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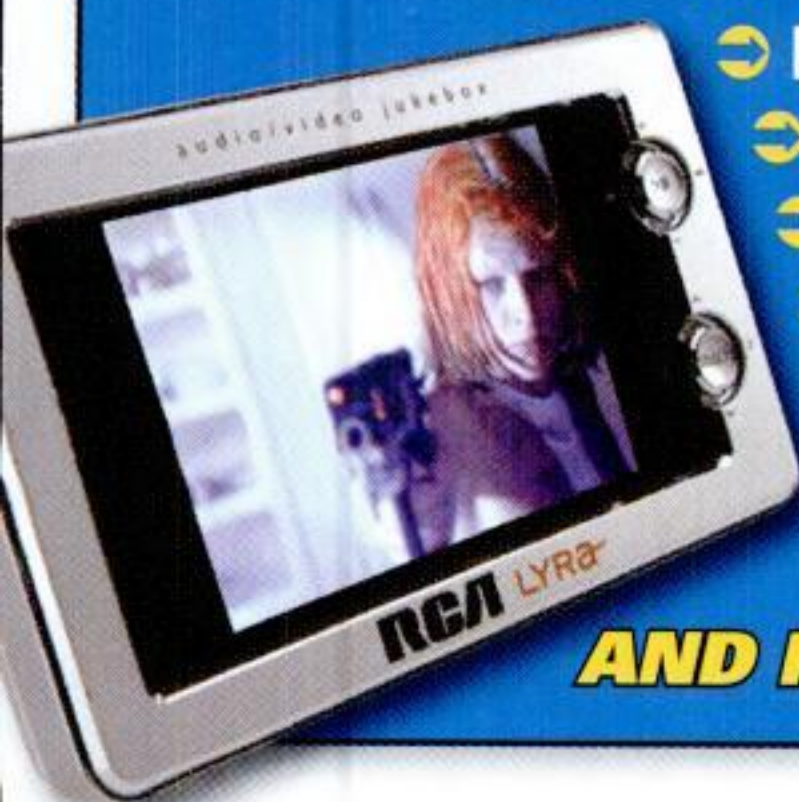
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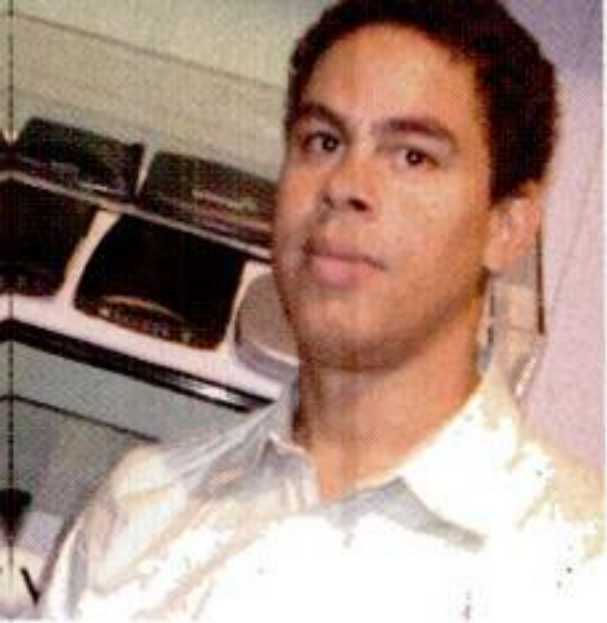
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# Release Notes

## Goodbye, Last Generation!

I write this fresh on the heels of my tenth Electronic Entertainment Expo. Held in Los Angeles, this trade show, more commonly known as E3, is always an interesting blend of digital entertainment, business, and cold, hard technology. Games are always the core focus of E3, but if you take a deep whiff, the scent of technology permeates the entire Los Angeles Convention Center.

Consider the "big trends" of the show—the three things everyone was talking about:

► **PC Games look awesome:** Well, duh. We've been playing with the next-generation 3D cards from ATI and nVidia for a few months now, so we're not surprised. But everyone else sure was. "I can't believe how much better PC games are looking than those on the Xbox and PS2," gamer after gamer told me. That's what happens when you compare technology from four years ago to technology from tomorrow.

► **PC console systems:** It's an interesting concept—a closed gaming system made of PC parts. I took a look at several of these "PC consoles" like the Discover and the Infinium Phantom and came to the conclusion that while the last-gen components will likely turn off hardcore gamers, there's something to be said for being able to play a game without compatibility concerns.

► **Windows gaming:** It's clear that Microsoft is extremely interested in expanding Windows' gaming repertoire. As a PC gamer from way back, I definitely appreciate this because it wasn't always the case. The company's plans aren't perfect, but the initiative around standardizing PC controllers and creating a Windows Live service that will allow us to play against and with Xbox gamers sounds promising.

Trends aside, from my decidedly *Maximum PC* perspective, E3 feels kind of like the Matrix. Everyone wanders around gawking and talking about all these great-looking games, but only a minority of the show's attendees are truly aware of what's behind these amazing graphics and dazzling frame rates—and how big a technological shift is en route.

Of the folks who "get it," the majority develop and design games. They know all too well how important the next (and markedly faster) generation of PC parts are to the game design process because they've likely spent the last two years of their life wrestling with the prior generation of videocards and CPUs.

These folks, who make a living from defining the "average" PC, believe a large number of people are about to begin upgrading the systems they bought over the last 18 months in order to fully enjoy the coming generation of games. As one game company exec told me, "We're about to enter the biggest PC upgrading cycle in history."

