that adding the Crystalizer technology into the mix only served to create more intermodulation distortion. This appeared to be consistent with 24 and 32bit playback.

Regardless, the Soundblaster X-Fi USB device delivers EAX 5.0 to the laptop/portable world effectively, with all the definition and driver compatibility that the internal PCI/PCI-E solution offers. We tried a few of the regulars out, such as *Battlefield 1942* and *Assassins' Creed*. The EAX 5.0 HD options were all available with full acceleration. Curiously, the use of the USB external processor seemed more reliable in terms of install and detection than its PCI/PCI-E relatives.

Finally, a word of caution for home studio and digital music creators. ASIO driver modes don't seem to work, and on top of this, latency to the external USB device is beyond the acceptable realm for use in applications such as Sonar, Cubase SX or Nuendo.

If you need a 5.1 surround solution that is capable of 24bit output, but don't necessarily need or care about audiophile quality sampling and fidelity, this might be the device for you.

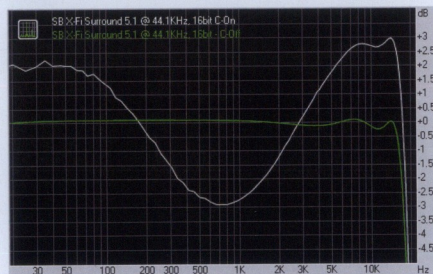


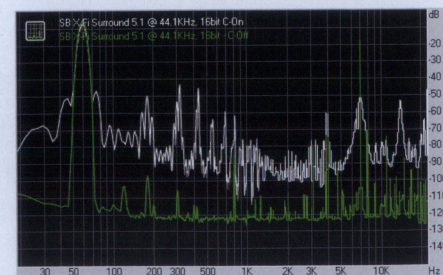
Figure 2. Frequency Response @ 44.1KHz, 16bit with and without Crystalizer.

engineering taking place, but some primitive graphic equalisation. There doesn't appear to be an adaptive algorithm used here.

Not satisfied with our own ears' appraisal (and moreover, looking for some hard numbers to see what impact the post processing technology has on the signal!), we employed Right Mark's Audio Analyser engine to benchmark the quality of the audio internally, with the Crystalizer turned on and turned off. Figure 2 shows a comparison.

The Crystalizer essentially destabilises the frequency response from the nominal form, making it deviate  $\pm 3$ Hz away from the control signal (in green). In applying the Crystalizer technology, we are gaining frequency at one point, but removing it or decreasing it at the other end of the scale. At a very scientific level, this is a sub-optimal approach to fixing compressed audio. As we mentioned previously, a psycho-acoustic approach using an adaptive algorithm, rather than EQ'ing would seem more appropriate here.

We decided to check if the act of applying the Crystalizer technology actually distorted or cleaned the sound. We did this by measuring the intermodulation distortion quotient (talk nerdy to



Intermodulation Distortion @ 44.1KHz with and without Crystalizer.

SCORE **6.5** OUT OF 10

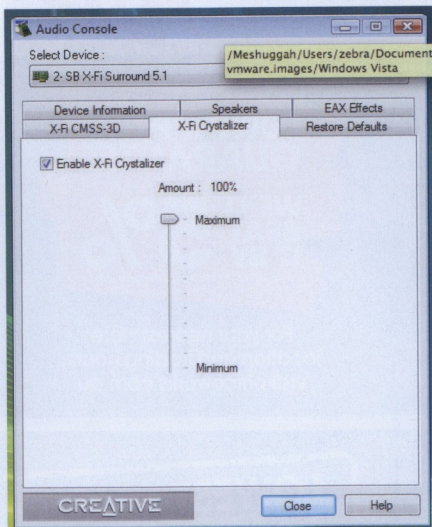


Figure 1. Creative X-Fi Crystalizer control panel.



# Creative HS-450 Communications Headset

What?! David Hollingworth can't hear you!  
He's testing headphones!

**SPECS**  
Price **\$59.95**  
Supplier **Creative**  
Website **au.creative.com**

This latest headphone effort from Creative fills a handy little gap in their range, sitting just below the awkward to type Fatal'ity range, and sitting above some of the company's cheaper options. Sixty bucks isn't a lot to ask for a good sound (or even a sound sound experience – get it? No? Sorry...) experience, but does the HS-450 tend toward its cheaper brother or its higher-end cousin?

We're quite pleased – and a little surprised, to say that these 'phones are really quite good.

The HS-450 is pretty basic in design – simple black plastic, flouro trim and mic boom arm – but there a couple of flourishes that set it apart. The over-ear design features velour (Elvis would be proud) foam padding and has a real retro hi-fi feel. It clamps tightly – possibly too-tightly if you are large

of head (like me –ed) – over your head and even during the most heated of tactical discussions or raid strategising it'll be hard to shift. It also features a good 2.5m cord with an in-line volume and mic controls.

It's pretty solid in the sound stakes, too. The headphones are unsealed, so the odd cry of "Screw you n00b!" or explosion may leak through to annoy others, but at least those sounds will be nice and crisp for the person actually intended to hear them. The high end is bit of a weak point, especially listening to music with a lot of crisp notes. Bass and middle range is good though, especially in gaming.

The microphone is perfectly serviceable for yelling at people, but it's certainly not high-quality. Then again, you're not really paying for high quality.

For the price these are a remarkably good choice for gamers who don't lean toward high quality sound reproduction. They're okay for casual music



use, too, but if that's your main reason to use headphones you'd be better off looking elsewhere (and possibly paying more, too). Still, a versatile set of headphones for general PC use. (P)

**SCORE**  
**7.0**  
OUT OF 10

# Kingston HyperX DDR3-1800 C8

Josh Collins goes for broke chasing HyperX speed.

**SPECS**  
Price **\$590**  
Supplier **Kingston**  
Website **www.kingston.com**  
Specifications **2x 1GB kit; PC3-14400; DDR3-1800; 8-8-8-24; 1.9v; 240-pin DIMM; Non-ECC Unbuffered DDR3; Micron ICs; Lifetime warranty.**

As a respected player in the memory manufacturing game, Kingston has spent recent months revitalising and invigorating its brand and its series of performance-oriented DRAM.

To that end, Kingston recently held a global design competition to create the face of the HyperX brand, the HyperX Girl. The global winner of the HyperX Girl competition is not only an Aussie, but

Kingston also informed us the entrant was from an Atomican. So we thought it a good sign that the time was right to take a squiz at this HyperX-series memory kit from Kingston.

Rated for DDR3-1800 the Kingston HyperX modules certainly play the speed game. But when it comes to latencies, the modules are sitting back with the pack and playing a conservative match. The kit needs either higher frequency or lower latency to improve its overall performance position in the market. Corsair kits obtain faster speeds at stock due to the tighter latencies with a CAS 7 based lead time. On the flip side of the equation, Patriot is a step ahead with a higher stock frequency on its DDR3-1866 modules while

maintaining the CAS 8 based timings.

The competition to these modules uses very similar ICs, so what's the dealio?

There are a myriad of answers to this question but the most important for us, the enthusiasts, comes down to the not so simple task of binning. For many, this is believed to be focused purely on frequency. While this aspect is a focus, it isn't the full picture.

When binning, not only does a manufacturer look to obtain sustainable frequencies but other areas such as sustainable latencies and operating voltages are tracked.

With an operating voltage of 1.9v, these sticks struggle to keep up with the Corsair Dominators in terms of out of the box flexibility, but with equivalent voltage supplied, the HyperX modules soon meet the mark.

If the extra voltage needed, that is outside of the factory tested values, to meet some of the competition doesn't bother you, then this kit has some potential to bring the joy with a little electrical coercion. (P)

(Note: these modules came into the labs after photography day –ed.)

45nm Core 2 Quad	400x8; DDR3-1800 8-8-8-24 1T 1.9v	400x8; DDR3-1800 7-7-7-20 1T 2.0v*	400x8; DDR3-1600 7-7-7-20 1T 1.9v	400x8; DDR3-1600 6-6-6-18 1T 2.1v*
Capacity	2x1GB	2x1GB	2x1GB	2x1GB
Super Pi 4M	1m 19.263s	1m 19.248s	1m 19.141s	1m 18.780s
wPrime 32M	11.933s	11.876s	11.914s	12.057s
Hexus Pi Fast	28.74s	28.73s	28.84s	28.58s
Everest Read	11157MB/s	11439MB/s	11526MB/s	11852MB/s
Everest Write	8526MB/s	8526MB/s	8527MB/s	8527MB/s
Everest Latency	52.7ns	51.5ns	52.7ns	50.4ns

\*Note: Additional voltage necessary to obtain stability and functionality at these frequencies and timings – use additional voltage at your own risk

**SCORE**  
**7.5**  
OUT OF 10



# Lian Li Tyr X2000

David Hollingworth spends some important alone time with his new hot case.



## SPECS

Price **\$TBC**

Supplier **Anyware**

Website **www.anyware.com.au**

Specifications **230 x 430 x 680mm (W x D x H); 3x 140mm fan (front); 1x 140mm fan, 2x 80mm fan (rear); 6x 3.5in internal drive bays 6 (SATA, hot swappable); 1x 3.5in external drive bay; 2x 5.25in external drive bays; EATX, CEB, ATX, M-ATX motherboards; USB 2.0 x 2, IEEE 1394 x 1, E-SATA x 1, HD+AC97 Audio ports; black aluminium construction**

When we un-boxed this latest menhir-like effort from Lian Li, it was less like taking a new PC component out of its packaging and more like the birth of a golden child. There were oohs, there were aahs; those not present were called for, so that they too could bask in the glory of this singularly outstanding achievement in case design.

Oh yes, we like the PC-X2000. We like it a lot.

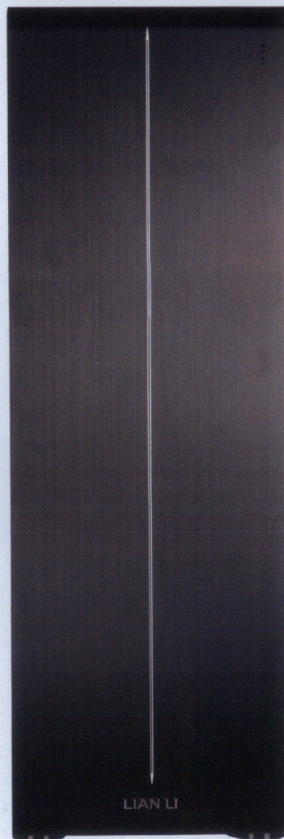
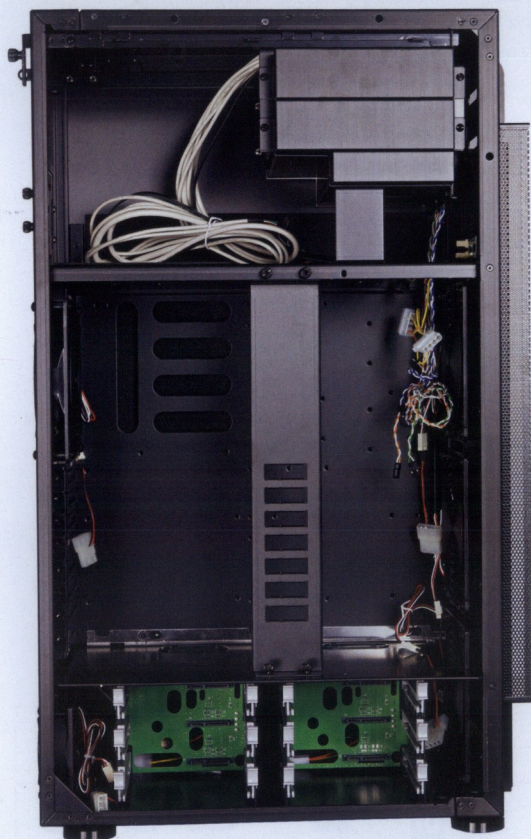
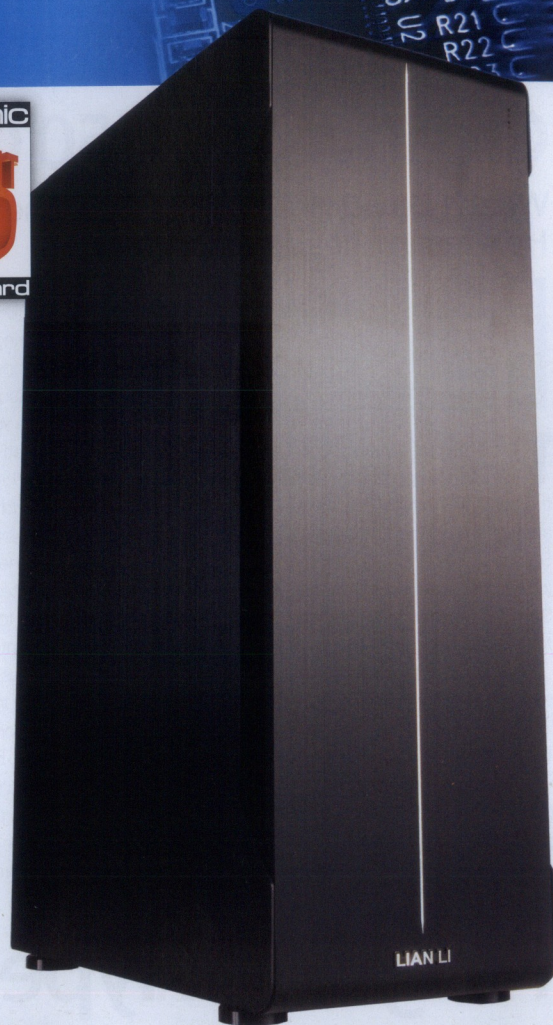
Our love – like any good love – may start at the skin, but rest assured it goes down to the case's very bones. Externally, this over-sized tower is imposing in its austere design – matte black, diamond-etched aluminium makes one hell of an impact, at least on us. The clean lines and strong curves work together to inform observers that this case means business.

We took a stroll around the case, our eyes

drawn to such wonderful touches as the side-mounted external drives bays, the four spacious grommets for serious watercooling and the wonderfully machined and grilled back-plate. As always, the side-panels are secured by easy-to-fiddle thumb-screws, with a latching design that means those screws will never be lost. Even the case's four feet are aluminium, with a rubber base-pad for added stability and to lower vibration potential.

Already impressed with our exterior observations, we made some small-talk and gently slipped off the side-panels. Now undressed, this case's charms were even more obvious.

The interior is matte black, and if you can find a surface that is even remotely poorly milled and engineered we'll give you a shiny penny. Very rarely will you hear us talk about the 'case-maker's art' – it's wankery of the first order – but you cannot look at the rolled edges, plastic-lined cable runs and awesome build of the PC-X2000 without thinking there may be something to the idea that a hand-crafted case is both possible and infinitely superior.



This is a case designed with easy access to the system it protects and keeping that system running cool in mind. The hard drive bays are all in their own separate lower area, with a couple of fans to keep them cool, and an in-built PCB and cable arrangement to enable hot-swapping. Above the drive area is the main mobo plate, which, if you take the other side of the case off, hinges down and out. Each PCI backing slot is itself well-made and vented to further increase airflow at the back, and at the front, where you've got an impressive number of fans, you can take out the air filter and actually wash it if you're some kind of computing clean freak. The last area – and all these areas are thermally distinct, and designed with different thermal loads in mind – is where your PSU and external drives sit. The PSU backplate can even be unscrewed if you have an extra-long model.

Sure, there's a lot that some users may disagree with. The side-ejecting external drive bays split the office, and some argue that the same people who want hot-swappable drive bays will want a lot more of them. To that end, it could be argued that the PC-X2000 is trying too hard; but, to our mind, this is a very versatile case for the enthusiast who requires forbidding form and exemplary function. (C)

SCORE **9.0** OUT OF 10

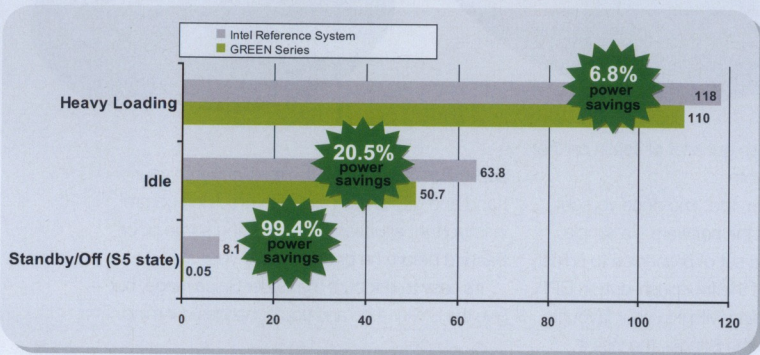




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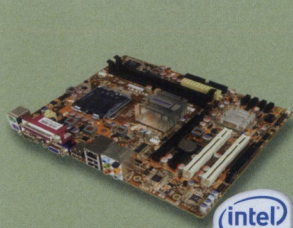
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### Green on Demand (GoD)

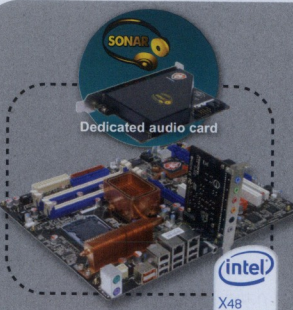
Green on Demand (GoD) improves energy efficiency by reducing the number of power phases running when the computer is in idle or low-loading states.



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\* Power savings depend upon usage pattern and exact system configuration.



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# Cyber Snipa Stinger

David Hollingworth discovers some pleasant surprises from this boldly coloured pointer.

**SPECS**  
 Price  
**\$69.95**  
 Supplier  
**Anyware**  
 Website  
**www.anyware.com.au**

At first blush the Stinger is a pretty unprepossessing mouse. Its packaging is kinda tacky, and it looks a little tacky itself – all red rubber and light looking plastic. Once you crack the clear plastic and take it out you at least notice that it's got a nice long USB cord. There are few worse things than a short cord that's not going to reach the natural positions of your mousing area and PC. Okay, maybe getting garrotted by a long USB cord is worse, but you get the idea.

The Stinger is certainly lighter than a lot of gaming mice. Even discounting the difference between using it with and without the included weights – seven 20g jobbies – it's simply very light in the hand. It feels good, though, and that's when you get the idea that the Stinger may have a few things going for it.

Each side of the mouse features red, textured rubber grip, nestled in slight curves for your thumb

and little finger. It's a comfy grip, even more so once you settle the mouse on a flat surface. It's got a lot of Teflon on the bottom, and it's very smooth.

It feels smooth in action, too, and once you get the weighting right, install the software – a simple macro editor and a limited set of properties to adjust, such as changing each of the four push-button DPI settings – you can tear away with it in your favourite game. The more you use the Stinger, the less it feels like that tacky first impression was even remotely correct.