—GEORGE JONES

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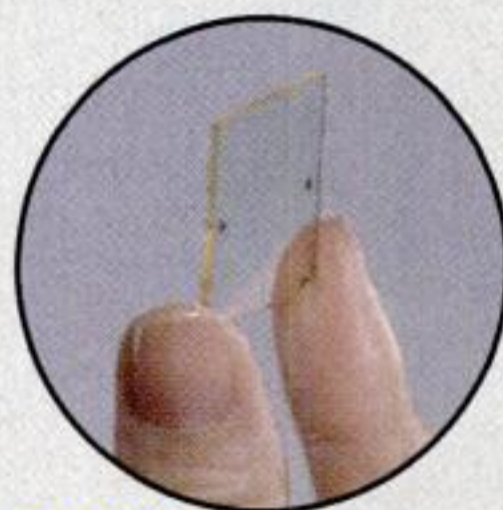
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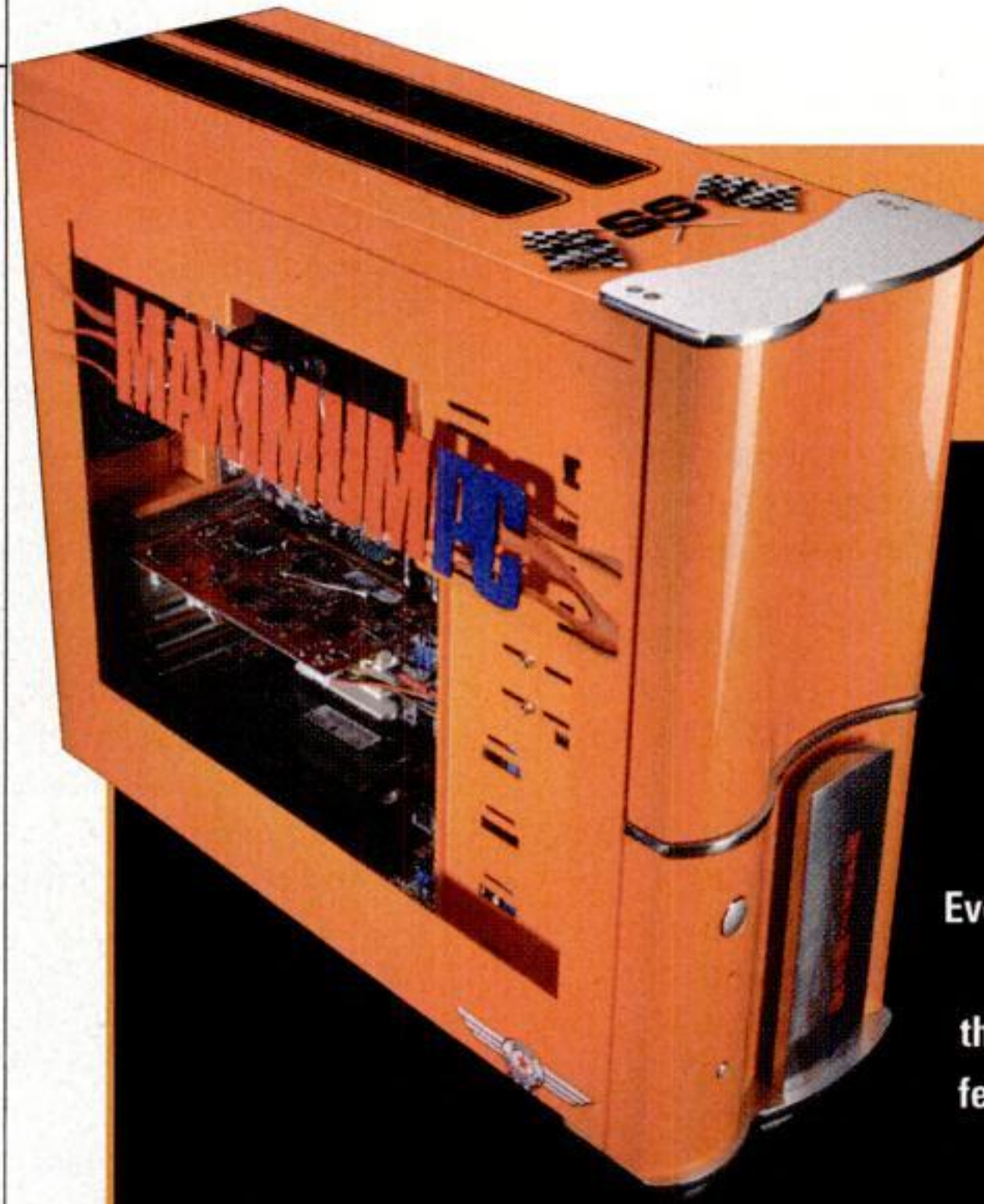
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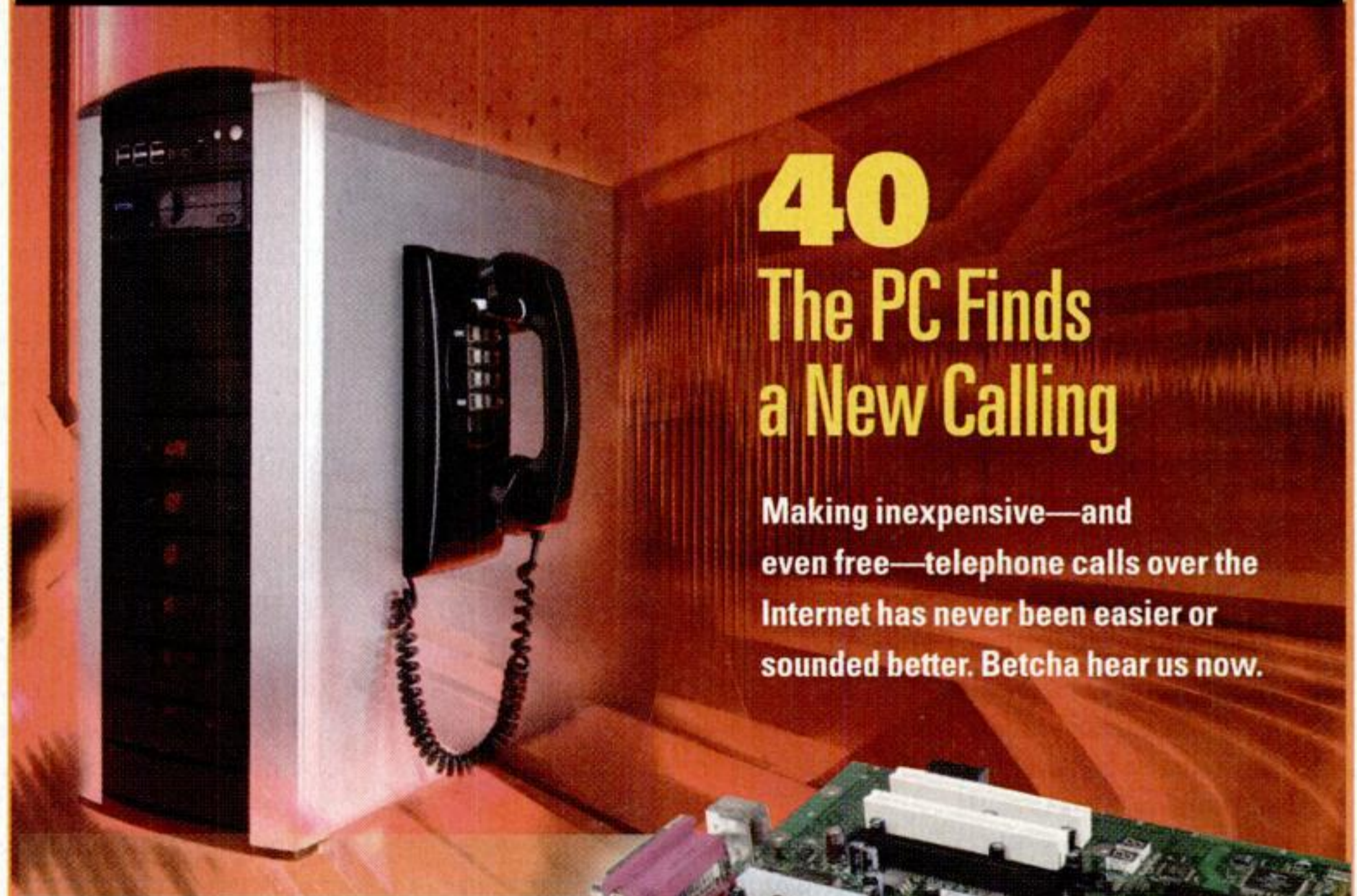


## JULY FEATURES

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## PC Makeovers

Even the dowdiest PC can shine like a new penny in the right hands. Check out our three case studies and find out what a difference a few choice upgrades can make.



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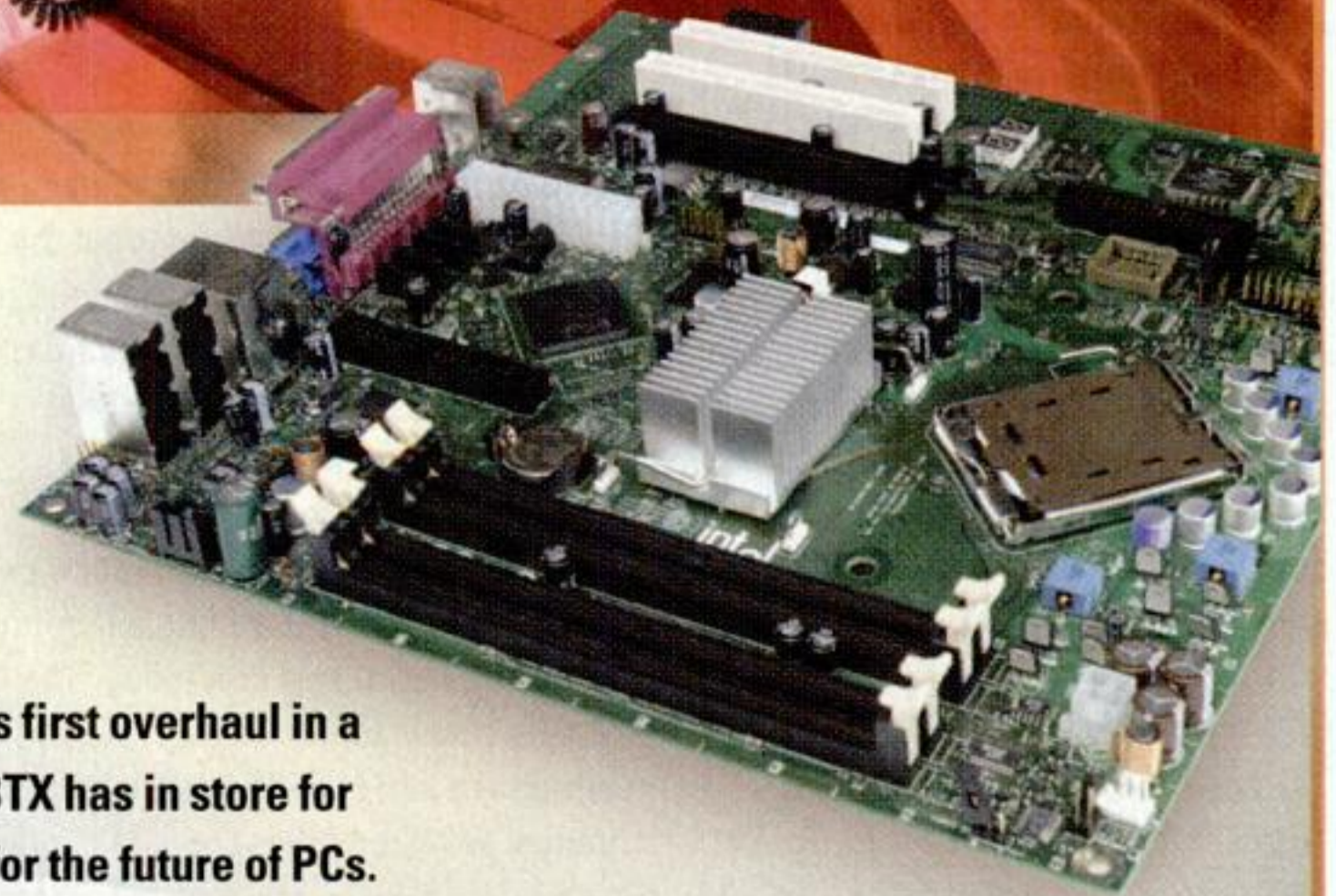
## The PC Finds a New Calling

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## Behold BTX!

The motherboard gets its first overhaul in a decade! Find out what BTX has in store for you, and what it means for the future of PCs.



This One



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# In/Out

You write,  
we respond

## L COMPUTERS: ONE MAN'S STORY

After receiving your June issue in the mail, I was amused with your plea to readers regarding L Computers. A few months ago I saw an ad for a contest where the grand prize was a "supercomputer." After seeing the picture I was compelled to find out what it was and how I could get one. I found [www.go-l.com](http://www.go-l.com). After browsing the web site I was like a little kid in a candy store. I e-mailed L Computers asking them to please put me in contact with a salesperson, as I was a serious buyer and had to have one of their systems. A couple of weeks later... still no reply. So a second e-mail was sent, reiterating that I was very interested and wanted to make a purchase, but wanted to talk about some of the hardware details with a salesperson... still no reply.

On a brighter note, after reading about Alienware's dual-videocard ALX rig, well, let's just say that all is not lost. Think I can get one with 32 gigs of RAM?

—CHRIS WALKER

**EDITOR IN CHIEF GEORGE JONES RESPONDS:** At press time, we had received just three responses to our June issue request for purchasers of L Computers' systems to share their experiences with us. We're beginning to wonder how many PCs the controversial high-end system manufacturer has actually shipped. Meanwhile, the company refuses to respond to our requests for a review system. Rest assured that as we learn more information about the subject of our January 2004 cover story, we'll pass it on.

## UH, NO, WE JUST WANTED TO MAKE YOU FEEL BETTER ABOUT YOURSELF

Hey, are you guys trying to insult our intelligence? I'm talking about the Geek Quiz [June 2004]. On Stage 4: question 16, it asks "What color is most often the ground wire in a power connector? A. Blue B. Red C.

Green D. Black." This question should be in Stage 1. I bet a 10-year-old can answer that correctly.

—WYNN ANG

## WHY DIDN'T YOU JUST USE AN EXTERNAL CRT?

In your review of the Sony VAIO PCG-TR2A in your May 2004 issue, you state that "both mini-laptops were unable to run our *Quake III* demo at 1280x1024 because their displays don't support vertical resolutions higher than 768."

However, later in the same review, you state, "Using the video port, the TR2A was able to drive an external CRT at 1600x1200 without any problems."

If the laptop is capable of displaying 1280x1024 or higher (up to 1600x1200) on an external monitor, why didn't you run the *Quake III* benchmark on the external CRT? There shouldn't be any difference in performance between that and what it would have been on the LCD. Giving the laptop a *Quake III* score of WNR (would not run) for a benchmark that *could* have run on an external monitor seems a bit questionable.

—ADAM ZEY

**SENIOR EDITOR GORDON MAH UNG RESPONDS:** For our official benchmarks, we only print what the notebook can run without the need of an external display. If our benchmark calls for a resolution of 1280x1024 and the notebook cannot support it, we give it a "would not run." To publish a score that a consumer cannot achieve without adding a display would be unfair and confusing. The simple fact is that the Sony TR2A, which we still love, is unable to run games at 1280x1024.

## EDONKEY MAY BE A SELLOUT, BUT IT WAS FIRST...

In the June issue of *Maximum PC*, the "Broadcatching" article referred to *BitTorrent* as "an evolutionary take on the P2P

## IT'S CONCEALMENT, NOT COVER

In your review of *Battlefield Vietnam* in the June 2004 issue, you maintain that the "ground cover" in the game "doesn't provide any cover at all." While I won't dispute that point with you, as I have not played the game, I think what you meant was concealment. Underbrush is used to disguise your existence while advancing on a target, but it does not provide cover from enemy fire. Cover, on the other hand, is something that will stop a bullet. In the real world, cover and concealment are used together to make sure the mission is done and that you come home in one piece. This technique is taught in basic training, and reinforced to troops in the field.