The extra wide Teflon feet make for a very smooth glide across almost any surface. There's a veritable galaxy of buttons (well, nine, actually) to press and poke to enact mayhem on foe and

application alike, and the arch beneath your hand and grip areas help with precision control in important situations. Like sniping some poor bastard before he or she snipes you.

It's easy to discount the Cyber Snipa range, but give the Striker a go and you'll change your mind. (P)



**SCORE**  
**7.5**  
 OUT OF 10

# Zalman FPSgun

Sometimes it's possible to reach too far with mouse design. David Hollingworth explains.

**SPECS**  
 Price  
**\$69.95**  
 Supplier  
**www.altech.com.au**  
 Website  
**www.xfxforce.com**

Since the dawn of time\* humanity has yearned to perfect the ultimate gaming mouse. For too long, fans of the noble FPS have had to make do with what can only be called 'pointing with a potato'. Surely there is a solution – short of tacky coin-operated shoot-em-ups – that can give us the feel of firing a precision weapon?

One possible solution is the Zalman FPSgun. But is it a good one?

Well, it certainly tries very hard. As you can see from the pic, it looks the part – all pistol-grip-looks and alternative thoughts on how a mouse should operate. The idea is simple: you grip the mouse like a gun, and rather than having the point of control actually under or near your hand, it's project out in front, by about six inches.

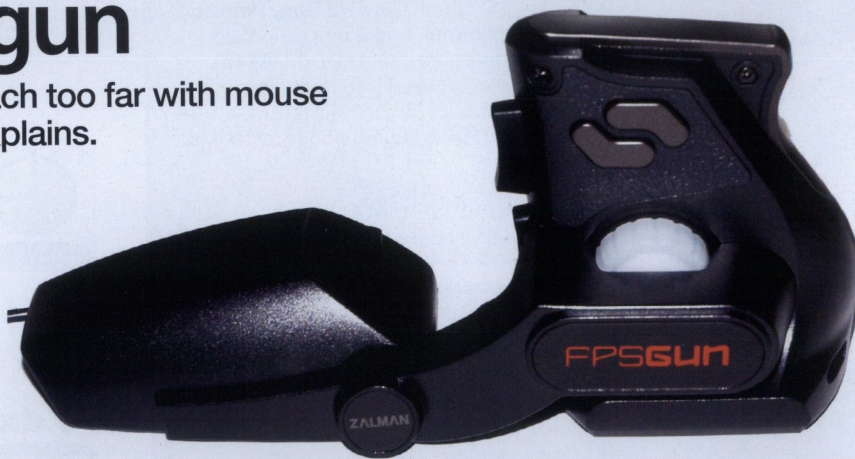
In theory, this is meant to produce a similarly feeling to pointing a weapon, while magnifying hand movement so that slight twitches are all that is

necessary to point and maneuver the aiming cursor.

Theory, however, doesn't always add up to practice.

In practice, the FPSgun is actually – for a veteran mouser, anyway – quite painful to use. You see, not only is that vertical grip more pistol-like, but it's meant to hold the bones of the hand and wrist in a more natural manner. The problem is that after years of gaming the natural positions for most people is horizontal. Further making the FPSgun problematic is that the forward mounted laser, instead of making it more responsive, makes movement overly exaggerated.

There are all the usual touches of a modern gaming mouse – a mess of buttons and variable dots-per-inch for in-game and out-of-game actions – but it's still hard to recommend. It might work very well for someone just starting out on their pwning career, but otherwise, humanity is still stuck with that old potato. (P)



**SCORE**  
**5.0**  
 OUT OF 10





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# THECHIPPERY

Silicon wars and opinion from the electron trenches.

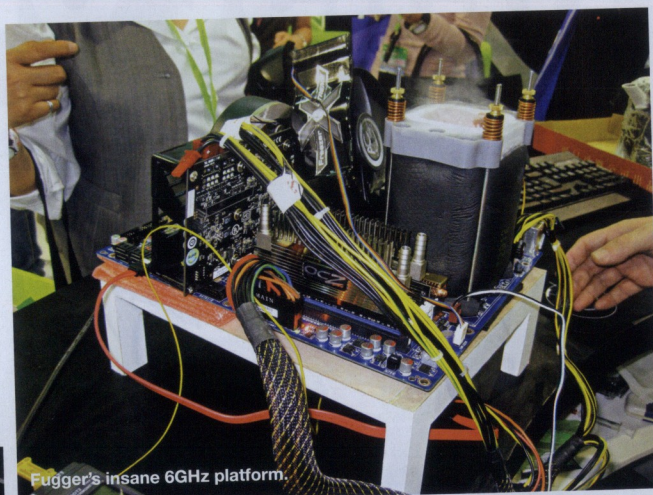


Just a portion of the floor-space provided at the new Nangang complex.

## Computex 2008

Josh Collins reports back from the very bleeding edge of PC technology and innovation.

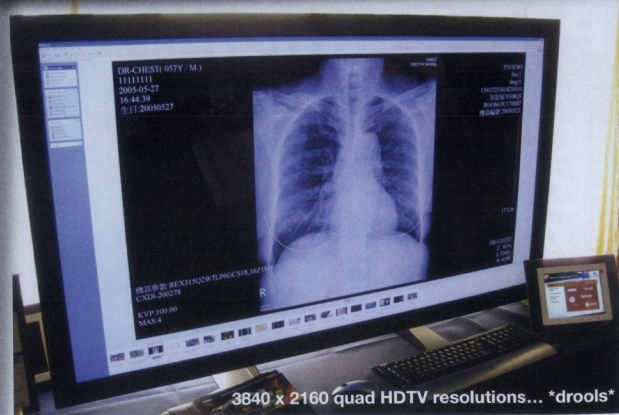
Computex...there are very few events that even come close to evoking the same level of PC-enthusiasm, tech-excitement and hardware-awe as this event. Sure there's CeBIT in Hannover, Germany and CES in Las Vegas, USA. But while both are great shows in their own right and feature many of the relevant companies for gamers, hardware enthusiasts and the like, neither has the same sheer focus and impact found at Computex.



Fugger's insane 6GHz platform.

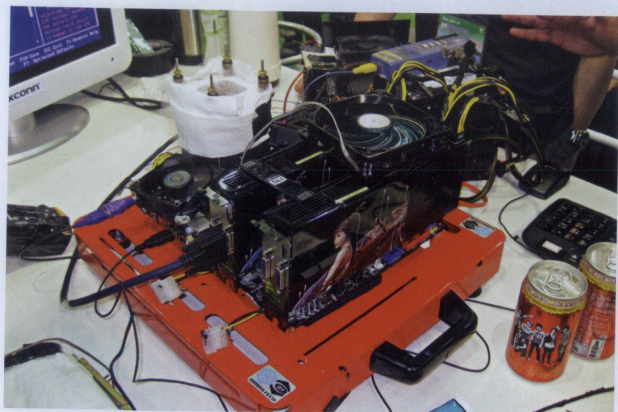


Same serious copper from Foxconn.



3840 x 2160 quad HDTV resolutions... \*drols\*





One of Foxconn's many OC demonstrations – this one manned by legends k|ngpln and fredyama.

## On with the show

For an enthusiast, Computex is the Holy Grail, with a heavier and more intense component-level focus than any other show; it's not hard to understand why it has become the favoured event of our computing year. True, CeBIT is the world's largest electronics trade show, with – on average – three million people passing through the show halls. Then again, CeBIT includes electronic goods such as washing machines, fridges, aviation equipment, financial computing and more.

While these areas of the electronics evolution hold their own interested crowd, it's the PC component focus of Computex that gets our attention, and rightly so.

This year saw a 40 per cent increase in the number of exhibitors. This meant that not only were the usual halls packed with vendor booths, but there was even call for an additional exhibition space – the Nangang exhibition complex.

The new complex was about a 20 minute cab ride from the CBD, and

“For enthusiasts, Computex is the Holy Grail, with a heavier and more intense component focus...”

hosted the epicentre of the event – Hall 1. This distance made exhibitors nervous that the show would be split and the Nangang complex would get little foot traffic.

To battle this, the organisers forced many of the large and renowned companies to exhibit at Nangang. This meant GIGABYTE, Intel, AMD, Lian Li, Foxconn and other big names all had their presence felt on the new site. The huge crowds were a natural follow-on.

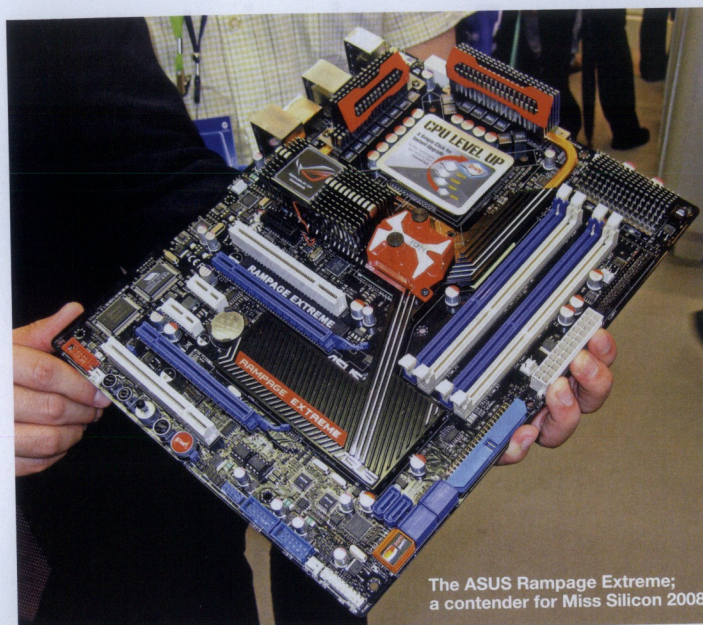
Interestingly, ASUS seemed to not be so keen (read: stubborn to move) and managed to organise the bottom floor of the auditorium exhibition hall where Microsoft's and Intel's head bigwigs put on keynote presentations on the company's respective emerging technology and advances – two industry heavyweights worth being associated with.



Booth babes, lovely booth babes. Sadly, we didn't get a good photo of the XFX ladies; they were, by far, the hottest at Computex 2008.







The ASUS Rampage Extreme; a contender for Miss Silicon 2008.



And another fierce contender for Miss Silicon 2008, GIGABYTE's P45 Extreme motherboard.

## Nothing but tech... and babes

For the average enthusiast chilling out at home, Computex often means hours of scrolling through photos posted online and checking out not only the wonderful but also the weird products and product marketing that can occur at the show.

But what is it like to be caught up in the white-wash that becomes the Computex haze?

I've always been a keen follower of the trade show, but this year was my first physical attendance – though I've always been there in spirit!

The first word and reaction that pops to mind when I think about it is simply 'Wow!' because it is just that impressive. The size, the effort put into the booths, the excitement and vibe running through not only the corridors of the halls but also the streets of the city itself... It's all filled with huge buckets of excitement.

But it's also a tiring week for anyone involved in the tech on show. Whether you're a company exec supervising the reception of the brand, a minion doing their darndest to man the booth, a booth babe simply set to look cute and promote or, like me, you've been sent as a journo to suss out the scene, it's a huge effort to get the job done.

Though tiring, we (Nick Ross, editor of *PC Authority*, and two of our sales

Lian Li's new low cost LAN range called LANCool – they certainly looked the part.

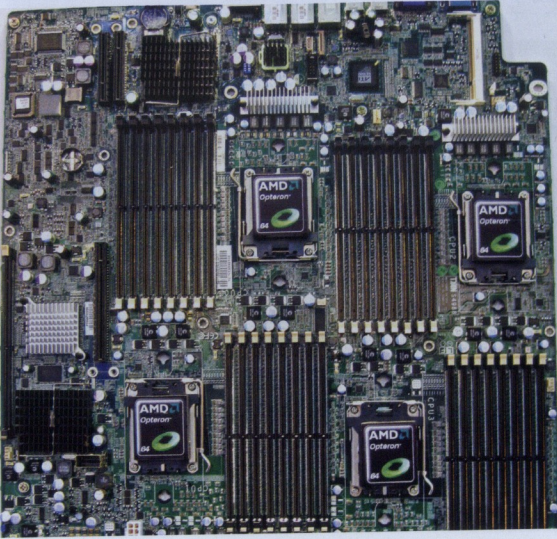


The Far Cry 2 themed and beautifully airbrushed CoolerMaster Cosmos CSX.



A coming together of some of the globe's best overclockers at Computex, here's a shot including giorgioprime, shamiro, kingpin, moloko (that's me!), ZolKaRn, Dimas and Nicookie.





Tyan, renowned server masters, had some crazy quad Opteron server grade silicon sexies on show – these boards are just awesome to look at, much less use.

and marketing crew, Joanne Nichols and Macca) made our way from hall to hall; or as we thought later in the week, hell to hell.

As the sales and marketing team dragged us editorial folk from meeting after meeting, we found blissful distraction in each piece of innovative tech or, um, innovative booth babe. Yeah...

There's no real justifying the gawking at the booth babes. After the first day you just get used to having a blank stare as your brain does all the work calculating your trajectory so you may stop in your tracks and just watch them glide by... God bless the booth babes. \*sigh\*

But even with the often cute and cosplay-like outfits of the booth babes, the new tech still had the more alluring aura. "Come on Josh," it said, "come and overclock me, figure out my tweaks, think of how good I could be running in your system at home..." Yeah, alright, I may sound like a sad case but don't think for a moment that you guys don't think along the same lines. I'm onto you!

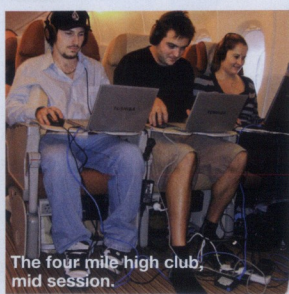
## Pwn the friendly skies

It wasn't all work, though. On the way there we set up a three-person LAN while shooting through the heavens in an Airbus A380 – what a wicked plane and piece of tech that is!

At first the air-hosts were a bit suss but once they realised that we weren't terrorists, they were pretty interested in what we were doing. Heck, one of them was even nice enough to take some action shots for us so we could show you guys. Ace.

## Keeping up with the Joneses

There were a number of themes that were not only evident but indeed prevalent at this year's Computex. These themes included focuses on



The four mile high club, mid session.



LEFT: Super Talent had some of its solid state drives on show, boasting a huge 256GB capacity in the 3.5in form factor.

BELOW: Thermalright, had a mass of, well, aluminium and copper masses, on show for all to see. These here are the copper revision of the much acclaimed Ultra 120 Extreme heatsink.



overclocking, multimedia functionality, out-of-the-box innovation and further system miniaturisation while maintaining or adding additional system functionality – mini ITX in particular was a popular platform to display this capability.

To prove that overclocking has truly been accepted by the chip manufacturers, there were renowned overclockers k|ngp|h, fugger, shamino, hicookie, ZoLkOrN, giorgioprino, Andre X, Coolaler, fr34k, and Team Japan at the show. And I even had the chance to get in on the action – well wicked.

It was simply awesome to see such a pool of overclocking talent all in the one place. As the guys came together to combine both knowledge and skills it was no surprise for Computex attendees with their overclocking ear to the ground to witness Core 2 Extreme quads flying along at anything from a modest 5.4GHz to a whopping 6.1GHz. All under the extreme cooling of LN<sub>2</sub>; naturally.

Overclocking was being heavily endorsed by the usual suspects such as GIGABYTE, Foxconn, Corsair and Abit, but it was also interesting to see ECS and Biostar meet the market's urge for highly overclockable platforms, both for gaming and enthusiast tinkering.

I feel like I've only covered the tip of the Computex iceberg but by the same token, these were certainly the highlights of both the trip and the show itself.

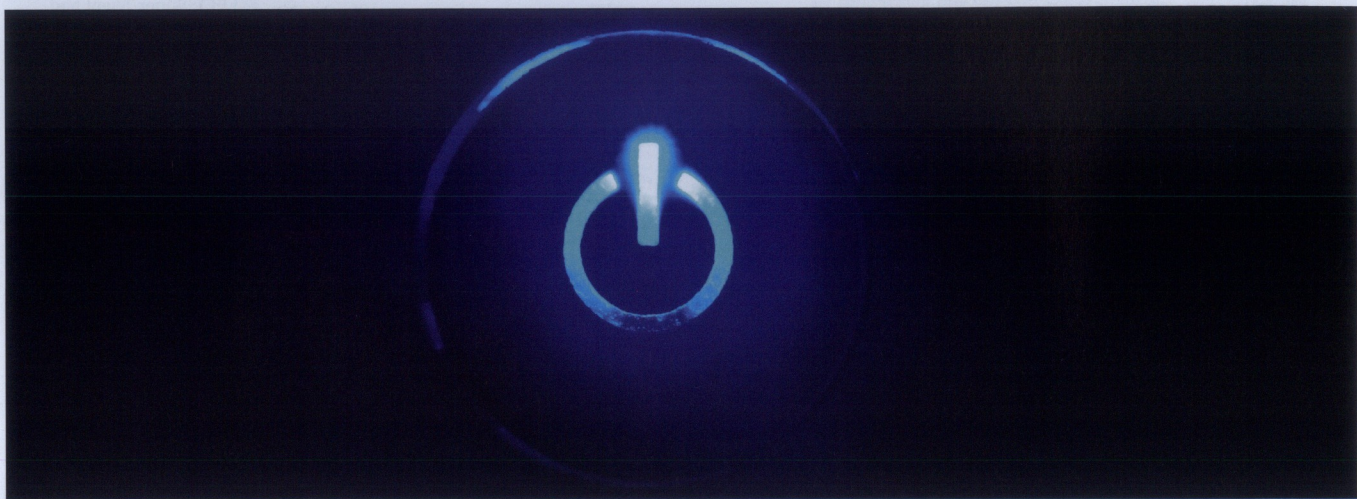
## (LN<sub>2</sub>) tanks for the memories

I'd also like to take the opportunity to say thanks to GIGABYTE for playing hosts to us for a number of evenings as well as Viewsonic, Sapphire and XFX for being really chilled out corporate peeps to relax with during what was nothing short of a crazy event. You only needed to be at GIGABYTE's evening events – that inevitably turned into parties – to witness the craziness in full force! Fortunately for some others, who shall remain un-named, it's a good thing cameras weren't so much at the ready at these events...



No booth babes were harmed in the writing of this column.  
jcollins@atomicmpc.com.au





# Internet washing machines, and magic rip-off boxes

Daniel Rutter gets his rage on.

**S**uddenly saving energy is cool again. This means new and interesting technology... and some new and irritatingly popular scams.

If you'd like to reduce your electricity consumption – except, of course, for your 750-watt SLI gaming box sitting in its air-conditioned throne room – it'll help if you know how much electricity you're using.

Your electricity meter will only show you the aggregate power consumption of each whole circuit. To tell whether, for instance, your fridge is leaky and thus running its compressor too often, you need a separate standalone meter.