—JOHN CARRIGAN,  
Formerly of the US Army



file sharing principle" because it "breaks [files] into small portions... and allows users to share whatever parts they have already downloaded...." This program, however, is not the first of its kind. *eDonkey2000* has been around for many years and shares the same principle. However, in the last few years *eDonkey* has started selling its program. But it was still the first to have this "evolutionary" idea and deserves due credit.

—RYAN ERNST

## WHAT HAPPENED TO THE PELTIER EFFECT?

I've heard of people using cooling systems based on the Peltier effect with some success. I've tried looking up such makes online but I've only been able to find science sites explaining what it is. Can you please tell me how it works and the price range?

—ED CAI

**SENIOR EDITOR GORDON MAH UNG RESPONDS:** Peltier, or thermoelectric, coolers in PCs have been out of fashion for some years now. Peltier discovered that by applying an electrical current to two ceramic plates that are sandwiched together, the device acts as a heat pipe. The disadvantage of a Peltier cooler is that at very low temperatures, it can create condensation, which doesn't play nice with PCs. Peltier coolers also consume far more power than a typical fan, heatsink, or water pump setup. It's our belief that Voodoo's patented water-cooling mechanism is a hybrid of a traditional water cooler

and a Peltier system. As a stand-alone method, though, Peltier went out with the Slot 1 Pentium III CPUs.

## TWO FOR CUBASE

Great discussion on the value of having a dual-CPU motherboard in your "Experiments with Speed" article (June 2004). However, I think you missed the one application that best demonstrates the utility of that second CPU: digital audio workstation software such as *Cubase SX*.

When recording and playing back multiple audio tracks, CPU usage will increase somewhat, but as you start to add effects such as compressors, delays, EQ, microphone emulators, voice processors, and especially reverb, CPU usage goes through the roof. Digital audio software vendors have specifically designed their applications to take advantage of multiple CPUs. *Cubase* spreads the load across multiple CPUs so you can increase the number of concurrent tracks, effects, plugins, and virtual instruments you can run. Even so, you will still hit a point where you cannot add more tracks or effects to the CPUs' load.

Next time, you might want to try using such an application. I think you will find the results to be very impressive.

—MICHAEL J. COAR JR.

**SENIOR EDITOR GORDON MAH UNG RESPONDS:** We hope you don't think we're against dual-processor





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# COMING NEXT MONTH

## IN THE NOW-WITH-FORTY- PERCENT-MORE-HYPHENS AUGUST ISSUE OF MAXIMUM PC

### THE ULTIMATE TROUBLESHOOTING GUIDE

Face it—whether you're a newbie or a know-it-all, if you run Windows XP on your PC you'll eventually run into head-scratching, anxiety-inducing, and possibly even heart-stopping problems. We're here to help. Where other magazines have tried and failed, we will succeed. Don't miss next month—it could save your life!

### PC URBAN LEGENDS

Do RAM management utilities really work? Is it better to completely drain your batteries before recharging them? And who really invented the GUI? Find out the answers to these questions and more!

### MAXIMUM PC CHALLENGE: RUGGED GEAR

Watch in awe, wonder, and delight as the Maximum PC Lab staff simulates catastrophic real-world conditions in an attempt to test the integrity of several ruggedized notebooks and other products. We can't wait!

### PLUS

Super reviews: Wi-Fi routers, midrange next-generation videocards, PDAs, ultra-light notebooks, spy software, and more!

systems. Some of us have run them for many years (in fact, this response is being written on a dual-Xeon box). But we're dead serious when we say that a huge majority of applications still do not take full advantage of the second processor. For the average person who cruises the net, uses Word, and plays games, investing in a two-CPU box is hard to justify. These circumstances may soon change, however. Read our Quick Start opener on page 12 for more info.

### CODING CONTROVERSY

I'm a software developer, and have been doing this professionally for 15 years. I've been programming for 23 years now. I know VB, C/C++, C#, Pascal, Fortran, and (God help me) can even code in Assembly on Intel and old Motorola silicon. While Brian Cumming's anti-VB stand in your June issue [In/Out] was true several years ago, I stand behind your decision use it. If you are teaching programming, you have to teach using the most current and widely accepted platform. This is Microsoft's NET framework. Furthermore, within the NET architecture there is practically *no difference* between the languages anymore. They ALL compile to the same IL (intermediate language) code, which is then compiled to actual machine code on the first run.

It used to be that C++ was the closest to actual machine code and invariably produced the fastest, leanest code. In the days when RAM and hard drive space were at a premium (not to mention that computers were really frigging slow then!), this was very important. Unless you are developing device drivers or doing intense graphical systems, most programmers today use tools that allow them to get the most "bang for the buck," which is a roundabout way of saying we are willing to sacrifice some performance for ease of use and quick access to advanced features.

So, Brian, welcome to the new millennium. Sorry to tell you this, but in the NET

environment, there is absolutely *no difference* in code bloat and performance between C#, C++, and VB anymore. And whatever you can do with C++ in the NET platform, I can run circles around with VB in the NET platform. But that's because I'm just that good.

—LONNIE WEST

### EDITOR IN CHIEF GEORGE JONES

**RESPONDS:** Thanks for the strongly worded support, Lonnie. A big part of the reason we chose VB is that it's so widely supported. As a side note, stay tuned for our August issue—we'll be running part two of our programming workshop series.

### DEAR JON...

In the June 2004 issue of *Maximum PC*, Jon Phillips wrote a column about Internet regulation and free speech ("How to Disarm Ashcroft's Army"). Mr. Phillips implied that Ashcroft's efforts to "clean up the net" would severely damage the integrity of the First Amendment right to free speech. He stated that the "focal point" of the article was that if *Maximum PC's* readers believe that the Internet should be the "preeminent vehicle of unfettered free speech," then readers should closely evaluate the Bush Administration's goals. I respectfully submit that there is no such thing as "unfettered free speech," and the provisions of the First Amendment do not give the right to "unfettered speech."

Forgive me if I'm being presumptuous, but I believe what you mean is "unfettered free speech void of any consequences." For example, the freedom of speech certainly gives one the right to walk in front of the White House and begin yelling threats at the President, yet there are certainly consequences that will follow this "free speech." The truth is that Internet porn and the increasing number of television programs that push the envelope

do have consequences. If this form of "digital free speech" is not regulated, then there will no way of protecting children from harmful material.

I am an avid reader of *Maximum PC* and will continue to be. And by the way, I do support Ashcroft's efforts to "clean up the net" – not for the preservation of the First Amendment, but for the sake of my young daughter.

—BRIAN L. HENSON

### DVD-RAM RECOMMENDATION?

For people who use DVD-RAM for backup (I have a boatload of music notation files), which multi-format DVD-RAM burner does *Maximum PC* recommend?

—STEVE BOGDAN

### FEATURES EDITOR LOGAN DECKER

**RESPONDS:** Using DVD-RAM to back up your music notation files is a wise choice. As you probably already know, cartridge-based DVD-RAM is efficient, reliable, and durable removable storage. Panasonic's DVD-Multi series of drives is your best bet, with support for DVD-RAM, DVD+R/W, DVD-R/W, and of course, CD burning. ■

### CUT, COPY, PASTE

- In June's "What Comes after Terabyte?" chart we mistakenly said that an exabyte is equal to one hundred thousand terabytes, when it is actually equal to one million terabytes.
- The system review of Velocity Micro's ProMagix PC that ran in the June 2004 issue incorrectly listed the *SYSmark2004* score for our zero-point system. The score should have been 172, not 313 as was reported.
- The Mobo Mania feature in our May 2004 issue incorrectly listed the prices of two motherboards. The MSI PT880 Neo costs \$80. The MSI 875P Neo costs \$160.
- June's Rig of the Month cost \$30 *before* the addition of a side door. The final price was actually just under \$45.

**LETTERS POLICY:** *MAXIMUM PC* invites your thoughts and comments. Send them to [input@maximumpc.com](mailto:input@maximumpc.com). Please include your full name, town, and telephone number, and limit your letter to 300 words. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.





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# Quick Start

The beginning of the magazine, where articles are small

## Intel Kills Tejas in Favor of Dual-Core Design

But what does it mean for you? We cut through the marketing speak and rampant rumors to deliver cold, hard facts and hot, fresh analysis

**W**hen Intel released the Pentium 4, the company expected the NetBurst architecture upon which its shiny new CPU was based to eventually reach 10GHz over the architecture's lifetime. Those plans recently came to a screeching halt when Intel announced it was killing Tejas—the successor to the Prescott P4—because of unmanageable heat issues. In its place: A new approach to CPU design that emphasizes dual core processors.

This announcement set off rampant speculation that the Pentium 4 is dead, that the days of megahertz madness are finally ending, and even that Intel is making desperate moves because of AMD's success. *Maximum PC* is here to separate the fact from the fiction. Read on to find out what's really going on—and what it means for consumers like you.

### Q: WHAT IS TEJAS? AND WHAT'S ALL THIS DUAL-CORE STUFF?

Tejas was the successor to the current Prescott Pentium 4. There's really not much concrete information on the CPU, but it was rumored to include additional instructions (perhaps SSE4), slightly more L1 or L2 cache, and possibly a redesigned core. Many expected that Tejas would be

called Pentium 5 when released.

Regarding dual-core processors: If you currently think of your CPU as having one brain, a dual-core CPU will have the equivalent of two brains, which will theoretically allow your PC to perform more than one task at a time with even higher performance than before. Both Intel and AMD have planned to use multiple cores in single chips eventually. Intel simply moved its plans up by about a year, a shift that makes a lot of sense given Microsoft's assertions that Windows Longhorn—the next-generation of the Windows OS—will run better with dual-core CPUs.

### Q: WHY DID INTEL KILL TEJAS?

A few factors contributed to the 187 of Tejas. The first and most important was heat considerations. Tejas was rumored to suffer from the same thermal issues that plague Prescott. Even Intel admits that trying to make and sell a 150 watt CPU (Prescott is 100 watts) was beginning to seem impossible.

A second factor involves the new CPU's production process. Analyst Peter Glaskowsky told us Tejas was being designed in Intel's Austin design center and was the team's first effort. This may

have led to delays with the new proc—some analysts have claimed that Tejas was initially supposed to be released before Prescott, but had been delayed more than a year.

### Q: DOES THIS MEAN THE PENTIUM 4 WAS A FAILURE?

Certainly not. As Intel likes to point out, if it was a failure, it was a profitable failure that sold hundreds of millions of CPUs since the Pentium 4's introduction in November 2000.

### Q: IS THE PENTIUM 4 EFFECTIVELY DEAD AS A RESULT OF INTEL'S CHANGE OF STRATEGY?

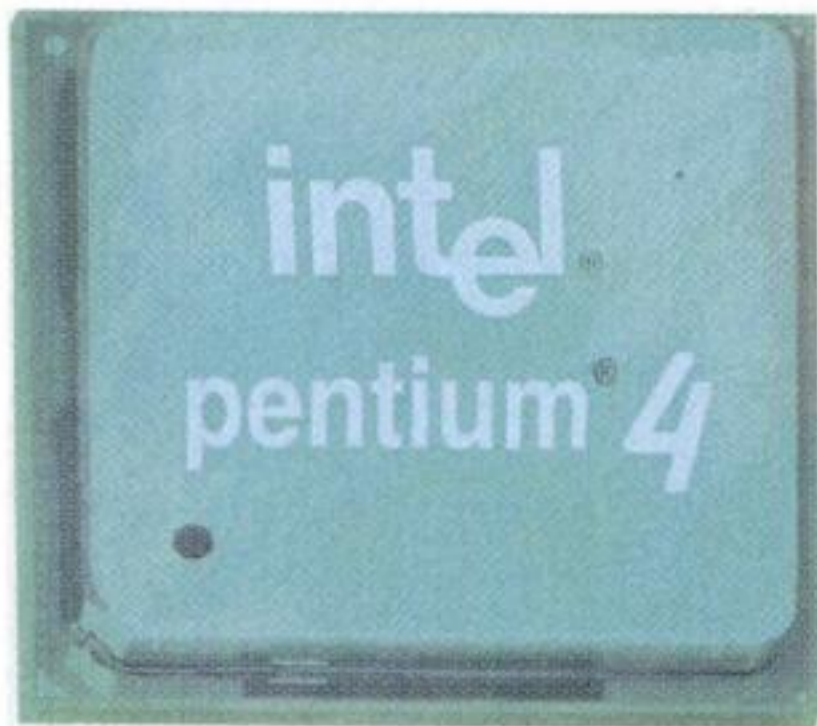
That's not 100 percent clear yet. Early news stories indicated that Intel was bailing on the NetBurst CPU architecture and would move to a CPU format that uses dual-cores based on the mobile Pentium M chip. After a few weeks, however, it wasn't clear if Intel was completely abandoning NetBurst. In fact, Intel has recently indicated that the first dual-core chips will be in the Prescott family.

Asked point blank whether NetBurst was dead, one Intel spokesman quoted Mark Twain's famous line that "Rumors of my demise are greatly exaggerated."



Lost in the shuffle of Intel's big announcement: Prescott Pentium 4s will be moved into a dual-core design.





We think it's quite possible that NetBurst, or some semblance of it, will live on in Intel's dual-core CPUs. One thing has been confirmed, though: Intel eventually plans to merge its desktop and mobile CPU architectures. But it's likely the CPUs will vary widely depending on the functionality.

**Q: SO WHAT HAPPENS TO PRESCOTT?**

Intel still says Prescott is on schedule to hit the 4GHz mark this year. Furthermore, Prescott will get 2MB of cache a la the Extreme Edition, enhanced security via the LaGrande technology, 64-bit support, and several other new features like SpeedStep and Vanderpool's virtual capabilities. The big news, however, is that Prescott will apparently be moved to a dual-core design. We take these ambitious plans for Prescott to mean the P4 still has some life left in it.

**Q: WHAT DO THESE CHANGES MEAN FOR ME?**

Not much in the short term. Long term, however, this migration may limit some of your upgrading choices. We still expect to see new LGA775 socket motherboards that will support Prescott and would have supported Tejas. It's likely these motherboards and chipsets will not support the new dual-core CPUs Intel will introduce in 2005, so you'll probably have to dump the board in favor of a new one when you upgrade to dual-core CPUs.