All This Will Change in the networked world of tomorrow, which technology companies always insist is exactly five years away but which really *will* arrive fairly soon.

The usual vision is one in which every major appliance in your house – everything from PCs to ovens – can report its power status, and possibly even be controlled, either within your house or over the public internet.

Security failures in net-controlled appliances could of course result in hilarity. But this setup would, for instance, allow you to easily turn off the air-con if you go to work and realise you left it on. And you could also send anonymous power usage stats to central servers, which could in turn let people know the real-world power consumption of different models of appliance.

Appliances already come with Energy Star ratings, but they're an oversimplification. A washing machine with a low Energy Star rating may actually consume no more power than one with a high rating, if you only do cold washes. Individual power meters in every appliance get around this problem.

Meanwhile, on the dark side, plenty of people stand ready to take your money for 'power saving' gadgets that don't actually do anything at all.

There's a plague of these bleeding things. Search for 'power saver' and you'll find dozens of them. They usually claim to 'stabilise' the mains voltage and reduce 'overheating' and/or 'power loss', thereby making all of your appliances more efficient and saving you money. And they're supposed to protect you from power surges and lightning strikes and, I don't know, probably tornadoes as well.

“...they're supposed to protect you from power surges lightning strikes and, I don't know, tornadoes...”

Some of them wire into your breaker panel, but a lot just plug into a socket somewhere and, allegedly, spread their magic through your whole house by osmosis, or something. Most of them are claimed to work by improving the power factor of your electrical gear.

You can read more about power factor and power factor correction (it's what that 'PFC' on the box of your new PSU means) in my old Ground Zero column at [dansdata.com/gz028.htm](http://dansdata.com/gz028.htm). Basically, many kinds of AC loads are 'reactive' rather than mere passive resistors, and thus cause more current to flow through the wires than you'd expect for the amount of actual power they draw. The more of this extra current is sloshing back and forth, the worse the power factor.

There are a few reasons why the 'power saver' claims are ridiculous. The most important one is that only large commercial power users are actually *billed* by power factor.

Ordinary spinning-disc home power meters don't even *notice* it.

So even if these plug-in one-size-fits-all \$100 power factor correctors weren't a ridiculous idea in the first place (PFC actually has to be matched to the load), and even if the power factor of the average home were particularly bad (it isn't), and even if electrical distribution stations didn't have their own PFC gear (they do), the 'power savers' would be solving a problem that doesn't actually exist.

If you've got a quantum ceramic fuel depolariser bolted onto your car and insist your

stereo sounds better when the speaker cables are on little stands that keep them off the carpet, I'm sure a plug-in 'power saver' will suit you down to the ground.

The rest of us can just keep an eye out for the first air conditioners with IP addresses.

Dan Rutter has the power. Duh-duh duh!  
[dan@atomicmpc.com.au](mailto:dan@atomicmpc.com.au)



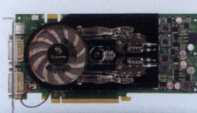
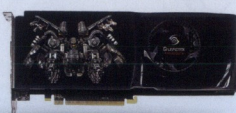
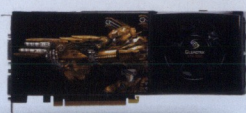


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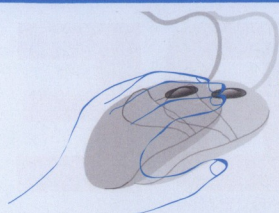
There's nothing sexier than new kit. And whether you need to horde your pennies (Budget), want the most power for your dollar (Performance) or own a small mansion and

a collection of sports cars (Extreme), we're here to help with this handy matrix of Atomic recommended products. You may find your needs fall between categories – that's okay,

just mix and match to suit your budget! Each piece of kit has been reviewed hands-on in Atomic, so if you want to learn more, look up the issue and page number listed.

		CPU's	Motherboards	Memory	Video cards
<b>BUDGET</b> <i>I can't afford to eat... gimme gear!</i>	intel	<b>Intel Core 2 Duo</b> PRICE \$100-\$480 Stretch a little further and buy yourself a Core 2 Duo – you'll be thanking yourself later. The E4400 is the cheap ticket to speed, at \$165.	<b>GIGABYTE GA-G33M-DS2R</b> PRICE: \$132 Using the G33 northbridge and has overclocking performance like its full ATX brethren, this Micro-ATX offering is extraordinarily hard to pass up. <i>Reviewed in Issue 81 – Page 52</i>	<b>TEAM Xtreem Dark PC2-6400 C4</b> PRICE \$80 Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits. <i>Reviewed in Issue 80 – Page 56</i>	<b>GeForce 9600GT 512mb</b> PRICE \$150 It's simple, it's black, and pumps out some pretty pleasing pixels for a very reasonable asking price. So far, easily the best of the 9-series. <i>Reviewed in Issue 87 – Page 43</i>
	AMD	<b>AMD Athlon 64 AM2 X2</b> PRICE \$135-\$335 Cheap CPUs are a wonderful thing, and the X2s are now wonderfully cheap. The 3600+ is your budget baby at about \$85.	<b>GIGABYTE AM780GM</b> PRICE \$100 This mobo had Josh drooling and dreaming of the ultimate budget media center – not a state he often finds himself in! <i>Reviewed in Issue 89 – Page 40</i>		
<b>PERFORMANCE</b> <i>Hardware that bangs the best for buck.</i>	intel	<b>Intel Core 2 Quad</b> PRICE \$300-\$680 Core 2 Quad – a processing powerhouse, now affordable and overclockable like buggery. The Q6600 is the best buy, at about \$240.	<b>Foxconn P35 Mars</b> PRICE \$236 A great board for the enthusiast with a mess of great ideas and good overclocking potential. <i>Reviewed in Issue 85 – Page 48</i>	<b>TEAM Xtreem Dark PC2-6400 C4</b> PRICE \$80 Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits. <i>Reviewed in Issue 80 – Page 56</i>	<b>GeForce 9800GTX 512MB</b> PRICE \$340 The 9800GTX manages to outperform both the 8800GTX and the ATI HD3870, which is no mean feat, and manages it at a fair price. Tasty. <i>Reviewed in Issue 89 – Page 49</i>
	AMD	<b>AMD Athlon 64 AM2 X2</b> PRICE \$135-\$335 The X2 series are still fantastic chips, and in the face of the Intel threat are now going for cheap. The 6400+ is your current sweet spot at about \$190.	<b>ASUS M3A32-MVP Deluxe</b> PRICE \$242 True perfection in mobo form. Very well laid out and overclockable to boot. <i>Reviewed in Issue 85 – Page 51</i>		
<b>EXTREME</b> <i>Gimme power. Money is no object.</i>	intel	<b>Intel Core 2 Extreme QX9770</b> PRICE \$TBC The cream of the overclocking crop, based on the new Yorkfield architecture. Truly, Lord of the CPUs. <i>Reviewed in Issue 86 – Page 48</i>	<b>XFX 790i Ultra SLI</b> PRICE \$555 It's an imposing board that offers a host of enthusiast options, performance tweaks. We like. <i>Reviewed in Issue 88 – Page 40</i>	<b>Corsair DHX NV Kit</b> PRICE \$900 All up one of the most powerful and versatile kits we've seen. <i>Reviewed in Issue 90 – Page 50</i>	<b>XFX 9800GX2</b> PRICE \$620x2 <i>Reviewed in Issue 88 – Page 50</i>
	AMD	<b>AMD Phenom X4 9850</b> PRICE \$320 Sadly gets beaten by a mid range Core 2 Duo, but still the top of AMD's pile. <i>Reviewed in Issue 89 – Page 44</i>	<b>ASUS Crosshair 2</b> PRICE \$TBC Quite simply the new and leading kid on the block when it comes to AMD boards. <i>Reviewed in Issue 89 – Page 42</i>	<b>Corsair Dominator Twin2X 10,000</b> PRICE \$1016 Crazy speed sticks that will also happily do 1T/800MHz/3-3-3-3. Comes with a fan attachment to keep things cool! <i>Reviewed in Issue 77 – Page 58</i>	<b>XFX 9800GX2</b> PRICE \$620x2 <i>Reviewed in Issue 88 – Page 50</i>




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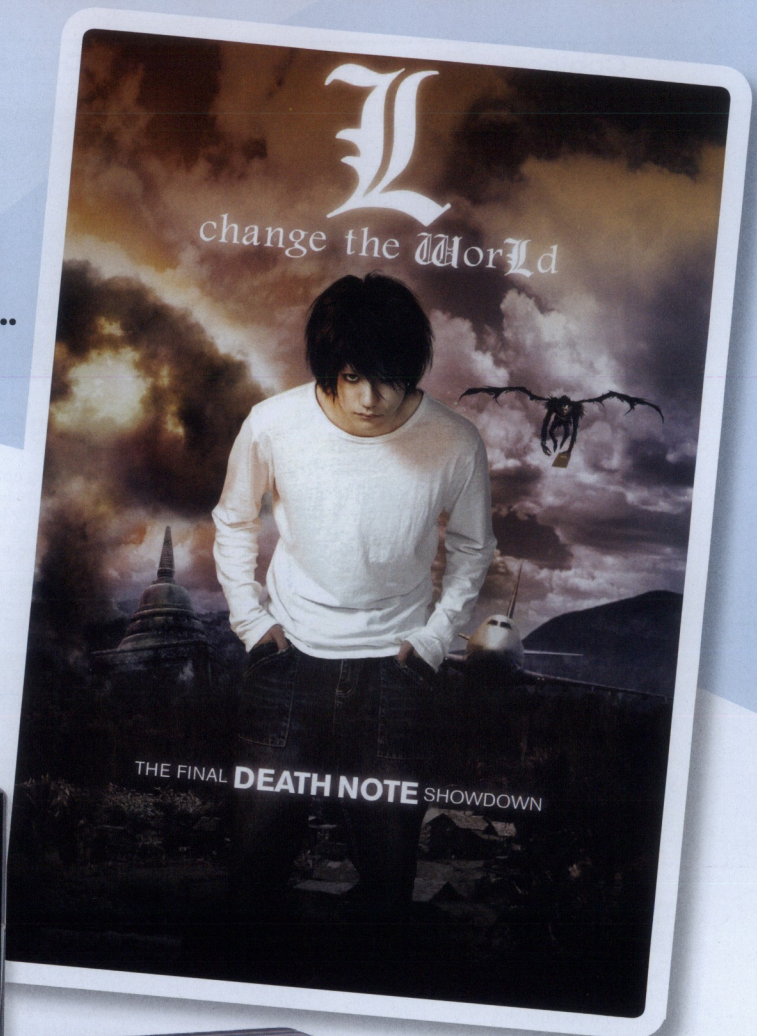
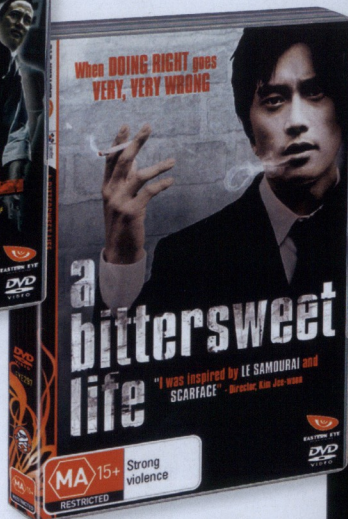


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# GAMEPLAY

GAMES, GAMING AND GAMERS COVERED ATOMIC-STYLE

I don't think we could possibly have a more eclectic mix of games than those we have on offer this month. There's shooters, RPGs and puzzlers, for every platform from Wii to 360. Keen!

Before we get to the juicy reviewing, we've got Engine Room, which this month takes a close look at the technology behind the next Star Wars gaming saga, *The Force Unleashed*. LucasArts has come up with some pretty neat stuff that will have evil Jedi everywhere chuckling with glee.

Then we take a turn for the... odd. Design-guy David West found himself

so entranced by the Wii game *Boom Blox* that he just had to share his adventures with Steven Spielberg's puzzling epic. From Jenga-style fiddling we move on to military action with *Battlefield: Bad Company*. If blowing shit up and stealing gold from world-class mercenaries is your thing, you'll love it.

We then make a return to the universe of *Mass Effect*, to see if its outing on the PC – easily our platform of choice – has anything to recommend it. We loved the game the first time round, so is this a better way to travel the stars?



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Logan Booker chats to the game's producer about the emerging physics technologies that will bring the Star Wars universe to life like never before.

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Zara Baxter shares some techy travel tips.





# Feel the force

**Logan Booker swaps lightsaber blows with Julio Torres, producer on LucasArts' *Star Wars: The Force Unleashed*.**

**S**tar Wars is a franchise that just won't die, though for gamers this is a good thing – in every imaginable way. While George Lucas may have made a bit of a mess with episodes one to three on the silver screen, recent games based on the epic space opera have been quality work – *Lego Star Wars*, *Rogue Squadron* and 2002's *Jedi Knight II*, just to name a few. Oh, and a little RPG called *KOTOR*...

Like the novels, the Star Wars' games have served to expand and deepen the universe we've all come to adore. These titles learnt quickly what players wanted: lightsaber fights, cool Force powers and no Jar Jar Binks (the Star Wars equivalent of Star Trek's Wesley Crusher). It's because of this serious, careful handling of the property that most Star Wars games didn't turn

out to be crappy cash-ins, scorned by the gaming community. Rather, many became respected products, and a few were able to stand independent of the franchise that bore them; the *Jedi Knight* series being the best example.

Even with all six episodes in the can, LucasArts continues to find stories to be told of rebels, empires, bounty hunters and Jedi. *Star Wars: The Force Unleashed* brings us a tale involving the last of these – a previously unknown apprentice of Darth Vader's called Starkiller.

As you'd expect, this intrepid lad is gifted with the use of the Force and a deadly opponent with a lightsaber. *Star Wars: The Force Unleashed* is his adventure, and we're lucky enough to come along for the ride.

## Fresh face

The opening level of *Force Unleashed* on the Xbox 360 and PS3 has the player controlling none other than Darth Vader during a planetary assault. Tossing, pushing, pulling and choking enemies from afar is a trifle, and everything else falls to a swift swipe of his glowing red saber. Not even the (usually) unyielding stone of overgrown ruins can stand against the emperor's right-hand, with such structures destroyed with a flick of the wrist. It is here we see Pixelux's Digital Molecular Matter technology in action for the first time, and suffice to say, it's quite something.

Vader soon comes across a small boy who, seemingly without thinking, draws the Sith lord's saber to his outstretched hand. Vader decides then and there to train the boy as his secret apprentice.

It's in the level afterwards that we take control of an adult

WE're not sure if LucasArts is trying to show that this guy is a total badass, or just has a bad flu...





Starkiller, and while he's not as formidable as Vader, he's powerful enough to be a force to be reckoned with... and loads of fun to play.

According to producer Julio Torres, *Force Unleashed* has been in development for two-and-a-half years – not including pre-production. In this time, a lot of work has gone into integrating Euphoria, a procedural animation system; and Digital Molecular Matter, a sophisticated physics middleware with a taste for materials, into the game.

## DMM (Digital Molecular Matter)

Havok has been doing the rounds as the industry-standard physics middleware since 2002, when it replaced Karma in Epic's Unreal Engine 2. UE2's popularity with developers and subsequent licensing saw the technology spread quickly. While *Force Unleashed* continues to carry the Havok torch for general physics, it's adopted Pixelux's Digital Molecular Matter for materials.

"DMM allows materials to behave very much like they do in the real world, so glass will break like glass or wood will splinter like wood and metal will bend like metal," explains Torres.

Note that Havok has a semi-equivalent tech suite in the form of Havok Destruction (and to a smaller degree, Havok Cloth). DMM however has allowed LucasArts to enhance *Force* powers with flexibility, realism and most importantly, a 'wow' factor.

"For example, a player can Force Push a metal door and bend it open to get through; after getting through it he or she can use another Force Push to bend it back in place," explains Torres. "This is due to DMM materials, therefore locking out incoming trouble that they otherwise would have to deal with."

This is what separates DMM from other physics systems. Usually if you smash a destructible object, it can only present two states – complete and broken. DMM introduces a third state: deformation (or fracturing, depending on the material).

According to Pixelux, DMM uses Finite Element Modelling,



Okay, we admit it. The reverse grip on the lightsaber is damned sexy.

ENGINE ROOM







“Euphoria allows NPCs to react to gameplay situations – it infuses them with self preservation...”

or FEM, to determine how a material should react to impact forces. Developers tweak a bunch of variables to define the properties of materials programmatically – rigidity, ease of fracturing, etc, and the processing part of the technology handles the deformation. If there are any doubts as to how effective FEM is at simulating material dynamics, it should help to know the theory was developed by NASA for the purposes of structural analysis.

An often ignored aspect of game physics is collision detection. While the odds of seeing an enemy with half his elbow in a wall or something equally silly have decreased in recent years, it remains a problem. DMM tries to eliminate such inconsistencies by using a tetrahedral mesh, and development tools to generate deformation and destruction meshes.

## Euphoria

DMM isn't the only whiz-bang technology we'll see in the high-definition builds of *Force Unleashed*. LucasArts has incorporated NaturalMotion's Euphoria into the game to give characters more realistic responses to outside stimuli. Put

Ah! The Rancor! (just imagine that in a British accent)



simply, Euphoria is the definition of procedurally-generated content; instead of creating pre-canned death animations and the like, developers code behaviours and allow Euphoria's 'Dynamic Motion Synthesis' to do the rest.

"Euphoria allows NPCs to react to gameplay situations – it infuses them with a sense of 'preservation' so they react to situations and attacks by defending and saving themselves, many times in unpredictable ways," says Torres. "Players may Force Grip an NPC and attempt to throw them off a ledge; with Euphoria the 'self-preservation' kicks in and the NPC may choose to grab a ledge to save itself while they are flailing through the air."

Seeing as actual animation is left in the hands of Euphoria, the technology can create 'unique game moments' as advertised on NaturalMotion's website. However, its implementation benefits the developers from a production standpoint, and it can be argued that this is the greater advantage.

"If we did not add these technologies we would have to use the more conventional method of 'art swapping' when objects and material are affected by attacks," explains Torres. "We would have to use regular predictable AI to make the NPC's react to gameplay."

DMS achieves its uniqueness by "accurately simulating the 3D character's motor nervous system and physical body," according to NaturalMotion's whitepaper. If this sounds like a complicated thing to emulate, that's likely because it is. The whitepaper goes on to say that DMS is 'R&D intensive'; to accommodate the varying types of entities one may encounter in a game – from animals, to humans, to robots – Euphoria comes with "wide-ranging library of adaptive behaviours."