**Q: IS INTEL RUNNING SCARED?**

Intel has definitely been getting its butt kicked by AMD, and the company knows it. AMD featured 64-bit support via AMD64. Intel, in response, is adding EM64T to its chips, which we've reported will perform nearly identically. Similarly, AMD has support for NX which will prevent buffer overrun errors from spreading viruses and worms. Intel, amazingly, now has plans to add XD—known as Execute Disable—to its chips.

So, yeah, it would be safe to say there's been some serious

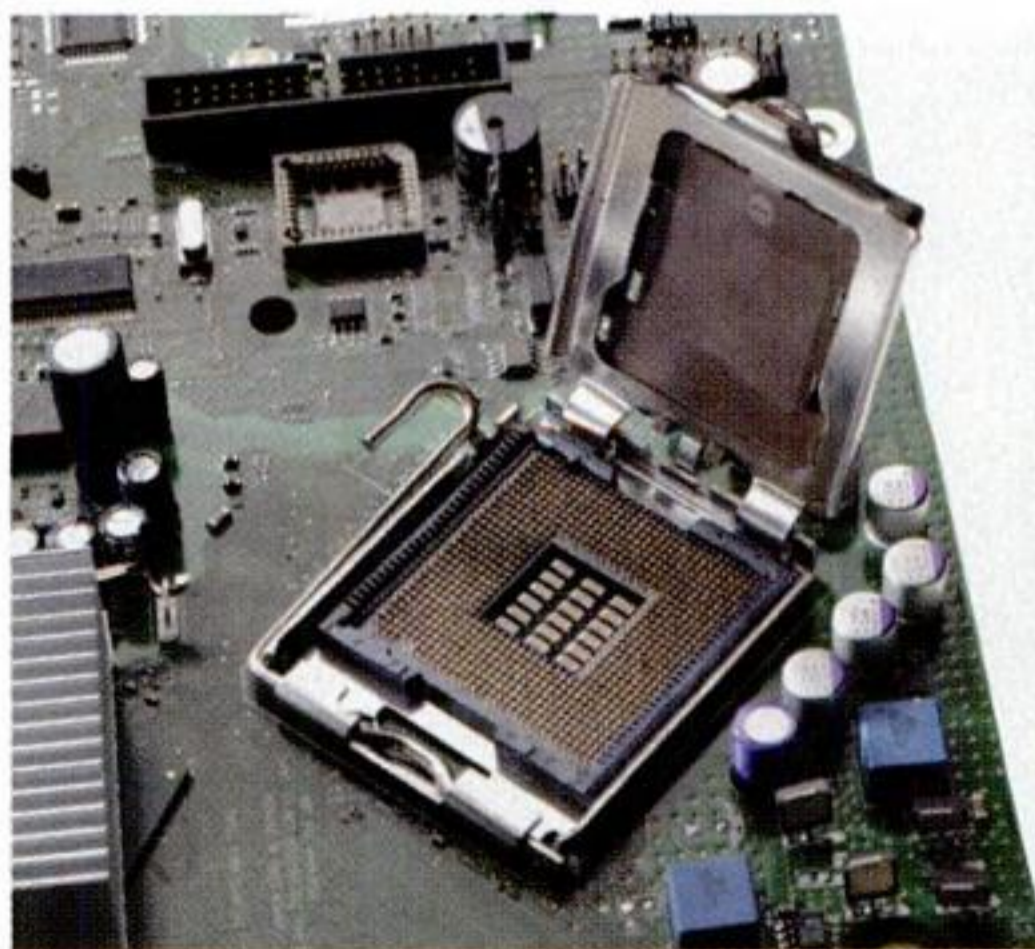
catch-up going on. In fact, it would be easy to look at this dual-core announcement as one way Intel plans on regaining the technology lead in CPU development.

**Q: IF PRESCOTT HAS THERMAL ISSUES IN A 90NM PROCESS, AND TEJAS WAS ALSO 90NM, DOES THIS INDICATE AN ISSUE WITH INTEL'S NEW 90NM PROCESS?**

That depends on who you ask. Intel says there are absolutely no thermal issues with its 90nm process and points to the debut of its new Dothan Pentium M as an example. It has more cache and runs at higher speeds, yet consumes less power and generates less heat, Intel says.

However, analyst Peter Glaskowsky says both the process and design are the problem. "There's this cliff in these new processes which wasn't there before," Glaskowsky says. As Intel pushes on the performance throttle, he explained, the power consumption and thermals seem to be increasing at rates that Intel hasn't been able to manage. Beyond the problems with the 90nm process, Glaskowsky says Intel may have been overly ambitious in its pursuit of deep pipelines and the branch predictions.

Intel, however, maintains that it is committed to getting thermals under control in Prescott. Time will tell.



**Intel's next-generation LGA775 socket was originally scheduled to be the home of the now defunct Tejas CPU. If you purchase one of these mobos, Tejas' cancellation may mean that your upgrading options are limited.**

## Cars, PCs, Noise & Intel



During my eight-year stint at *Maximum PC*, I've drawn many analogies between sports cars and PCs, mostly focusing on their internal combustion engines and CPUs. To review: Just as different engine designs present different bore, stroke, horsepower, torque, and RPM compromises, different CPU architectures present different integer, floating-point, cache, pipelining, and megahertz compromises.

Car engines suffer parasitic losses that essentially rob their drivers of maximum possible acceleration. PC owners suffer similar indignities every time a CPU makes a branch misprediction. Wasted clock cycles—bugger!

And, of course, both car engines and CPUs can be custom-tweaked within inches of their lives for extra performance. It's called "face-melting turbo boost" in the automobile kingdom, and "balls-out-reckless overclocking" in the PC kingdom. Both practices can reduce hardware stability, and even lead to sudden, catastrophic failure.

Yep, sports cars and PCs share a lot of similarities, but the kinship ends when it comes to noise production. I like a car with a low, throaty exhaust note—not an extremely loud note, per se, but definitely an exhaust that makes its presence known. As for my PCs, however, I want them to run as quietly as possible.

Without a doubt, the 747-like racket emitted by my Dell XPS during the summer months is unbearable. It's bad enough to endure the turbo-props while I'm web-surfing, but when I'm in the middle of an FPS stealth mission, the insane fan noise makes it impossible to maintain the suspension of disbelief that makes PC gaming so fun. Ironically, when this magazine reviewed the 3GHz P4-loaded XPS in a July 2003 gaming PC roundup, it was declared "notably quiet" and "the most peaceful" of three machines reviewed.

Yeah, peaceful—in the climate-controlled Maximum PC Lab. But when ambient room temps reach into the high 70s, fan speeds (and thus noise levels) ratchet up to silly-loud levels. In fact, during heat waves, I find it's quieter to open up the XPS chassis and point my floor fan directly at its innards.

And so it's with great anticipation that I'm eyeing Intel's new "beat the heat" initiative. Intel is dropping plans to ship hot-and-toasty Tejas chips, which would have required excessive—and loud—cooling. Eight years ago, we never would have imagined that we'd be complaining about heat and noise generation, but in 2004, it's a huge concern. Intel is also switching to an entirely new naming convention, which I hinted at in my March 2004 column.

And wouldn't you know it: It borrows the nomenclature scheme of BMW's automobile line-up.

Jon Phillips was formerly editor-in-chief of *Maximum PC*, and now serves as the magazine's editorial director.