So, if the animations aren't pre-made, won't their creation on-the-fly impact overall performance? The DMS whitepaper concedes the technology does require additional resources, but that they only amount to "a fraction of the total CPU cycles". Seeing as Euphoria is not present in the standard definition versions of *Force Unleashed* (PS2, Wii and PSP), we can assume this fraction may still demand multi-core or next-gen hardware.

## Define 'standard'

LucasArts isn't developing *Force Unleashed* on its lonesome – it's employed the help of Australia's own Krome to create the Wii, Playstation 2 and PSP builds, or 'standard definition' systems as they're called.

Trevor Powell, lead programmer over all three versions, believes Krome was chosen by LucasArts for a number of





reasons. Primarily, it was the developer's experience with the GameCube (which the Wii is similar to) and its track record with titles such as *Hellboy* and *Ty the Tasmanian Tiger* that likely won the publisher over.

It was clear from the outset that the standard definition builds could not be simple ports. Quality reasons aside, the Wii and PS2 would struggle with *Euphoria* and *DMM*. As such, Krome had to come up with its own software to 'emulate' the experience of fully-fledged physics middleware working in concert with AI and player actions.


"We developed our own physics solution for the game, based partly on our previous code from previous systems, and partly on some open source systems," explains Powell. Even Havok was left out of the mix in favour of basic ragdolls and more traditional animation techniques. When Krome's software wasn't up to the task, cinematics were used instead. The end result is an experience similar to that of the meatier platforms, if not as fancy.

The Wii doesn't miss out on everything – Powell was able to confirm that bump mapping and normal mapping make an appearance on Nintendo's

console. In fact, unique to the Wii is the Duel mode, which lets two players battle it out using characters from the game. This alone should see consumers snapping it up despite the middleware compromise. We also know a level involving a Jedi Temple is exclusive to the Wii version, though all the consoles have their fair share of unique content.

## Do or do not

When the game arrives in September this year, it'll hit a number of platforms, including the Xbox 360, PS3, PSP, Wii and PS2. If you're wondering where the PC version is, LucasArts believes it couldn't create a product that would run on all possible configurations without compromising on the overall experience. This information comes from an interview with producer Cameron Suey on [Videogamer.com](http://Videogamer.com). As far as explanations go, it's not a strong one, but it's the only one we have.

While there's no multiplayer in the 360 and PS3 versions, Torres believes the numerous unlockables will bring players back again and again. As for the Wii, well, we're sure the Duel mode will keep you occupied for quite some time – at least until the sequel is released. 



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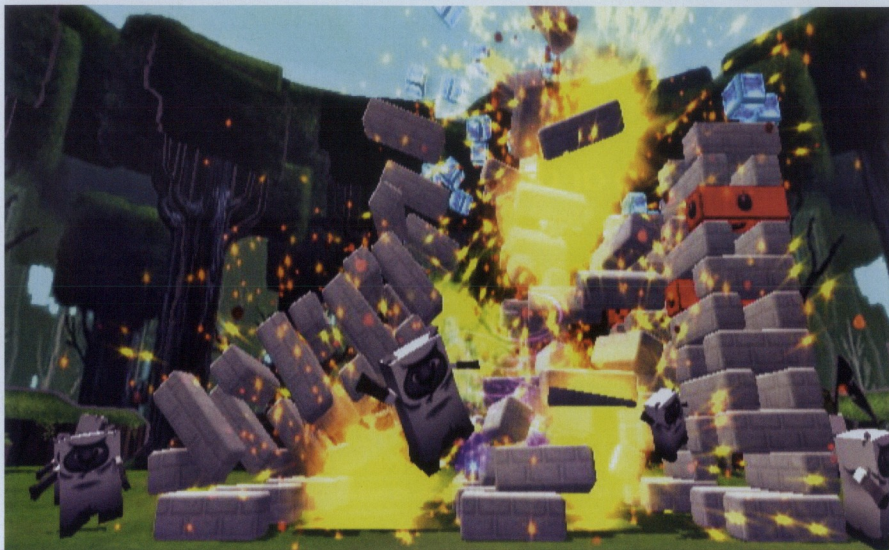
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# Boom Blox

David West makes blocks go boom. BOOM!

When you see the name Spielberg attached to a game, you can't help but expect some extravagant, cinematic saga – you know, Saving Private Ryan in pixel form. So when we were presented a puzzle game for the Wii, we really didn't know what to think.

At its simplest *Boom Blox* presents the player with a structure made out of blocks, with various ways of interacting with said structure. You may be tasked to remove blocks from it without toppling it – like our old friend Jenga – or to hurl objects at it with the right amount of power at just the right angle to satisfyingly bring the whole thing toppling. Another of many modes will require you to hurl bombs at invading parties as you attempt to keep them from destroying your blocks. All this is done utilising the game's great physics engine and a very well thought out Wiimote control scheme.

The controls are simple, with everything being handled by the Wiimote. You can rotate 360 degrees around the block structure to get the best vantage point and plot your course of action. Throwing is handled by simply making a throwing motion at the Wii. The force of the throw is measured and translates to how hard the object is thrown in game. In other modes, the Wiimote controls an onscreen hand used to pull at the blocks in the jenga-like puzzles. The system works very well, and allows you to do

everything that needs to be done simply and easily. Everyone can immediately pick up the game and have a blast.


While the premise is extremely basic, its execution is masterful. There are so many different variables to achieving these simple tasks that the game is catapulted above just being another puzzler and providing a genuinely fresh and rewarding experience. Differing object types react to the environment and the blocks in different ways. Bowling balls and baseballs have different weights and properties that affect the way they interact with the blocks; the blocks themselves also vary greatly. Wooden blocks are light and will sway as you painstakingly try and remove pieces, while steel blocks provide great resistance to almost anything thrown at them. There are bomb blocks that explode upon impact as well as chemical blocks that explode when one chemical block touches another. Vanishing blocks simply disappear when hit; leaving whatever was above them at the mercy of gravity.

All these varying elements combine to form the 300-odd puzzles in the game. The puzzles start off quite easy but as you progress in the game, they become fiendishly difficult, as any good puzzler should. Later puzzles are quite deep and with a great deal of flexibility in their makeup, allowing great opportunities to experiment with differing ways of achieving your task.

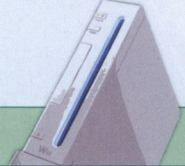
Multiplayer is an area where the game really shines. Up to four players can play, and battles can get quite heated as you steal shots from another player or take a miracle block out of a tower and watch as other players attempt to keep the thing from falling. The level editor pretty much rounds out the package; the editor is quite intuitive to use and you have near total control of the objects. You can place and stack them where you like, scale them to different sizes and apply different block types. You can try the levels

in real time as you build them and make rolling edits as you see fit. You're really encouraged to create some brilliant puzzles and this adds to the longevity of the game.

The graphics and sound are quite rudimentary, though are adequate enough to support the game. It seems a lot of the Wii's power concentrates on calculating the blocks flying everywhere to the detriment of making it look schmick, which given the premise of the game is exactly how it should be. The cuteness of it all may be too much for some, but that really is a personal thing.


Overall *Boom Blox* is an overwhelming success. It has taken an extremely simple idea and executed it with enough variety and depth to keep you coming back for more. In an ever-evolving landscape of games crammed with as many complex features as possible, it's refreshing to see a game based on simple old-fashioned fun that just plain works. 





Wii

Developer EA Los Angeles  
Publisher Electronic Arts  
Website <http://www.ea.com/boomblox/>

VERDICT

Gripping physics-based puzzles; full level editor, great multiplayer 

Boring visuals and sound 

SCORE

8.5 OUT OF 10



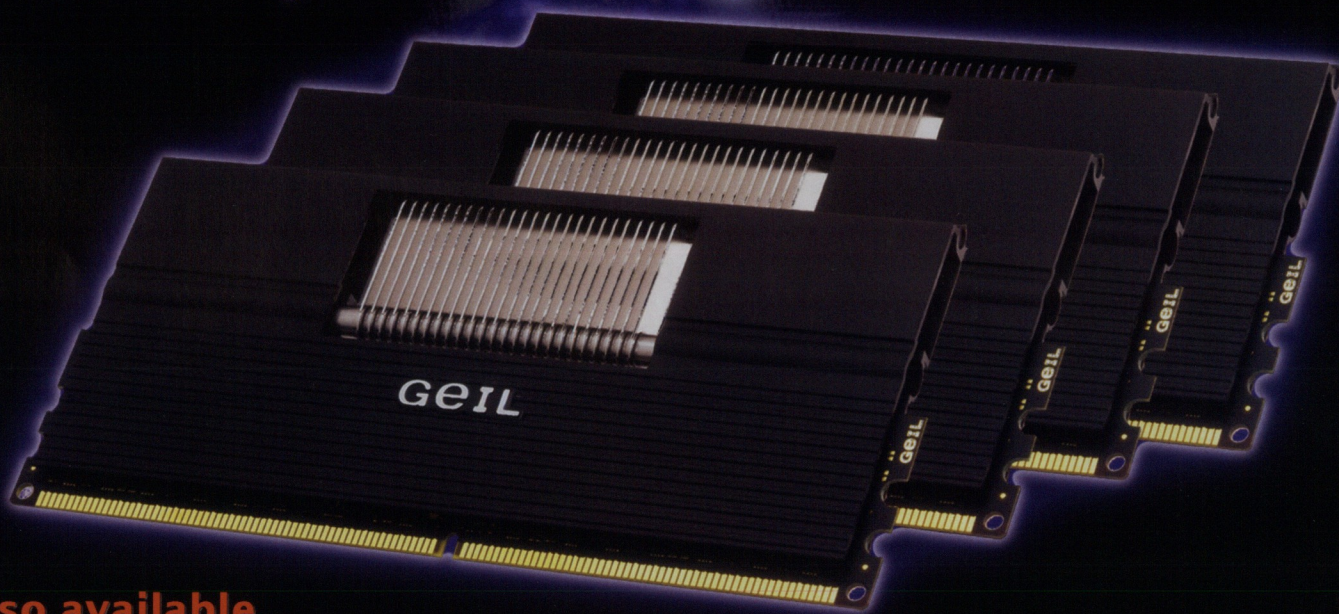
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# Battlefield: Bad Company

Honour. Duty. Integrity. These are words that B Company soldiers may be aware of, but **David Hollingworth** doesn't think they care for them much.

The *Battlefield* series of games from EA and DICE has a long and mostly illustrious history, having created games and game types that are considered industry standards of multiplayer gaming. However, one thing the series is not known for is character and individual storytelling.

Until now, with *Bad Company*.

The artwork on the game's cover says it all, really – it's a fragmentation grenade with a smiley-face badge on the safety pin. That theme of grim humour and high explosives runs through the entire game.

The single player game starts off in a workman like fashion, at least from a gameplay point of view. The missions are very much of the go-here-blow-up-X variety, but what lifts the game is excellent voice acting, superb writing, and the single best sound effects we've heard in a game of this kind to date.

You take the role of Preston Marlowe, your classic military everyman who's just been shipped into some nameless and war-torn Eastern European country to join B Company. This is the unit where the army's misfits end up, and your squad is no exception, comprising an explosives expert with an explosives fetish, a chattering conspiracy theorist and a sergeant who's merely counting time until his tour is up.

The tone is set early on when you arrive. Haggard, the bang-bang guy, leans in close as you introduce yourself, then mysteriously and

imperiously says "Pleased to meet you. You smell very clean." Banter like that follows you around the battlefield, and each mission is punctuated by set piece mission updates and discussions of overall strategy. The dialogue fairly sparkles, whether it's the paranoid Sweetwater pining for the unit's dispatch operator, or Haggard declaring that he's going to go check a dead man for a pulse – in his pockets, of course.

After a few missions where B (for Bad, get it?) Company and your squad in particular is called

upon to do the dirty jobs for the rest of the US Army, you discover that not only are you fighting Russians (and gee, it warms our heart to see the Ruskies as badguys again), but there are highly paid mercenaries taking shots at you too. Mercenaries who are paid in solid gold bars... from there on the game takes on a decidedly Kelly's Heroes feel.

The gameplay is solid, and while it may seem a little simplistic you'll quickly discover there are some lovely nuances. The single player doesn't







have classes as such – multiplayer does – but rather weapon sets. For instance, you can have an assault rifle with a grenade launcher, a sniper rifle with a pistol, or a shotgun with frag grenades (and smiley faces). Similarly you have a single equipment slot that further rounds out your skillset – things like a repair tool to keep vehicles running, an RPG, or a remote mortar targeting device.

Each level is set in a wide open map with a changing series of missions that draw you through it, and you can always complete objectives in any order and in a number of ways. Tasked with taking out some communication antennae? You can get up close and destroy them with some C4, stay the hell away and call



down mortar fire (Russian mortar fire, no less, which is just hilarious), or any combination.

There are vehicles to hoon about in as well, but they are more of a convenience than a heavy part of the single-player game. For instance, if you drive your HUMVEE into a wall and total it (which we never do, honest), hoofing it across the map is always an option.

The best thing about the gameplay is the destructible environment. Nigh on every wall, fence, sand-bag emplacement and tree can be blown up, knocked down or similarly pulverised. The transient nature of the battlefield makes for some thrilling encounters – you can blow in walls to flank an enemy, destroy their cover, or block line of sight with fallen trees. We expect in multiplayer – which we've not really had any time with, so expect an update on [www.atomicmpc.com.au](http://www.atomicmpc.com.au) – that this will mean absolute carnage for countless Eastern European villages.

But it's all of these elements taken together than really make the game work. The cries of your squadmates, the echo of rifle-fire and the thudding impacts of artillery as you call down a strike that destroys your target and all nearby buildings... this is war at its cinematic best.

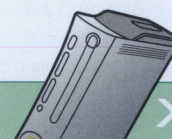
That sense of cinema, however, is marred by a number of design decisions that seem to suggest

certain parts of the single player game were a little... rushed.

For one thing, like many squad-based games your buddies follow you around, occasionally doing something useful, but mostly they're there for flavour. This gets annoying when you move too far away from them, and they spawn into existence right next to you. Sometimes they are content to cross the map, but other times they seem to have personal teleporters that they're simply not sharing. Bastards.

Then there's the respawning model. When you die, you spawn back at the last save point; however, the gameworld does not reset. If you just picked up a new weapon before you've died, or cleared a house, it'll stay cleared. Your squad will even start heading back toward you as if this happens all the time. We're not sure though this is a positive move toward freer gameplay, or a lax design choice. Either way, it's sort of... odd.

Still, this is a wonderful new chapter in the *Battlefield* series, full of pleasant surprises and intense gameplay. For the stellar sound effects alone, this is a tops FPS. If only it were on PC... (P)



XBOX360

Developer EA Digital Illusions CE  
Publisher Electronic Arts  
Website <http://badcompany.ea.com/>

## VERDICT

Great sound; good voice acting; good selection of gear and weapons.



Odd spawn system; lacks a proper save game setup.



8.0  
OUT OF 10







# Mass Effect

It's time to save the galaxy – again. David Hollingworth gets back into the shoes of Commander John Shepard.

We had our first taste of the *Mass Effect* universe back in issue 85, when we reviewed the game in its Xbox 360 incarnation. It was a groundbreaking title, fusing excellent storytelling, exciting combat, and stunning graphics into one milestone of a gaming package. We were certainly chuffed, at least, and gave the game 8.5 out of 10. What held *Mass Effect* back was a handful of poorly designed sub-systems (we're looking at you, inventory), less than reliable frame rate and long load times. Still a great game, essentially, but hobbled.

Now along comes the PC port, and while, as we are dedicated PC gamers at heart, we have to wonder: is this just a cheap ploy to extend the sales window of the game?

Short answer: no. But since you probably expect a little more depth...

If you've paid any attention to gaming in the last six months, you'll know about *Mass Effect*, but for those who haven't been paying attention it is an epic RPG from the same people who gave us *Knights of the Old Republic* and *Jade Empire*. In other words, the good folks at Bioware know a thing or two about telling a tale that makes you, the player, feel at the very heart of the action, and *Mass Effect* is no different.

As Commander John Shepard, you are thrust into politics and war on a galactic scale, as humanity starts to make its case for being a

bigger partner in how the universe is run. We are not alone, you see, and in fact we are one of the younger, less advanced races. Like an annoying younger brother, we've got a lot to prove, which would be hard enough if there wasn't a psychotic alien hellbent not only on destroying humanity, but threatening the entire breadth of galactic civilisation.

The action takes place on many planets, ships and other exotic locations, and said action is a lot more like a PC shoot-em-up than a classic RPG. You can freeze the game to order your team around, and tell them to use certain powers, and it's here that people who have played *Mass Effect* already on 360 will start to see improvements. For one thing, you have slightly more control over your squad, and the command interface is vastly improved. Switching out weapons and skills no longer seems a fight in and of itself, for once thing, and for another your squadmates are actually far better in a fight now. They very rarely block your line of fire, they use the right skills at the right time, and you generally need to hold their hands a lot less.

The other big change is in how the game handles your inventory of gear and upgrades. On 360, it was an annoying click-fest, requiring upwards of four or five clicks just to get rid of something. The PC version has been vastly streamlined, and we find it much easier to equip items, and far easier to turn unwanted tech into bio-goo to fuel some of your Tech powers.

They are probably the two biggest changes; you'll also get some extra content, which was originally released as a paid extra for download on the 360. Taken all together, these changes and freebies alone make *Mass Effect* a much more playable game, but there's two more important things that need to be considered.

Firstly, quite aside from the changes to the game, combat now feels a lot more precise and in control, especially once you start levelling your



shooting skills. Being able to use a mouse and keyboard is an absolute revelation, at least to some of the old PC hands at Atomic HQ. With the game's cover system, and more accurate targeting thanks to mousing, taking on Geth and giant-intelligent-plant-infected-badguys is like taking out tangles in *Rainbow Six*.

Secondly and lastly, it's a testament to the writing and story of *Mass Effect* that it is just as compelling to play a second time. Sure, there's some great action, but the experience is more like re-watching a favourite film. Of course, in the case of *Mass Effect* you can change the nature of your main character, which adds even more nuance to each play-through.

Like a fine wine, *Mass Effect* has gotten better with age, and we can say with complete confidence that this is quite possibly the best RPG ever written. Newcomers should pick it up on PC to see what the fuss is about, and even those who've already racked up hours on the CSV Normandy will find a lot to like in this new version. (P)

**PC**

**Developer** Bioware (Demiurge Studios: PC port)  
**Publisher** Electronic Arts  
**Website** <http://masseffect.bioware.com/>



**VERDICT**

Deep story; excellent voice acting; improves the few dodgy parts of the Xbox original ✓

Mako handling still not easy; some poorly implemented shadow effects. ✗

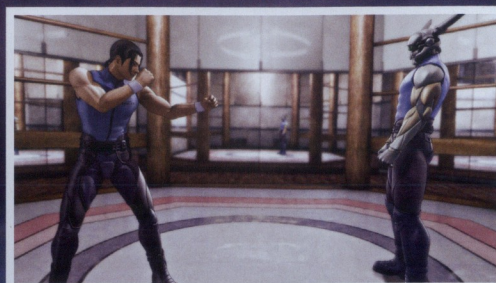
**SCORE** **9.5** OUT OF 10



# CULTURESHOCK

Everything you need to know about geek film, music and literature.