## Welcome, Chip Multiprocessing



In the December 1999 issue, I wrote that chip multiprocessing (CMP) would come to desktop PCs "within the next few years... [maybe] in the next system you buy." My prediction is finally coming true. Intel will introduce its first x86 processors with two CPU cores on a single chip—in the second half of 2005. (OK, so maybe I jumped the gun.)

Intel has announced that CMP will eventually spread across its entire line of PC processors: desktop, server, and mobile. In fact, Intel canceled some highly-anticipated single-core processors to make way for dual-core replacements. The detour makes sense. CMP is proven technology in other types of microprocessors, and it attacks some design problems that are plaguing single-core processors.

CMP has been around since the 1990s, mainly in specialized embedded processors, network processors, high-end server processors, and digital signal processors. Some chips already have more than a hundred processor cores. PCs and most servers have been limited to single-core processors. AMD has said it may introduce a dual-core Opteron someday, and now Intel is racing to market with dual-core Pentiums and Xeons.

However, x86 processors will use CMP for somewhat different reasons than specialized processors. Generally, the specialized chips are for applications that allow lots of data parallelism: genome mapping, climate analysis, packet processing, and so on. Multiple cores can work simultaneously on different parts of a large data set.

But the CPU architects at Intel and AMD are wrestling with physics. The nastiest problem is that power consumption is surging to levels unacceptable in PCs without resorting to exotic (and expensive) cooling systems. Power rises at a linear rate with clock frequency, so the usual practice of cranking up the CPU clock is becoming a painful way to achieve higher performance.

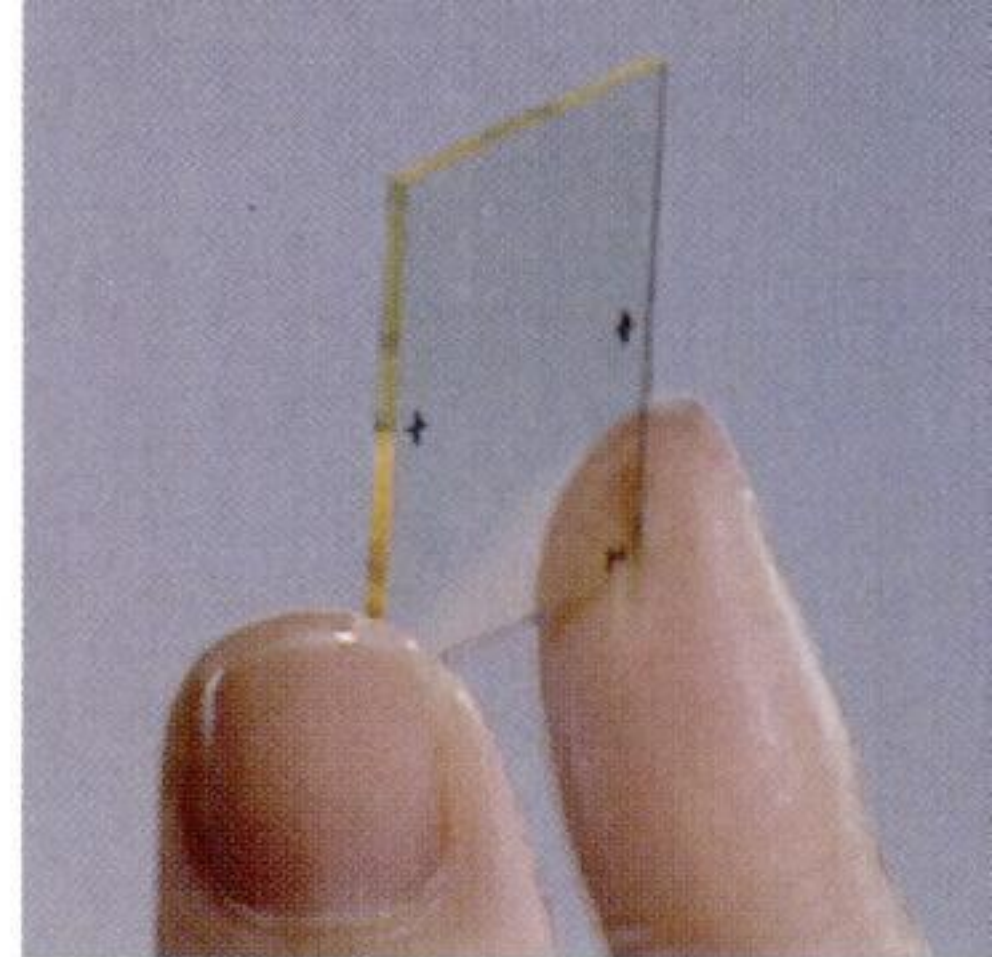
Chip voltage is even more important than clock frequency for power consumption. Although Intel's new 90-nanometer chip-fabrication technology makes lower voltages possible, the Prescott Pentium 4 hasn't been able to take advantage of it, which partly explains Prescott's disappointing power/performance ratio.

CMP can deliver high performance without increasing the processor's clock frequency or voltage, much like Intel's Hyper-Threading technology. Indeed, if Intel enables Hyper-Threading in a dual-core chip, it would be almost like having four processors: two real cores and two virtual cores.

In time, we may see PC processors with a dozen or more CPU cores. But with this prediction, I'm being more realistic—it will probably arrive in 10 years.

## Is Info-MICA the next CD-ROM?

A forward-thinking Japanese company gives the entertainment industry a reason to smile again



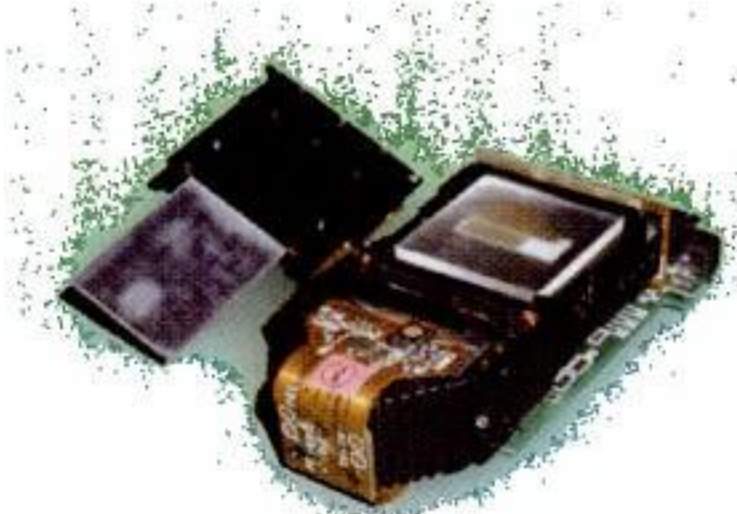
**Dual-layer? Big deal. How about 100-layer storage?**

The introduction of dual-layer DVD burners for consumers smashed the last remaining technological barrier preventing the duplication of commercial DVD-Video discs. Affordable technology is now available to decrypt, duplicate, and burn the contents of an 8.5GB commercial DVD-5 disc in the comfort of your own home—or prison cell, if you get caught.

As a result, it's only natural that Hollywood will soon be looking for an inexpensive alternative to DVD. It has to be extremely small and require very little power in order to take advantage of the popularity of handheld devices with sharp viewing screens. Plus, the capacity has to be massive, so the entertainment industry can sell movies we already own on DVD in even higher-resolution formats. And most importantly, it can't be able to be copied.