CULTURE SHOCK



## Appleseed: Ex Machina

**DVD / MOVIE**

Directed by Shinji Aramaki; Starring Ai Kobayashi, Koichi Yamadera, Takaya Hashi; Distributed by Madman Entertainment

The sequel to 2004's *Appleseed* opens in a typically grandiose gunfight, with Olympus City's elite ESWAT team taking down a bunch of heavily cyborged hostage-takers in a church. If you're not familiar with that first film, or with the manga both movies are based on, then you might feel a little lost, but the action's fast-paced enough to draw you in almost immediately. It's frenetic, over the top (in a good way), and it's all very very familiar, for some reason...

When you get a look at the credits, and the frequent (and oddly important) clouds of doves that swarm Olympus, it all starts to come together. The executive producer of the film is the action veteran John Woo. Suddenly the slo-mo cyborg mojo and b-plot of tough-loving your partner back to two-fisted glory make sense!

The plot is at one and the same time complex and remarkably simple. On the complex side you've got Olympus City – a kind of post-global-apocalypse Switzerland – trying to unify the Earth's various nations under one security satellite system, run-amok cyborgs, mysterious mobile phone technologies and genetic flesh and blood copies of now fully cyborged partners... gasp!

But the simplicity kicks in pretty early. After all, this is *Appleseed* – there ain't no problem that can't be solved with the application of a little bit of angst and a lot of high-calibre weapons-fire.

*Appleseed*, in both the first movie and in the four-book manga, has always been about serious political in-fighting backed up by military hardware. The second film follows that recipe, but the politics and machinations are very much filler in between fight scenes and shoot-outs.

Which, oddly enough, is no bad thing, especially when all those fight scenes are rendered in stellar proto-cell-shaded style. The first film looked good, but this one is a downright masterpiece of animation, with every character fully motion-captured, astounding technical marvels (the landmates, or armoured suits, and hover vehicles are as stunning as anything in *Ghost in the Shell*), and cityscapes of wondrous beauty.

We saw *Appleseed: Ex Machina* as part of the Sydney Film Festival, but it

will be getting a limited release this month as part of the Reel Anime festival (alongside *Batman: Gotham Knight*, *Vexille* and *The Girl Who Leapt Through Time* – [www.madman.com.au/reelanime/](http://www.madman.com.au/reelanime/) for more info). It will eventually make a DVD release in September, too, but this really is worth catching on the big screen. For one thing, how often do you get to see top-flight anime in a movie theatre? For another, this is a true big-screen experience, and the sound work in the film really deserves to be heard in the best possible environment. Sadly, the Festival closes on the 16th, so unless you pick up *Atomic* the day it comes on sale (and why don't you?!)... **DH** (C)

score **8.0** OUT OF 10





# If it's Tuesday, this must be Tokyo

Zara Baxter divulges the secret life of a jet-setting journalist.

**H**ow to tell if you're a geek when travelling to the USA: you spot that the Department of Homeland Security uses Logitech Quickcam Pro 5000 webcams for their border mugshots.

How to tell if you're an ubergeek: You also recognise the model of fingerprint reader.

Sadly, I'm not an ubergeek, but I can recognise at least 20 cities just by the pedestrian crossing lights they use.

Travel is where geeks excel. We're most likely to memorise the hotel address in Simplified Chinese so we can scribe it for the cab driver in Shanghai, have a short-list of flights we can switch to if our intended aircraft keels over for unforeseen reasons, and enact stage three of our backup plan before anyone else realises there's trouble a-brewing.

I recently found myself, at 4am, wondering whether it was too early to call reception to get the IP routing tables fixed on a dud Wi-Fi connection, after troubleshooting it, of course. As a result, I strongly recommend that your final choice of hotel comes down to the quality of its internet. HP has taken the step of including a Wi-Fi router in the power adapter of their new Voodoo Envy 133. This shows the kind of understanding of geek needs that I expect more manufacturers to emulate.

Also vital are tours of the requisite touristy locales. That might mean Frys and Best Buy in the US, while for Tokyo, the tech district Akihabara is the one essential destination. There's a handy list of geek sightseeing at [www.sericyb.com.au/geek-travel.html](http://www.sericyb.com.au/geek-travel.html).

Travelling light is another geek thing: ensuring everything fits into carry-on luggage means never having to wait at the baggage carousel. You can also engage in the Olympic geek sport of getting tech gadgets through screening without unpacking your bag (my current record is eight, though I might be disqualified on a technicality because they asked me about my USB memory stick).

But it's those extra little things that make your travel truly geektastic. Like scoping out – and using – the sole power socket at the airport gate. And an awesome slutty-adaptor that takes all power cables and connects to all sockets, along with a USB charger that takes all comers (do you kiss your mother with that mouth? –*ed*). Your pocket hard drive, with enough movies to keep you amused during a couple of weeks on the road – and

a full backup of your music collection. And, of course, knowing how to get through security without having your laptop confiscated.

It turns out that various border checkpoints feel happy to take a rifle through your gear, demand that you enter passwords to show them encrypted files and the like. So far two dozen passengers singled out because of racial or religious profiling have had electronic gadgets such as mobile phones, laptops and MP3 players searched. In some cases data was copied from the gadgets, and in others, items were held for several days.

Security guru Bruce Schneier sensibly recommends keeping as little

vital data as possible on electronics you travel with. He also suggests a two-tier encryption strategy to protect your laptop – use file encryption for important documents and files, and disk-level encryption (such as PGP Whole Disk Encryption tool) to protect the entire laptop. It all sounds a bit onerous, but I quite like his alternate suggestion, which is to burn the vital stuff to DVD as an encrypted zipped file. That way, as he points out, you can say that you're carrying the files for your boss and don't have the passphrase. Of course, if they take the disc from you, you're still without your data.

Or you could just avoid carrying valuable data when you travel, while keeping it accessible when you need it. Use remote desktop back to your home PC with all the info, or email things to yourself via gmail or yousendit. Online storage is another option – I've tried box.net, but I'm looking for a better long term solution – and some people swear by .mac (now MobileMe) or other solutions. Online backup, such as Carbonite, is also useful. A mix of these options is what you'll likely end up with, and no doubt, if you're like me, you'll have to sample umpteen services before you select the one that fits your geekiest needs.

Zara Baxter has the geek superpower of learning to navigate the intricacies of public transport for any city within an hour, even when she doesn't read the language. Email her your nifty geek superpowers at [zbaxter@pcauthority.com.au](mailto:zbaxter@pcauthority.com.au)



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# TECHNIQUE

## HANDS-ON TUTORIALS FOR THE TECHNICALLY INCLINED

It's more spiffing building and Linux goodness this month, plus the usual dose of edumacational smarts and thrilling questions and answers.

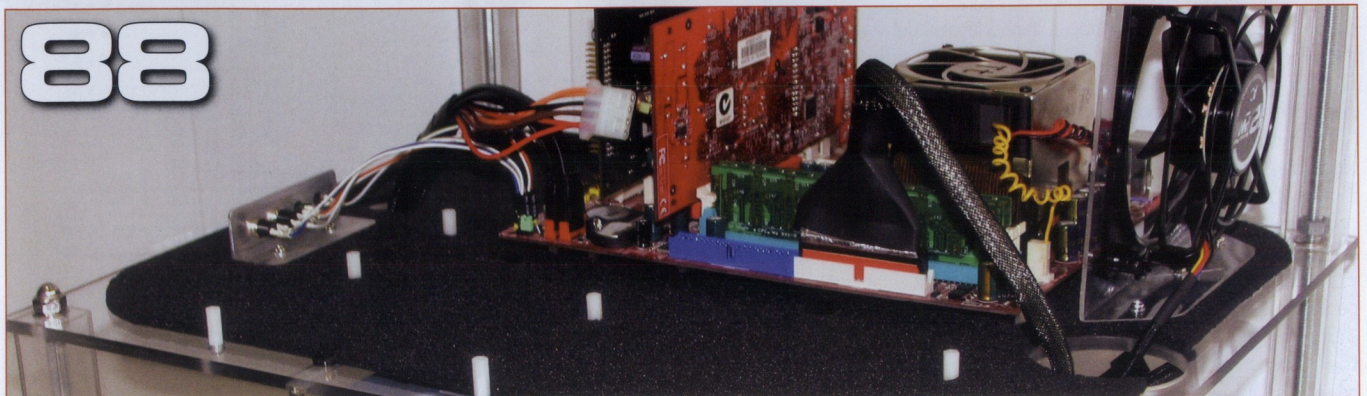
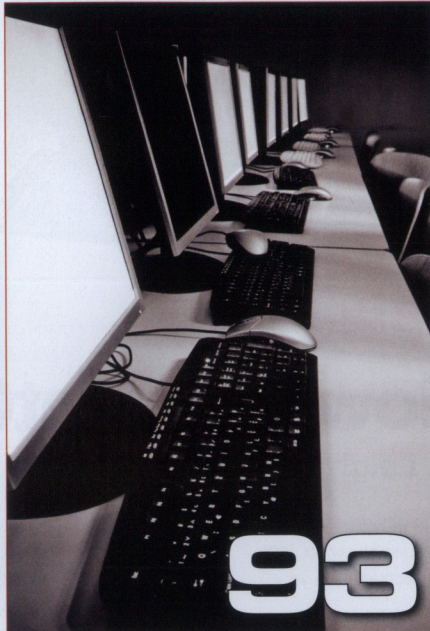
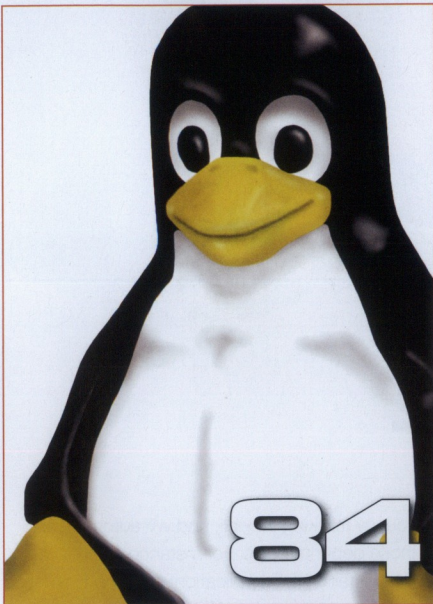
We kick off with the second part of Leigh Dyer's exploration of Ubuntu Linux from a decidedly Windows slant. This part of his three part series focuses on installing and updating software. Kind of essential, if, you know, you actually want to do anything with your shiny new Linux install.

Once you've mastered that, it's time to pick up your tools and join Ron for his latest nifty project – a custom built testing station. It certainly made our jaws

drop in admiration and we don't think you'll be any different.

We then segue nicely from open CP testbeds to open university education – smooth! Chris Taylor talks us through the benefits and pitfalls of open learning. It's a boon for those who can't make it to their university of choice, but a challenge for those with no drive to stick with it.

Dan Rutter then chimes in with his helpful hints, tips and vast cosmic knowledge. Finally, Logan Booker tells us tales straight from the lazy heart of geekdom. By which we mean his loungeroom.



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Install new applications and keep the up to date.

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Make overclocking and benching sessions easy with this great build.

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Your questions. Dan's vast intellect.

### Fallout 98

Logan Booker – funny man.



DIFFICULTY **INTERMEDIATE**

# Linux for Windows users pt02

Our favourite penguin wrangler, Leigh Dyer, is at it again.

Last month we got our toes wet in the Linux world by getting it installed and finding our way around the desktop. This month we're diving right into some of the gory details, starting with installing extra software on your new Linux system.

## Package management

One of the first questions that often comes up after installing Linux is "How do I install more software?" The short answer is to use the 'Add/Remove...' tool in the Applications menu, but the long answer is much more complex.

Every piece of software on an Ubuntu system is part of what's known as a 'package'. At the highest level, a package might be an application – there's a 'pidgin' package for the Pidgin IM client, for instance – but a package could also be a shared library (the Linux equivalent of a DLL), a command-line tool, a server application, or any number of other things. The package manager tracks exactly what packages you've installed, and a list of all of the files contained in each of them, like a super-effective and super-pervasive version of the 'Add/Remove Programs' dialog on Windows.

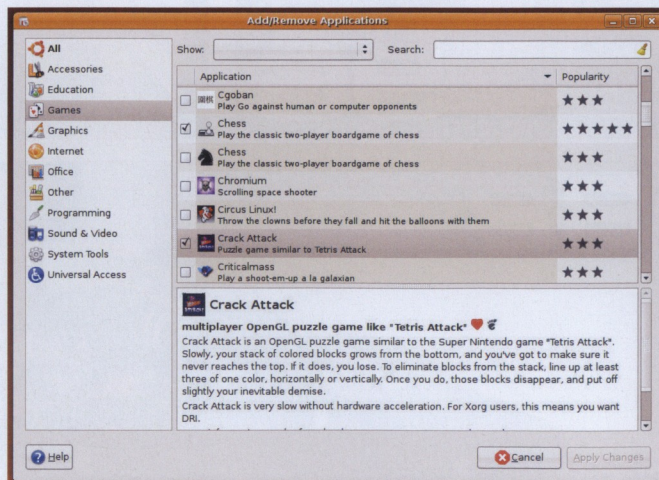
The package manager also tracks dependencies between packages, so it knows, for instance, that the 'pidgin' package depends on the GTK GUI libraries in the 'libgtk2.0-0' package, and will prevent you from removing packages that other packages depend on.

The most impressive feature is the Advanced Packaging Tool, or APT, which can install packages straight from the web. You've seen this in action through the Update Manager already, but it can also install new software packages.

APT works with special web sites, called 'repositories', which contain the individual packages along with a package list file that catalogues the available packages. Once you've added a repository, and APT has cached its package list locally, you can install any of the packages available from that repository. The Update Manager will automatically keep those packages up-to-date as new versions are released, too.

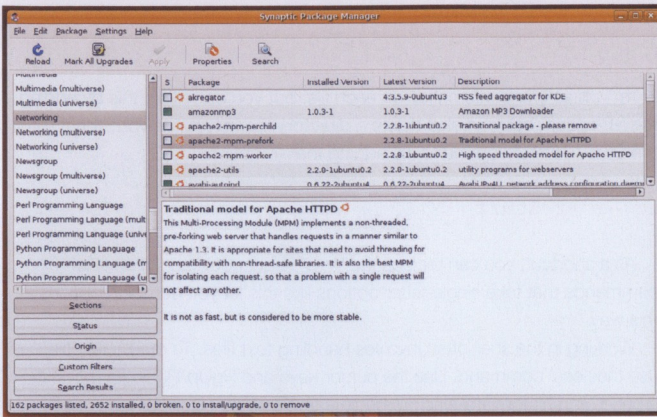
Even better, APT has dependency tracking as well, and will automatically install extra packages to fulfill those dependencies. For instance, even if you don't have KDE installed, you can install a KDE application – like the kick-ass music player Amarok – with a single command. APT will automatically download and install all the required KDE libraries for you.

There are three ways to interact with the package manager, starting with the 'Add/Remove...' tool in the Applications desktop menu. It only lists desktop applications, rather than all packages, but it's dead simple to use – just browse or search for applications that you want to install, tick the checkboxes next to them, hit 'Apply Changes', and relax as the magic



▲ The Add/Remove tool is the easiest way to install new applications.





▲ Synaptic gives you access to every available package.

happens. To add new package repositories, use the 'Software sources' tool in the System/Administration desktop menu.

The other GUI option is Synaptic Package Manager, in the System/Administration desktop menu. It works much the same way, but it gives you access to all of the available packages rather than limiting you to desktop applications.

The final option is the command line (once you've read about how to use it below!), starting with 'apt-cache', which lets you search for packages based on names or keywords. For instance, you could search for iPod-related packages:

```
apt-cache search ipod
```

To learn more about a package, use the 'show' option:

```
apt-cache show gtkpod
```

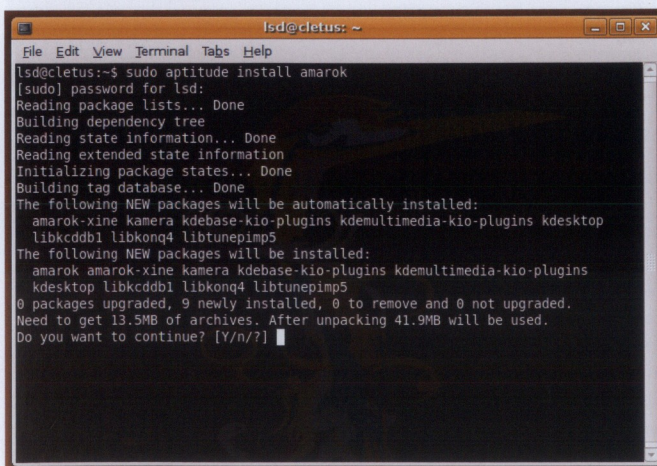
To install a package, use the 'install' option of the 'aptitude' command. This requires superuser privileges, which are provided by the 'sudo' command:

```
sudo aptitude install gtkpod
```

Likewise, you can uninstall a package with the 'remove' option:

```
sudo aptitude remove gtkpod
```

For simple cases, where only a single package needs to be installed or removed, aptitude will just do it. Otherwise, it presents a 'solution' – a list of



▲ Use aptitude to install packages from the command line.

the packages that need to be installed, upgraded, or removed to complete the requested command – and lets you review it before proceeding.

The final 'aptitude' option you need to know is 'update', which refreshes your local copies of the package lists from all of your configured repositories. The Update Manager should automatically keep these up-to-date, but it's handy to know the manual method just in case:

```
sudo aptitude update
```

Installing software from predefined repositories might seem restrictive, but it's an immense time-saver, and the selection of packages is incredibly broad: the core Ubuntu repository contains over 1000 packages, and the community-maintained 'universe' repository contains several thousand more.

## Shell basics

You can get by with Linux day-to-day using just the available GUI tools, but some level of familiarity with the command line, or 'shell', is definitely worthwhile. To begin, open a shell by running the 'Terminal' application from the Applications/Accessories desktop menu. At first it might look like a DOS prompt, and it's fundamentally quite similar, but it's also far more powerful, and it's often the most efficient way of getting a job done.

The first thing you'll see is the command prompt, which has three parts: your username, the current hostname, and the current directory, ending with a dollar sign. When you first open a terminal, the current directory will be '~' (the squiggly thing usually above the tab key (it's called a 'tilde' – *ed*)), which is a shortcut for your home directory.

**The update manager will keep packages up-to-date as new versions are released.**

To see what files are in the current directory, run the 'ls' command, by simply typing 'ls' (without the quotes) and hitting enter, in exactly the same way you'd run 'dir' at a DOS prompt. By default, 'ls' just lists names, but you can see more detail by adding the '-l' option, which lists (among other things) the sizes and dates on your files:

```
ls -l
```

To change the current directory, use the 'cd' command, just like on DOS. For instance, you could change to the 'Desktop' directory inside your home directory, which holds the contents of your desktop:

```
cd ~/Desktop
```

Here we've specified an *absolute path* – that is, we've said explicitly that we want to go to the Desktop directory inside the home directory. Since you're already in your home directory, you could use a *relative path* instead, which simply adds on to the current directory:

```
cd Desktop
```

By the way, you'll need to make sure you type the upper-case D at the start of 'Desktop'. Unlike Windows, Linux is case sensitive, so you need to make sure you get the capitalisation correct whenever you specify a filename.

Like in DOS, '.' is a shortcut for the directory directly above the current directory, so you can return to your home directory from the Desktop directory like this:

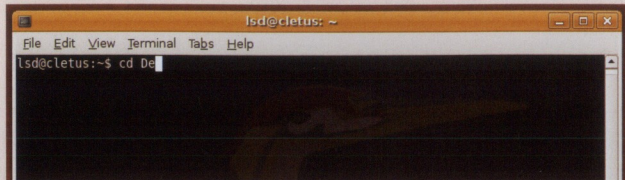
```
cd ..
```



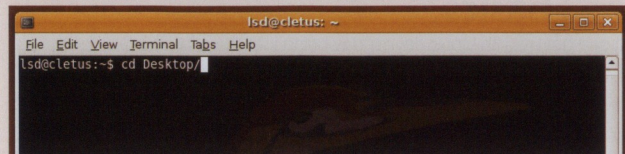
## TAB COMPLETION

### A sneaky way to handle long commands and filenames.

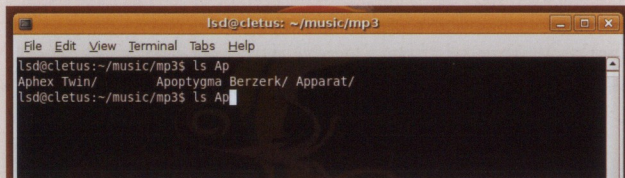
Type the first few letters of a filename.



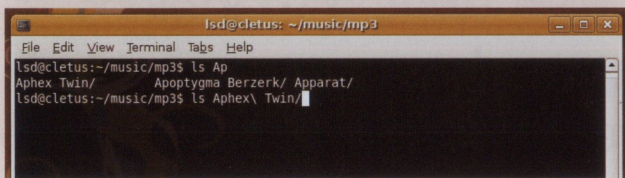
Hit the tab key and the filename is completed automatically.



If there are multiple matching names, hit tab twice to display them.



Type some more letters and hit tab again to complete the right name.



To get around more quickly, try 'tab completion': simply type the first few letters of a filename, hit the tab key, and watch as the shell fills in the rest of it for you. If there are multiple names that match the letters you've typed, the shell will complete as far as it can and stop. Hit tab twice to see a list of the matches, and then either type the rest of the name manually, or type another letter or two and hit tab again.

Tab completion is particularly handy when dealing with filenames that contain spaces. The shell will normally interpret a space as the end of the filename, but tab-completing a filename will automatically escape the spaces with backslashes. The other option is to put quotes around the entire filename. For instance, if you have a directory called "My Photos", the following commands will work:

```
ls My\ Photos
ls "My Photos"
```

If you don't do either of these, the shell would interpret 'My' and 'Photos' as two separate filenames.

## Other commands to know

Now that we've covered the basics, you just need to learn more of the available commands. To create a directory, use the 'mkdir' command:

### mkdir Stuff

To delete a file, use 'rm':

### rm myfile.txt

'rm' will ask for confirmation on each file, but you can avoid this by adding the '-f' option. You can also delete a directory recursively, as you would with the DOS 'deltree' command, by adding the '-r' option:

### rm -r -f Stuff

As a shortcut, you can replace the '-r -f' sequence with '-rf' – most commands that take single-letter options like this let you combine options in this way.

Working in the shell often involves handling text files. To read a text file, use the 'less' command. Use the cursor keys and PgUp/PgDown to move around, and hit forward-slash to begin a text search. Hit 'n' to advance to the next match. If you need to edit a text file, 'nano' is definitely the easiest option, since the Control-key shortcuts for saving files, etc. are listed across the bottom of the screen.

## Built-in documentation

One great thing about the shell is that many of the commands are self-documenting. Most tools will display a brief summary of their available options, or the most commonly used options, when run with a '--help' or '-h' flag:

### ls --help

For more detailed information you can refer to the manual pages, or 'manpages', which you can access using the 'man' command – just specify the tool you want more information on:

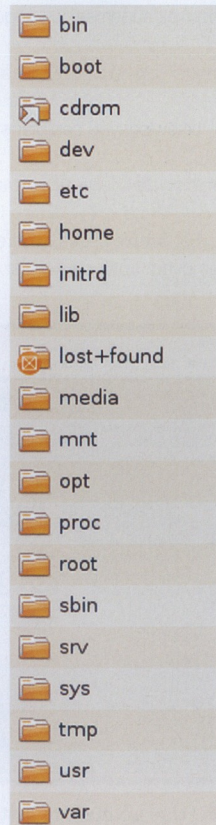
### man ls

## The Linux filesystem

Windows stores data in hierarchies of files and directories, stored under drive letters at the top level. Linux is much the same, but it has no drive letters – instead, everything falls under a single hierarchy, starting with the 'root directory', which is represented by a single forward-slash (/). The main directories under the root directory are:

- /bin** – core system binaries, like the command-line tools mentioned above
- /boot** – boot loader, Linux kernel, and drivers required to boot the system
- /etc** – system configuration files
- /home** – user home directories
- /lib** – core system libraries
- /sbin** – system binaries meant only to be used by the superuser
- /tmp** – temporary files
- /usr** – applications, libraries, and their associated files
- /var** – runtime storage, mainly for server applications

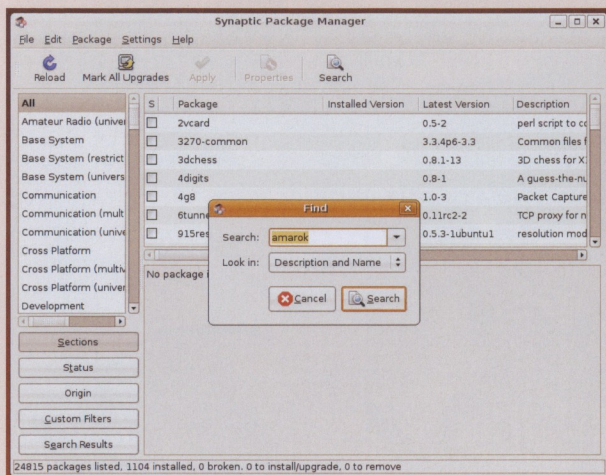
It might seem limiting to have a single filesystem hierarchy, but it's actually very flexible, since you can store sections of the filesystem onto separate partitions. A simple system might use one partition (the 'root partition') for everything, but you could instead use a smaller root partition, and create a separate partition for /home. Adding another partition like this is called 'mounting', and in that case, the '/home' directory



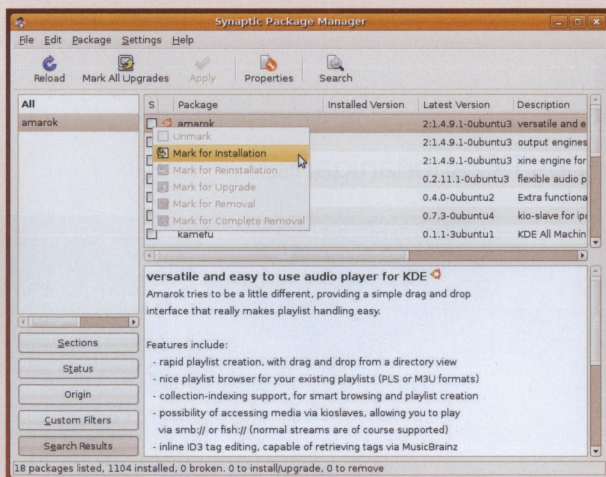


## RANDOM SYNAPSE FIRE

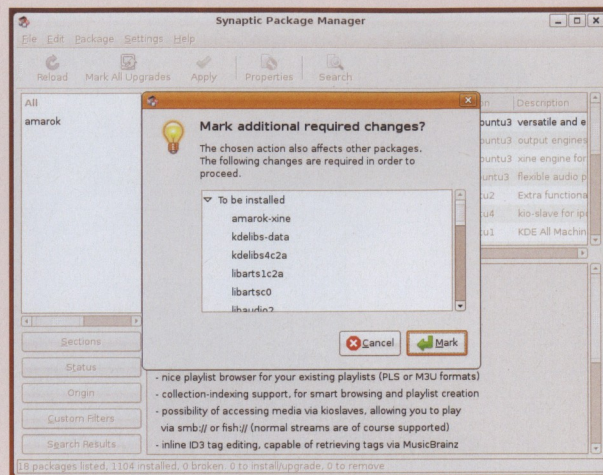
Using Synaptic to install packages can be confusing at first, but it's easy once you get the hang of it. It doesn't do anything immediately – instead, you mark the packages you want to install or remove, hit Apply, and it does everything in one go.



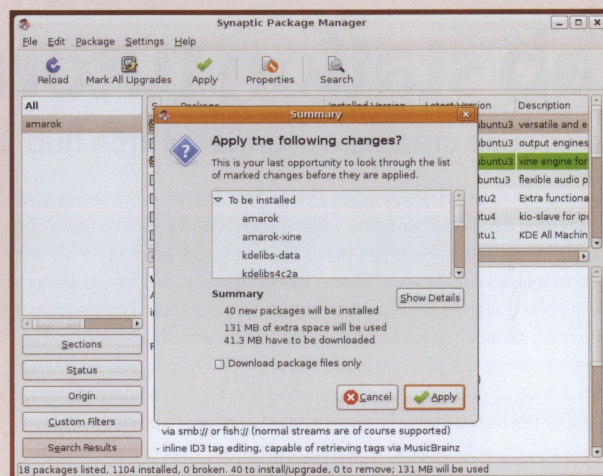
1. Browse for packages, or use the search feature.



2. Once you've found the package you want, click the checkbox to mark it for installation.



3. Synaptic lists any dependent packages that are required – click Mark to install these as well.



4. Hit the Apply button in the toolbar to start the installation process.

would be referred to as a 'mountpoint'.

Mounting is also used for removable media. In that case, the GNOME desktop mounts removable drives for you automatically, created under the '/media' directory.

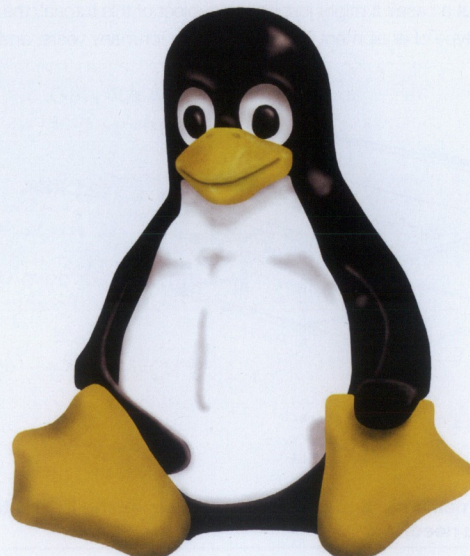
Three more directories contain virtual filesystems, which contain special files that don't actually exist on disk:

- /dev – files that represent hardware devices on the system.
- /sys – files that allow you to interact with hardware drivers.
- /proc – files that list information about your system.

For instance, if you read the contents of '/proc/cpuinfo', you'll find a wealth of information about the CPU, or CPUs, in your system.

## Next month

Come back next month for part three, where we demystify file permissions, users, and groups, and make your Linux system play nicely with Windows systems on the same network. (C)







DIFFICULTY **ADVANCED**



# Lab station tutorial

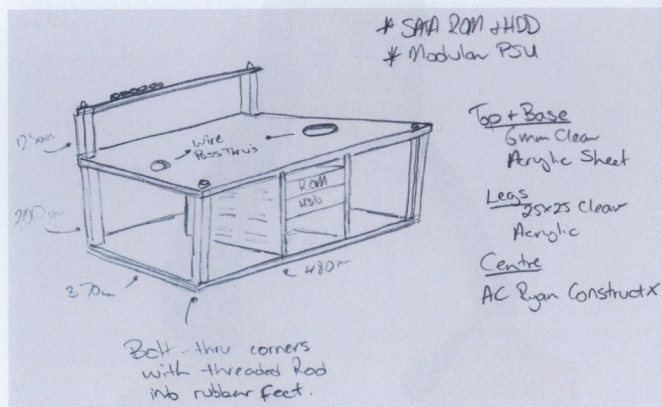
Ron Prouse creates a wonderful little hub for serious PC shenanigans.

One of the innate characteristics of being an Atomican is the way that we treat computer hardware – sometimes with awe, other times contempt, but never with indifference. Many of us just can't leave our PC's alone to perform their allotted tasks in peace, being fuelled by an overwhelming desire to poke and prod at silicon and copper components until the machine is performing perfectly, at speeds far beyond its original specifications. The extreme echelon of this practice is the realm of The Overclocker, an enthusiast with a drive so pure that even the computer case can sometimes become just another physical barrier to be vanquished... at which point the PC is a pile of expensive parts lying on a desktop, with a jumble of power and data interconnects giving them life. Very handy for immediate access, but lacking in vital protection from impact, static, dust and the inevitable split cola beverages.

So what is the sensible median ground? How can you add order and control without a case? It might just be the subject of this tutorial, the Lab Station. This type of equipment has been around for many years, and we do



▲ A mitre box makes perfect cuts simple to achieve.



▲ Sometimes a bit of paper and a pencil is all the inspiration that you need!

## DISCLAIMER

Whenever you pick up power tools, cutting and grinding instruments, or even a can of spray paint, you are putting your general wellbeing at risk from some form of industrial level accident. We take every precaution by wearing appropriate safety equipment, using tools with respect and within their limits, and by not inhaling the contents of glue and paint containers. We suggest that you should follow a similar regime, and seek professional assistance and guidance if you are attempting a task outside of your skill set. NB. Atomic MPC and staff are not responsible for your safety or longevity.



## SUPPLIERS

## PC CASE GEAR

[www.pccasegear.com/](http://www.pccasegear.com/) Ph 61 3 9584 7266

- 1x 120mm Artic Cooling PWM fan, \$15.90
- 1x Nexus Drive-A-Way HDD Enclosure, \$79.00
- 1x AC Ryan Constructx™ BayColumn 510 Clear, \$59.00
- 1x Noise Isolator Flex Pad Kit, \$25.00

## JAYCAR

[www1.jaycar.com.au/](http://www1.jaycar.com.au/) Ph. 61 2 8832 3100

- 1x Pk HP0926 nylon spacers, \$10.00
- 2x SP0711 momentary switches, \$2.40
- 2x 5mm LED's, \$0.50
- 1x Pk HP1102 LED Bezels, \$2.50
- 1x Pk HP0406 3 X 15mm screws, \$2.10

## Local Supplies:

- 2x 370 X 480 X 6mm acrylic off-cuts, \$30.00
- 1x 1.8 metre length of 26 X 26mm square acrylic Tubing, \$22.00
- 4x rubber door-stops, \$7.90
- 1 metre 5/8' ZP steel threaded rod, \$7.50
- 4x 5/8in chrome dome nuts and washers, \$5.00
- 1x 480mm X 25 X 6mm aluminium bar, \$7.00
- 1x metre 25 X 25 X 1.6mm aluminium angle, \$6.00
- 7x Lian Li Thumbscrews

not intend to take any kudos for the principal or design; it is just impossible to acknowledge the initial source of such inspiration. So, to whoever thought of the original concept, "Well done, Sunshine!"

## The plan

Planning was relatively straightforward, as most of the dimensions are standardised – it just depends on how much flexibility you want to include. We decided that our station should be able to house the most common of the



▲ No, they aren't a pair of skater trucks, honest!

## TOOLS

The tools used in this tutorial are mainly those found in the average workshop, including a drill press and drills, electric sander, router, soldering iron and hole saws. The main requirement is a decent bench or table, providing a solid, flat surface to operate on.

boards that we play with, namely E-ATX, ATX and Micro-ATX, and allow us to keep all of the wiring inside the perimeter of the 'body'. The placement of components will dictate many of the decisions along the way, and annoying minor issues (such as IDE and PSU cable lengths) will also have an impact on 'what can go where'. If you are sourcing specific hardware to emulate this project, the use of SATA peripherals and a modular power supply will make your journey far more enjoyable – if you are building out of upgrade leftovers then your best defence is to stay flexible about construction!

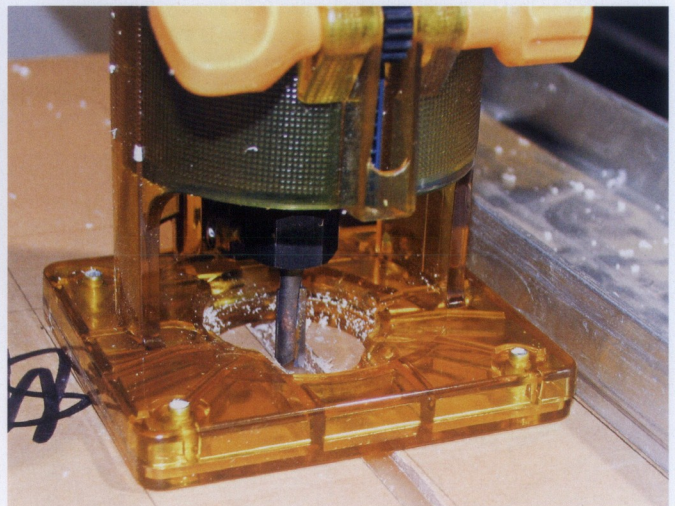
We decided to fabricate as much as possible out of acrylic to minimise the possibility of short-circuits, and only used metal for the expansion card bracket and to screw the four corners together.

“When cutting material such as acrylic there is only one Golden Rule – take your time!”

After cutting the upper and lower platforms to size, 370 x 480mm, the edges were sanded and smoothed over with sandpaper, finishing off with 600-grit wet'n'dry and Brasso metal polish as the lubricant; this gives a glass-finish once the edges are polished with a soft cloth. The six sections (two upper, four lower) of 26 x 26 square tubing were then cut to length, using a mitre box to ensure that all of the ends were perfectly square. Wrapping the area being cut with masking tape works in two ways; firstly, it makes accurate marking much easier, and it also helps to stop the edges of the acrylic chipping while being cut.

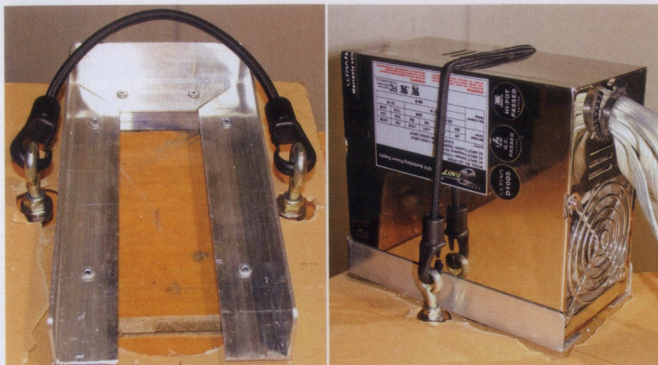
When cutting brittle material such as acrylic there is only one Golden Rule, and that is to take your time and not force anything. Once cut, the tubes were checked for conformity of length, and the ends sanded with a finishing belt.

The next step was to prepare the four feet and sections of threaded rod that will secure the corners of the structure. The feet started life as rubber



▲ Routing plastic is neat and easy to do, but make sure that you are wearing eye protection.





▲ Power supplies and bondage just seem to be a natural fit.

door-stops, which already had a small 'fixing' hole through the center that was slightly countersunk at the base. We took that to the next dimension by drilling a 7mm hole straight through, and then using a 12mm countersinking bit to bore a recess large enough to accommodate a 5/16in Nylock nut.

The sections of 5/8in (7.9mm) threaded rod could now be screwed through the undersized hole in the rubber, and the nuts attached from the underside – we used Nylock nuts as they lock firmly into place, making it unlikely that they will un-screw when doing up the top sections. The rubber feet were then screwed back down over the nuts.

To give the structure some additional strength, we decided that the AC Ryan Constructx BayColumn centre section would be rebated into the upper and lower levels, and glued in place. The Constructx panels are 8mm thick, and we rebated them 3mm into both of the 6mm thick platforms, resulting in 75 per cent more contact surface area being glued together than if we had used a plain butt-joint. The platform panels were grooved with a trimming router and 6mm twin-edged cutting bit, run down one side and then back on the other. To get a perfectly straight cut, a section of aluminium channel was clamped in place as a guide, and the router body slid along firmly against its face (righthand-side of the pic).

We cut the two BayColumn panels to 208mm long with a jigsaw, squared them off with a bench grinder sanding disk, and ground them back to the required length of 206mm for a snug, 'interference fit'.

## Secure peripherals

One of the issues that is rarely addressed by this type of equipment is the securing of the peripheral equipment, such as ROMs and power supply (PSU) – which are not usually high turnover items anyway! We decided that it was worth the effort to mount these items, especially the latter, rather than have them sliding all over the shop whenever the Station was moved around. A section of 25 x 25 x 1.6mm aluminium angle was cut to length, and triangular tabs cut out so that the sides could be bent to 90° internally, forming a three-sided tray. The fourth side was left open, as this is the dimension that varies; as opposed to the DIN-prescribed height and width of ATX units. The tray was then fixed in position to the lower platform, using 1/8in rivets. Two threaded eyelets were drilled and bolted to the base, on either side of the



▲ The AC Ryan BayColumn is an expensive item, but the end result is worth it.

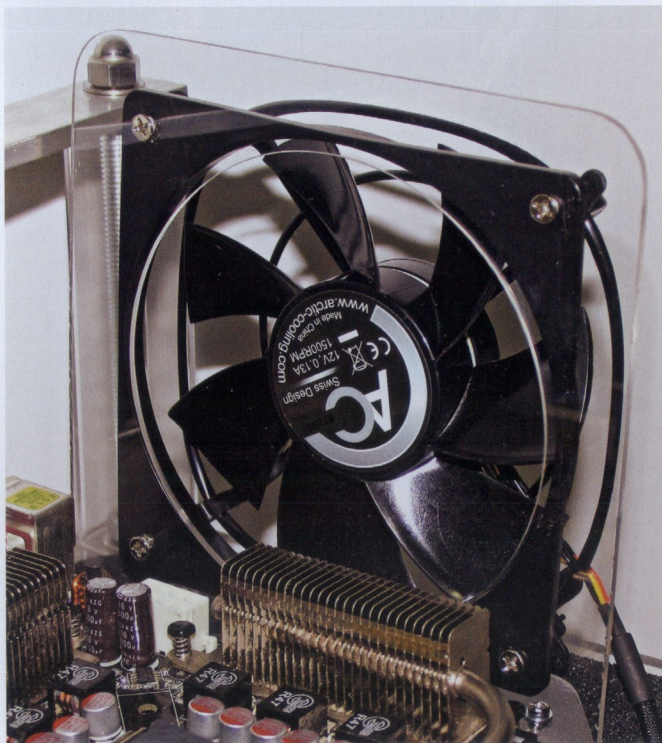


▲ What other computer magazine would picture a rusty old hammer?

tray, so that an elasticised strap will hold the PSU into position. Why did we lay it on its side? Simply to avoid blocking off any underside ventilation that may be fitted, while also placing the wiring outlet as close to the top platform as possible.

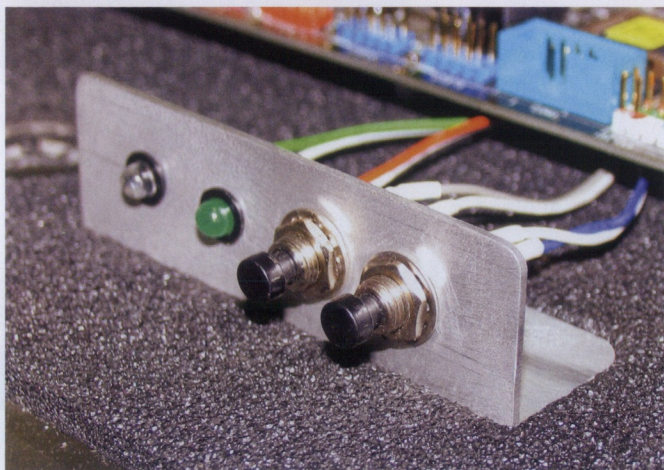
A 90mm hole was cut in the upper panel for the PSU wiring to pass through, placing it at the upper side of the motherboard position. The PSU could also be reversed so that the wiring exits at the rear, adjacent to the I/O panel.

To keep the BayColumn panels positioned correctly whilst the glue dried, two 5.25in devices were screwed in and the assembly adjusted for square. The BayColumn also has two 3mm thread inserts on each panel, so the top platform was drilled and the four anchorage points were used for additional support. The large, black slot-head screws that came with the BayColumn are a double-edged sword – on one side, it is great to have a supplier thinking



▲ The Arctic Cooling PWM fan is placed to emulate the airflow of a power supply.





▲ At some stage we are going to have to label these switches...

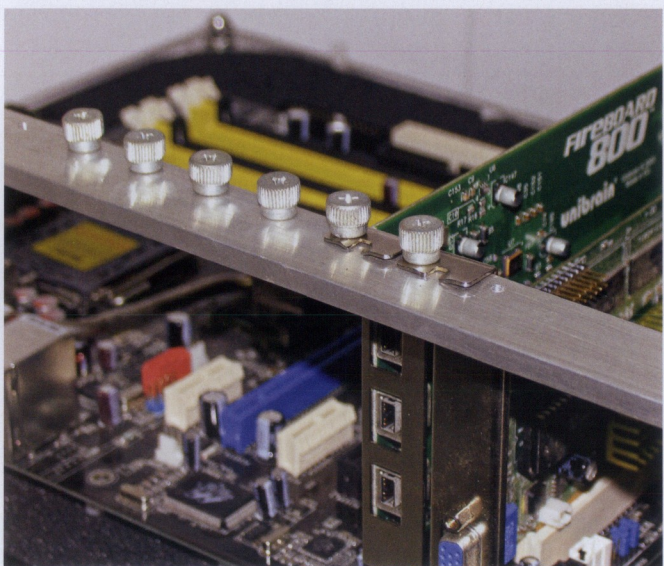
ahead enough to include screws long enough to pass through the 8mm thick sides, but unfortunately they are only useful with the fine-thread used in ROM's, not the coarser thread used in HDDs.

Once the glue had set, the bays could be populated properly, with a DVD-RW and two 3.5in SATA hard drives in 5.25in enclosures. The drive enclosures were used for two main reasons, component protection and silence, but the up-side was that we only had to allow for 5.25in bays!

## Mother of all mounts

Now comes the obvious part, fitting the motherboard mounting points. After looking at several wild and wacky methods that have been used by others, and discounting them, we decided to go with the simplest method possible. Firstly we plotted the 15 mounting points that will cover all of the E-ATX, ATX and Micro-ATX variations on to the upper platform, and drilled them out using a 4mm drill bit. The mounting screws only require a 3mm hole, but using a slightly larger drill allows for some latitude in their final positioning. The mounting points were created using 15mm high nylon spacers (Jaycar Cat # HP0926), 3x 15mm screws (Jaycar Cat # HP0406), and 3mm flat washers on either side of the holes.

To add tactile and aesthetic appeal to the Station, we covered the upper platform with 5mm thick Noise Isolator Flex Pad. To get the pad to fit properly, the mounting points were marked out onto the backing sheet, and then a 10mm hole punch was used to cut the slightly oversized holes. The pad was



▲ The 6mm thick add-in support bar is a perfect example of over-engineering.

then laid straight over the top.

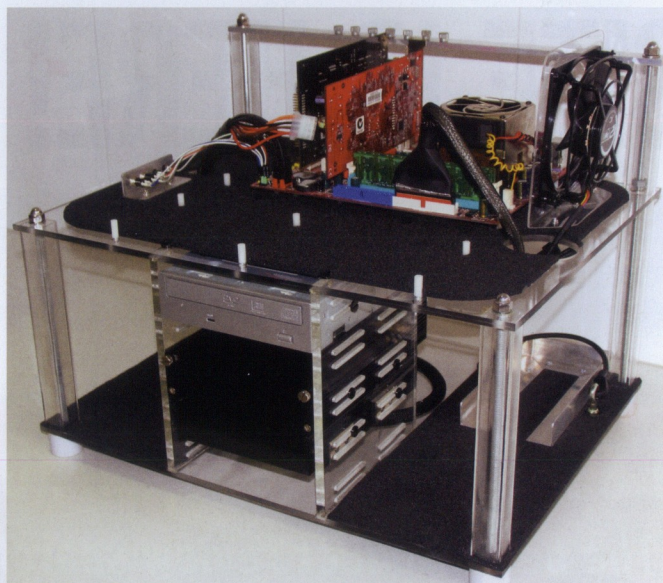
The motherboard can now be secured using standard 3mm computer case screws.

To create a fairly 'normal' amount of airflow over the motherboard we added a 120mm Arctic Cooling PWM fan in a position that would closely resemble a PSU air intake. A 150 X 170mm piece of 6mm acrylic off-cut was cut to shape, had the centre hole cut-out and drilled for the four retention screws. Once complete, the lower 20mm section was heated with a hot air gun and bent at 90°, and three mounting holes drilled. The fan assembly was then screwed to the upper platform with 3mm screws.

## Under control

On to the control panel! Using some motherboard headers rescued from an old case we fabricated 'On/Reset' switches and 'Power/HDD' LEDs. The momentary switches are Jaycar Cat # SP0711, soldered and insulated with heat-shrink. The LEDs are just boring LEDs that were lying on the workshop bench! The mounting bracket was made from an 80mm length of 25 x 25 x 1.6mm aluminium angle, mounted to the right-hand side of the upper platform. Rather than polishing it to a chrome finish, we opted to leave the bracket in its native dull finish.

One ugly situation that can occur when bench testing outside of a case environment is that an AGP or PCI card becomes dislodged and shorts out. Our final step was to fabricate a solid support for the expansion cards. An aluminium bar, 480 x 25 x 6mm, had an 8mm hole drilled at each end so that the threaded rods could pass through. The positions for each of the nine retention screws were marked in the standard ATX form factor, and then a 2.5mm drill used to make the initial holes. A 3mm tap was then used to cut threads in each of the holes, and Lian Li thumbscrews slotted in.



▲ The Micro-ATX motherboard give a perspective of actual overall size.

The final assembly was really just a matter of stacking the components together, and screwing down the chrome dome nuts at each of the four corners. Once that was done the project became extremely rigid and stable. The SATA drives were connected, and the leads passed through the righthand-side of the upper platform; similarly, the IDE cable running through the left-hand side shares a 90mm hole with the PSU leads. After assembly and cleaning, the station was loaded up with a Micro-ATX board to give a better indication of its physical dimensions.

The final pictures show that we added some Noise Isolator Flex Pad to each side of the lower platform, mainly to create a non-slip, non-conductive environment for stacking up highly sensitive electrical components. We r clever!

The one thing that occurred to us is that there is plenty of spare room on the lefthand-side – a great place to install a water-cooling loop at some later stage! (S)



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# Open learning

Can't travel, but desperately want to study? Chris Taylor has a look another alternative.

The past couple of years have seen Australian universities put a lot of time and effort into promoting their study-by-correspondence options. Seven of our universities – Curtin, Griffins, Macquarie, Melbourne, RMIT, Swinburne and South Australia – have banded together to set up a service, Open Learning Australia ([www.open.edu.au](http://www.open.edu.au)), that offers you the opportunity to study in as many different fields and topics as you'd find at a more traditional university. To be sure, Open Learning Australia began in 1993, but it's only been quite recently that it's been heavily advertised and grown in popularity.

For those who already work full-time, learning at home – either through the Open Learning Australia service or via a more traditional university's correspondence options – can be great. The advantages are numerous and fairly obvious, but there are certainly some serious disadvantages to be found.

## Convenience

Of course, learning by correspondence is very convenient. If you're working full-time, it may be your only option unless you're willing to cut back to part-time or casual employment – not

necessarily realistic or desirable, if you've a mortgage or a family or simply don't want to go from a respectable, gainfully employed, honest-to-God human being to a poverty-stricken student surviving on MSG-flavoured noodle snacks and Dolmio's range of heat-and-eat pasta sauces. Learning by correspondence can be great if you simply live too far away from a university and have no desire or ability to relocate, either due to suck-arse economic realities, or family or work commitments.

Learning by correspondence allows you, the student, to fit your studies around your many and varied commitments. And if you're a mature-age student (as in older than 21) or have been out of home for a few years, that's just brilliant.

Of course, too much of a good thing can, as that old saw goes, be bad. Having to be on campus isn't necessarily a downside – sure, you have to travel to get there – but you're able to access the library really easily. While universities now place a lot of their learning materials online in .pdf or a similar format, having access to physical books and journals is a benefit that shouldn't have its worth underestimated. Reading everything off an LCD is shit.

Furthermore, if you're learning on-campus you have a timetable. You're told be at Room 341 at 2pm and then to move to Room 269 at 4pm. At times that just sucks if you've other commitments, but it does enforce a sort of discipline. While going to university is all about learning independently, the fact is we are more likely to do stuff if someone tells us what to do and when to do it. When you learn by correspondence, it can be very easy to put things off until tomorrow or the day after that if you're tired, are working over-time or some family commitment pops up.

Without a tutor who expects you to have done the readings before you walk into their room at 11am on a Wednesday, you may find it hard – unless you're really disciplined – to maintain the motivation to do them. Furthermore, by having university as such a flexible thing in your life, one could see it as being somewhat devalued – if you can just push it to another day every time it's slightly less than convenient for you, you may not take it as seriously as you should.

That being said, if you are really disciplined and generally interested in what you're studying, the convenience of studying this way outweighs the negatives. So long as you can establish your own





timetable and ensure you stick to it, you'll be fine. If, for some reason, it is unavoidable that you miss out on your planned 8-10pm study session tonight, be sure you fit it in tomorrow or, better still, at 10-12pm. If you can't promise yourself that you'll fit those two hours in somewhere, come hell or high water, learning by correspondence may not be for you. While you already have a full-time job, you're doing this degree to get ahead, yeah? And

advantage. When listening to lecture recordings and viewing the visual aides online, it can sometimes be difficult to figure out which slide the lecturer is talking about. Furthermore, focusing in an actual lecture theatre isn't too hard. The lights are dimmed, the lecturer is right there and the slides are being beamed onto the wall behind them. You can focus easily on what's being said and displayed. With a recording, however, it's very

**“ So long as you establish your own timetable and ensure you stick to it, you'll be fine. ”**

even though you might be claiming government assistance, you're paying a lot of money for it, right? Keeping yourself consciously aware of the immediate cost of your studies, as well as the potential economic gains, could prove an excellent motivator for getting through those dull readings and time-consuming lectures.

## Communication

Speaking of lectures, there are certain advantages to attending them in person. While universities tend to upload both the lecture slides and a recording of what the lecturer said, having seen them – along with any extra videos or images the lecturer displayed – in one presentation is an

easy to just tune out. Of course, if you're the sort of person who can listen to audio books for more than two minutes, you shouldn't have a problem.

Lectures aren't the biggest issue, though. When you learn by correspondence, generally your tutorials are replaced by discussions on a forum. For those nervous about raising their hand and vocalising their opinions in class – even when ten per cent of one's mark rides on the ability to do just that – being able to talk in text is advantageous. For others – the author included – debating in person as you would learning on-campus as a student at a traditional university is much more preferable. While being able to post something on the forum at 1am when





you've finally dealt with your various day-to-day commitments is swell, so is having instantaneous feedback on your ideas and opinions from tutors or fellow students.

Furthermore, for those who've not yet attended university, your tutor – rather than the lecturer – serves as your first and probably only point of contact when you have problems or simply want to clarify something you didn't understand from a reading, lecture or tutorial. While in a traditional, on-

campus learning setting the tutor might have fairly limited consultation hours, they generally have an office you can camp out in front of if the matter is urgent. Not all tutors are on top of their email – a pain in the arse for on-campus students, but a major problem for their off-campus counterparts who can't physically hunt the bastards down.

We made a point earlier about the initial cost of studying at university. Even with the HECS-HELP system, going to university is expensive. The costs

aren't reduced simply because you'd rather study off-campus. If you rate lectures and tutorials over recordings, .pdf documents and forums, you may feel that as an off-campus student, you're getting less for your significant investment than an on-campus student would. One could argue that you're making a considerable saving in that you don't need to pay for transport to get to or from the university campus, but this point is made void and redundant if you're a full-time worker who pays for fuel or train fares to get to your workplace.

A classic advantage of off-campus learning, though, has always been the ability to learn at your own pace. Granted, you're still looking at a 13-week semester – piddly if you're studying a language, programming, politics or something equally heavy – but you're able to spend as many hours as you please posting on that forum. As an on-campus student, you only have a single, hour-long tutorial and maybe – depending on what it is you're studying – a seminar that provides a little bit of room for student-teacher interaction. Sometimes, that simply isn't enough.

Whether you see off-campus learning as being superior to on-campus learning is up to you. To my mind, aside from the convenience factor – which may be the sole factor in your decision, depending on your situation – what one gets from off-campus learning simply isn't worth giving up the numerous advantages offered by on-campus learning. If learning on-campus is realistic for you, even if it means you need to study part-time – effectively doubling the number of years you'll be spending with your head in the books, then seriously consider it. Being on-campus is a motivator in itself. And while not everyone goes to university to socialise, having a group of people there with shared interests in and a common goal – both inside and outside the formal environment of a tutorial room – can be enormously beneficial.

In some areas of study – particularly languages, from our experience – having the opportunity to forum a study group is something invaluable that off-campus learning simply can't replicate. (E)

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# INPUT OUTPUT

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## I/O

Dan Rutter brings the answer like no-one else can!

### I/O OF THE MONTH

#### Dare you enter... The Memory Hole?

**I** I have an Abit AB9 QuadGT with 2x 2GB of DDR2 RAM. My video card is a GeForce 7950 GX2 that was a hand-me-down from a friend (free!), and it looks like I'm experiencing what you are saying is a '3GB barrier' ([dansdata.com/askdan00015.htm](http://dansdata.com/askdan00015.htm)).

This board does not have a memory remap feature, and I'm running XP x64. In BIOS it shows 3.1GB of memory and it also does the same in Windows. Is there any way to somehow jiggle this memory free, at least in the OS, or am I just screwed?

Also, do you think this video card is the culprit? What if I went to an 8800?

*Ayman Ibrahim*

**O** Once you get past the BIOS stage, nothing can do anything about the 'memory holes' created for Memory-Mapped I/O (MMIO) for video card and other RAM.

If the problem can be cured, it has to be cured at the very early boot stage. After that, the 'shadowed' RAM does not exist, in a quite literal way.

Actually, with the gigabyte of video memory on the 7950 GX2, you ought to have significantly less than 3GB of real accessible system RAM, because it's not the only thing in your system

that needs MMIO space. Dual-GPU cards are particularly bad memory-hole offenders, because each GPU always has its own slab of RAM, containing almost the exact same data as the other slab.

I don't know whether there's a memory-hoist feature in your motherboard's BIOS setup program. If there isn't – and I wouldn't be at all surprised if there weren't – then there is indeed nothing more you can do to make your RAM visible.

You could, however, add more RAM. Since you're running XP x64, memory above the 4GB line will be perfectly accessible. And your motherboard uses DDR2, which is dirt cheap these days. It can also accept up to 8GB of RAM.

The worst case scenario is that you already have all four memory slots filled, and will therefore need to scrap some existing RAM. Even if you buy four all-new 2GB modules, though, you still ought to be paying less than \$250.

Any GeForce 8800 card ought to give you significantly better 3D performance than what you've got. A 512MB 8800 GT would be the sensible choice; it'd give you back 512MB of system RAM, too. If you're on a budget, a GeForce 9600 GT will also be faster than what you've got – though not dramatically.

#### I/O OTM wins a Logitech G5!

There's a mouse in the house. Okay, it's not in the house, it's in I/O. And it looks damn good.



#### Wanted: Sega-Saturn-memory-card-to-SATA adapter

**I** I am trying to cut some corners with some leftover hardware I have, to put together something to sell. I would like to set this computer up with a RAID 0 setup, because I only have two 10GB hard drives, left over from a couple of Xboxes I have modified.

I've got a Foxconn 6100K8MA-RS socket 939 motherboard, Opteron 165, 2x 512MB Corsair RAM, Lite-On DVD burner and Biostar GeForce 8500GT graphics card, as well as the two 10GB Western Digital hard drives. I am planning on installing Windows XP Pro on this.

Could you please help me get this started? It is something I have never tried and I am not really sure where to begin.

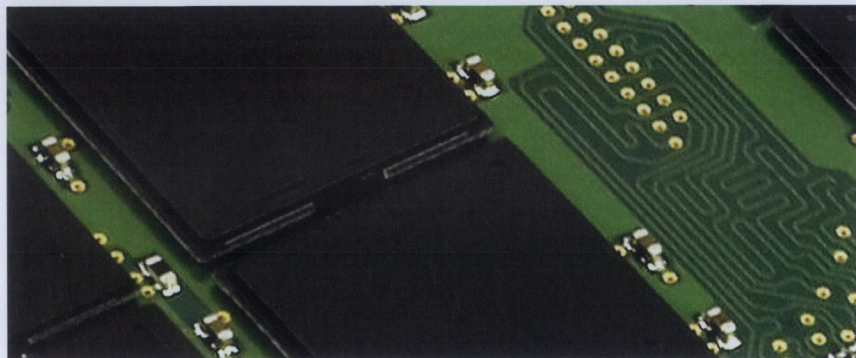
*Billy Meyers*



▲ Two bucks worth of disk space. And counting.

**O** I presume RAID 0 appeals to you because those old 10GB drives just aren't unreliable enough for you. Making a stripe-set out of them will, of course, add their unreliabilities together!

OK, point one: If those drives haven't been 'unlocked' (<http://tinyurl.com/4UUPVX>), you're





not going to be able to use them in a PC anyway.

Point two: Your motherboard only supports RAID on its SATA ports, not the PATA ones. And XP Pro can make software stripe-sets, but it can't boot from them. So I guess you could get adapters to convert the drives to SATA and do it that way, but this is still a pretty pointless exercise.

I mean, a sixteen-gigabyte CompactFlash card now costs well under a hundred bucks delivered. That fact is the universe telling you to boot this computer from some other drive.

If you really want to use the Xbox hard drives in this new computer, go right ahead, if they're unlocked. You could put swap files on them, and thereby reduce flogging of the main system drive. But that main system drive should be a cheap new SATA unit. Reliability and capacity aside, a new drive will be much faster than the old Xbox drives, even if you RAID 'em.

That's partly because a new drive will probably be a 7200RPM unit, while the Xbox drives are 5400RPM. But it's mainly because any new drive will have much higher data density than the old drives, so far more data will pass under the heads per platter revolution.

Personally, I'd crack the old drives open and harvest the platters for wall decorations and the voice-coil magnets for toys.

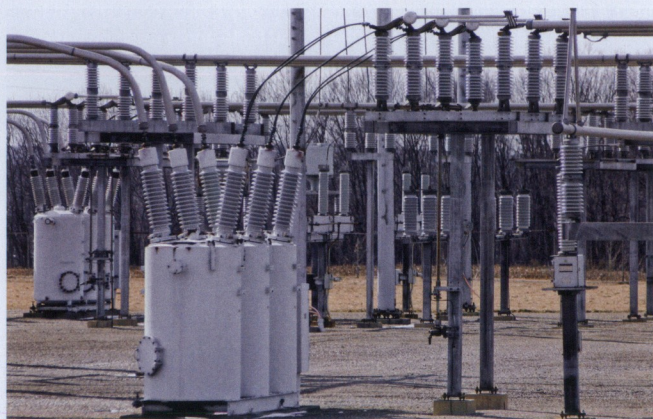
## Don't worry unless it starts talking

**I** Something weird just caught my eye in the ThinkPad X300 review at <http://tinyurl.com/5N8NK9>:

"I noticed that the solid-state drive on my review machine was far from silent — it makes some noise when electrons are being shuffled around. It's quieter than a normal hard drive, but you can still hear it."

What's going on here? I doubt it's the sound of thousands of electrons moving in unison.

*Eric Light*



**▲ Sometimes the humming sound means 'don't touch'.**

**O** A current through a conductor creates a magnetic field. That field will apply a force to anything nearby that's affected by magnetic fields, which includes other conductors that have current flowing through them. The result is vibration in time with the current flow.

This is why transformers hum, and it's why all sorts of solid-state hardware also makes noise, though lower-powered devices may make too little of it for a human to hear. Any AC in the audio range, from the 50/60-Hz of mains current to the several kilohertz of the inverters that drive backlights, can create a matching audio-frequency vibration of some component or other.

In this case, the solid-state drive itself may or may not be the source of the audible noise; it could be power supply components on the mainboard buzzing, for instance.

## Dettol and a wire brush

**I** Can you advise a reasonable way to clean an LCD screen? There's much conflicting advice on the Web. I don't want to buy proprietary cleaning kits/stuff if not necessary.

*John*

**O** Get a cheap microfibre 'glass' cloth from the supermarket. Dampen it a bit and it should be good enough for most monitor gunk. Press only gently, because the sandwich structure of LCD monitors is a lot more fragile than the thick glass pressure vessel of a CRT.

Add a dash of dishwashing liquid, or even ammonia, to your water if there's greasier stuff on the monitor. Alcohol (isopropyl or just meths) will also work well, but anything more than soap and water may damage coatings on the monitor over time.

Just a splash of alcohol in a bowl of water shouldn't hurt anything, though, and should be more than enough to clean even a very grotty screen.

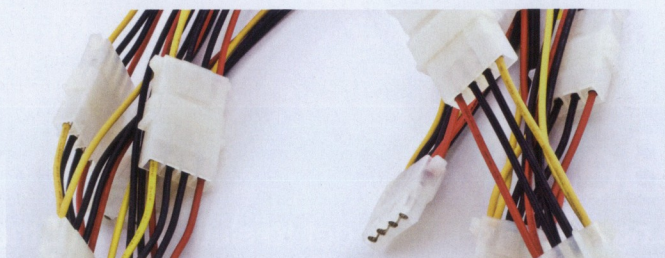
## Amps 'n' ohms

**I** I'm going to upgrade my rig this year and am considering a modular power supply.

PC Power and Cooling insist that corded power supplies are superior because modular power supplies increase resistance in the lines. I've looked through many forums and how-tos but haven't seen this issue addressed.

What's the real deal?

*Lou Parker*



**▲ Five cheap Molex Y-adapters plugged into each other. End-to-end resistance? 0.1 ohms.**

**O** Yes, the extra connectors in a modular PSU's plug-in leads do increase resistance. And PC PSUs need to deliver low voltage at high current, which is exactly the situation where connector resistance can really make a difference.

To see how much of a difference, I took five cheap Molex-plug Y-adapters — which are considerably cheesier than the connectors on modular PSU cables — and plugged them into each other in a string. Then I measured the resistance of one of the wires through all five junctions.

Just connecting my multimeter's test leads to each other gave a reading of 0.0 ohms. Adding the chain of adapters to the circuit gave me... 0.0 ohms.

So I changed tactic. I put five amps from my regulated bench power supply through the chain, and measured the voltage drop across it. 0.55 volts.

Plugging 0.55 volts and five amps into Ohm's Law (volts equals amps times resistance) gives a resistance of 0.11 ohms for the chain.

Let's say that you insert that much resistance into a 100 per cent-loaded output from a thousand-watt PC PSU.

That sort of PSU will be able to deliver something like 25A at 3.3V, which makes the 3.3V rail the most resistance-sensitive output. Even if you combine the multiple 12V rails, they won't quite equal it. 25A from 3.3V means about 0.132 ohms equivalent resistance; add 0.11 ohms to that and your resistance has risen by a very significant 83 per cent.

This is for five connector junctions, though, rather than the one extra junction that a real modular PSU will add. A single junction would raise the resistance by only 0.022 ohms, which is 17 per cent.

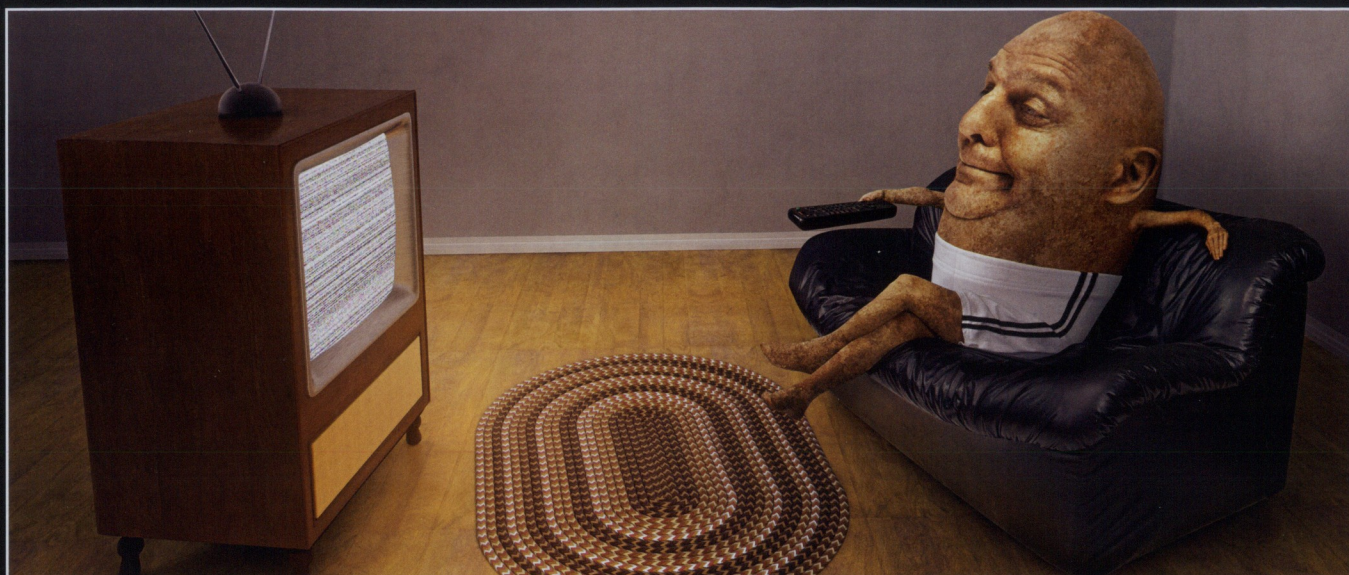
And the 3.3V output from the PSU doesn't come out on just one wire. There are eight +3.3V wires on the standard ATX connector. Split the current between all of those, and adding 0.022 ohms to each of them is the equivalent of adding 0.00275 ohms to a single-wire output. Which brings the resistance increase down to less than two per cent. At absolute full-blast power consumption, and from connectors of rather lower quality than chunky modular-PSU plugs.

Since all of this wiring is feeding PC hardware which either has its own quite heavy-duty regulator and smoothing circuitry will just inherently tolerate a ten per cent sag with no problems, the tiny sag that one extra connector will possibly add to the equation seems very unlikely to ever matter. (E)



# FALLOUT

Funnies and humour from the fallout zone



## Bed TV

Logan Booker can't get to sleep without the lights on... and the TV turned up.

I can't remember the last time I slept in my own bed.

From this statement, one could assume there's something terribly wrong with my usual place of rest. While it does sag in the middle, as I lack the strength to tighten the nuts to keep it in a more upright position, it's perfectly serviceable. Oh, and it has a really big mattress; one that could serve as a temporary life-raft should Sydney's inner suburbs ever experience torrential rain and extensive flooding.

No, I stopped sleeping in my room and started snoozing on the couch ever since my 42in LCD TV arrived. The moment I slipped its sleek, sexy black form from its cardboard shipping box, I've been inexplicitly drawn to it, much like an action movie bullet to an exposed petrol tank.

Now I find every reason I can to drift off in front of its magnificence. Recently I've been serenaded into dreamland by the authoritative yet staggered prose of Captain Kirk. But before that it was MacGyver, and before his mullet-crowned greatness, Dr John Dorian. It's not unusual these days to see my prone, settee-bound form from the breakfast table, mumbling instructions on how to build a lifelike Zach Braff doll using nothing but a paperclip, duct tape and a photon torpedo (there's a tutorial in that -ed).

This isn't so weird. Well, it's not in the same league as furies, people who love furies, and people who *really* love furies. What is weird is that the

couch is slowly transforming into my new bedroom. Empty cans sit next to its feet, plates are often left piled on the coffee table and a washing basket full of dirty laundry is in easy reach of my undeveloped arms.

I don't think my flatmates minded my video entertainment-fuelled relocation initially. I don't think they even had an issue with the cans, plates and clothes. What probably raised concerns, and this is just a guess, was when I started changing in the lounge room, and as we all know, lounge rooms are notorious for not having doors. Well, it was either the changing in the open, or watching hardcore porn while guests were over for dinner. One of the two.

Anyway, I've been told to pick up all my crap and move back upstairs, otherwise it's hard for them to justify why I need my *actual* bedroom. I argued that my *actual* bed was still in there, until they politely pointed out that it, too, had miraculously made the trip downstairs and was ever-so-quietly supplanting the couch as the lounge room's prime real estate.

Realising that what they were doing was, in effect, an intervention, I nodded in sad agreement. I've been given one last night to explain my departure to the couch. And the TV. I don't know how I'm going to go about it, but I reckon if I whack on some MacGyver and sleep on it, the answer will come to me.

NEXT MONTH



### MOBO HEAVEN

It's time to take another look at the backbone of your PC - the humble motherboard. This time we've got a whole mess of P45 models to put to the test.

### TABLE 2

Good or evil? Next month Logan Booker faces down just that question as he looks into the making of Table 2.

### CABLE GUY

We take the confusion out of AV cabling with Atomic history of, and guide to, the various formats that have plagued our TV cabinets over the years. Almost certainly for sure this time!

### ATI VS NVIDIA

With two new chipsets going to head to head, we take a look at both - the good and the bad. Definitely one to get the fanboys talking.



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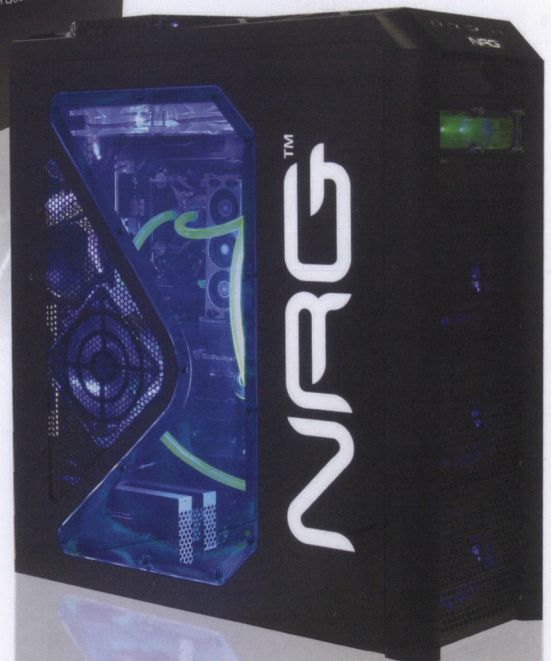


*There's a new gaming machine  
on the horizon and they sure don't  
come any meaner than this one!*

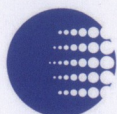
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