Info-MICA, developed by Japan's NTT Corp., appears ready to meet all those requirements in less than a year. The postage stamp-size prototype shown above holds 1GB of data, and was etched using a process called thin-film holography. The kicker is that this advanced process allows layers to be stacked as many as 100 high and still be readable.

NTT expects to roll out its cards to manufacturers by next year, anticipating an areal density of 1.7Gb per square inch on each layer. That means an SD-size chip with 100 layers should be able to hold 25GB of data!



**The Info-MICA chip is snug-as-a-bug in a prototype reader.**

## FUN-SIZE NEWS



### NOW WASH YOUR HANDS, PLEASE

Here's a cheery thought from Dr. Charles Gerba of the University of Arizona: Some PC components contain about 400 times as many germs as a *toilet seat*. Although not quite as disease-laden as telephones (with up to 25,127 germs per square inch), keyboards offer safe harbor to 3,295 germs per square inch, and mice are no less guilty with 1,676 germs per square inch. Contrast this with the average toilet seat, which registers a tidy 49 germs per square inch. Have a nice day!

### LOOKS GOOD ON PAPER

If you thought that origami Godzilla was cool, you should see what the Japanese are doing with paper. Sony and Toppan Printing jointly announced a paper-based optical disc for use in Blu-Ray DVD recorders that holds 25GB of data (or about two hours of high-definition video). Toppan says the disc can be destroyed for security purposes by simply cutting it with a pair of scissors. Which makes us wonder, why are scissors referred to as a "pair"?

### TECHTV STAFF GETS DELETED

After purchasing TechTV from Vulcan Ventures for an estimated \$300 million and merging it with its own G4 videogame channel, Comcast has pink-slipped all 285 members of the staff of the San Francisco-based cable channel. It appears that some employees will have the option of relocating to Los Angeles, where G4 is based, but which portions of the technology channel will be merged into G4 are still unknown. No, we don't get it, either.

Tom Halfhill was formerly a senior editor for Byte magazine and now an analyst for Microprocessor Report.



# First Look: Longhorn's 3D Interface

Microsoft sexes up Windows with a three-dimensional GUI code-named Aero Glass. We take it for a spin

Previewed at WinHEC 2004 (Windows Hardware Engineering Conference, a combination of developer workshops and Microsoft peepshows), the latest build of Longhorn finally reveals the first details of its next-generation interface. Here's a look at the eye candy coming to your desktop in 2006.



## 3D TASK SWITCHER:

One of the most dramatic changes to the traditional Windows interface is the 3D Task Switcher, which flips windows on their side so you can easily scan their contents.

## SNAZZY NEW SPECIAL EFFECTS:

Whenever you start a new application in Longhorn, the window appears to snap down and fade onto the desktop. We captured this screenshot about halfway through the process. Also, there are soft shadows rendered beneath all open windows.



## CONTEXT SENSITIVE POPUP WINDOWS:

Informative, context-sensitive pop-up windows abound in Longhorn. Nearly every item, from pictures and movies to the built-in clock area, has a pop-up that appears when you hold the mouse over it.

## NEW, IMPROVED GAMING SUPPORT:

Longhorn's new Games area includes lots of features that will make it easier to play games in Windows. We're particularly fond of the Game Patcher, which will automatically download large game patches when you're not using your computer.



## On Doom 3 and Half-Life 2



**H**ot on the heels of E3—the annual gaming trade show where companies demonstrate their line-ups for the next 18 months—I normally say something along the lines of, “Woo boy, do we have a good year ahead of us.” In fact, looking at some of the new crop of steaming fresh titles previewed at the show, this would be a completely legitimate statement.

However, the one problem I have with this statement is the phrase “this year.” Aside from the quality of the games previewed, the other thing that was fresh and steaming about many of these games were the release dates—and not in a good way either, if you catch my drift.

Two games, *Half-Life 2* and *Doom 3*, dominated everyone's thoughts going into E3. Like all the other magazines and web sites, I'd be playing it coy if I glossed over them and moved on to the more surprising titles. Over the years, we've all developed a benign patience with id Software, which always delivers—eventually. From what I've seen, you can rest assured that *Doom 3* will look spectacular. Heck, it already does, with more effort going towards making a well-crafted single-player mode (long a weak spot in id's titles) and the use of a flashlight and shadows to create a jumpy, creepy atmosphere. *Maximum PC* has been told by reliable sources that *Doom 3* will appear by the end of the summer.

And maybe *Half-Life 2* will as well. Because Valve began life by modding the Quake engine to make *Half-Life*, the company faced one huge learning curve when it decided to make the sequel from scratch. In the many, many (many) intervening years, Valve has fallen into the trap of chasing technology rather than anticipating it, which has resulted in a great deal of lost time and lost work. *Half-Life 2* was on display at E3 as a pair of movies, not as a functional interactive demo. While the movies were recorded versions of in-game play presented by Valve's head Gabe Newell, the lack of an interactive demo on the floor was curious. In its current state, it looks great, showing the kind of rich environments and clever AI we expect. But still, we saw very little of the game.

It feels like it will be an eternity before we can play either game, so here's my advice to the restlessly waiting: Relax, put them out of your mind, and they will eventually appear. Just embrace the nothingness of it all. Release dates are cheap Zen.

Meanwhile, you'd be wise to contemplate your next videocard. You're going to need it to play either game at high resolutions with a high level of detail.

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.



# TechnoFile

Quick takes on technology trends

## Alienware's Bold Experiment Could Double Your Gaming Performance

Many years ago, 3dfx rocked the 3D gaming world when it released the Voodoo 2 graphics chip. Not only was the Voodoo 2 the fastest 3D accelerator on the planet, but hardcore users could also pair the PCI-based card with a second identical Voodoo 2 card for nearly double the performance. Unfortunately, this tactic became impossible after the advent of the AGP bus because the spec prevented motherboards from having two active AGP slots at the same time.

With PCI Express on the horizon, we've learned Alienware is going to take another shot at a dual-board config. PCI Express offers a high-speed bi-directional connection between PCI Express add-in cards and the system's CPU via the chipset's north bridge, and is expected to replace AGP as the preferred interface for videocards over the next year. What's more, PCI Express can provide high-speed connections for more than one card, a capability Alienware plans to capitalize on in a big way.

### A CUSTOM MOBO IS THE FOUNDATION

Scheduled for release late in the year—Alienware's ALX line will debut in a single-graphics-card configuration this summer—this high-powered rig begins with a custom-designed Tumwater-based dual-Xeon motherboard, which sports two high-speed PCI Express slots—one X16 slot and one X8 slot. The number after the X refers to the number of "lanes" available for data transfer; each lane provides bandwidth equivalent to a single X1 PCI Express slot.

Both slots can accommodate X16 cards, but the secondary slot is stuck at X8 mode because the Tumwater chipset has only 24 PCI Express lanes connecting to the north bridge. Because the performance of most of today's games is limited by factors other than the bandwidth between the CPU and videocard, having one card in the half-speed X8 slot won't have a devastating effect; after all, an X8 PCI Express slot is still faster than a current AGP 8x slot.

### IMAGE-SPLITTING IS THE KEY

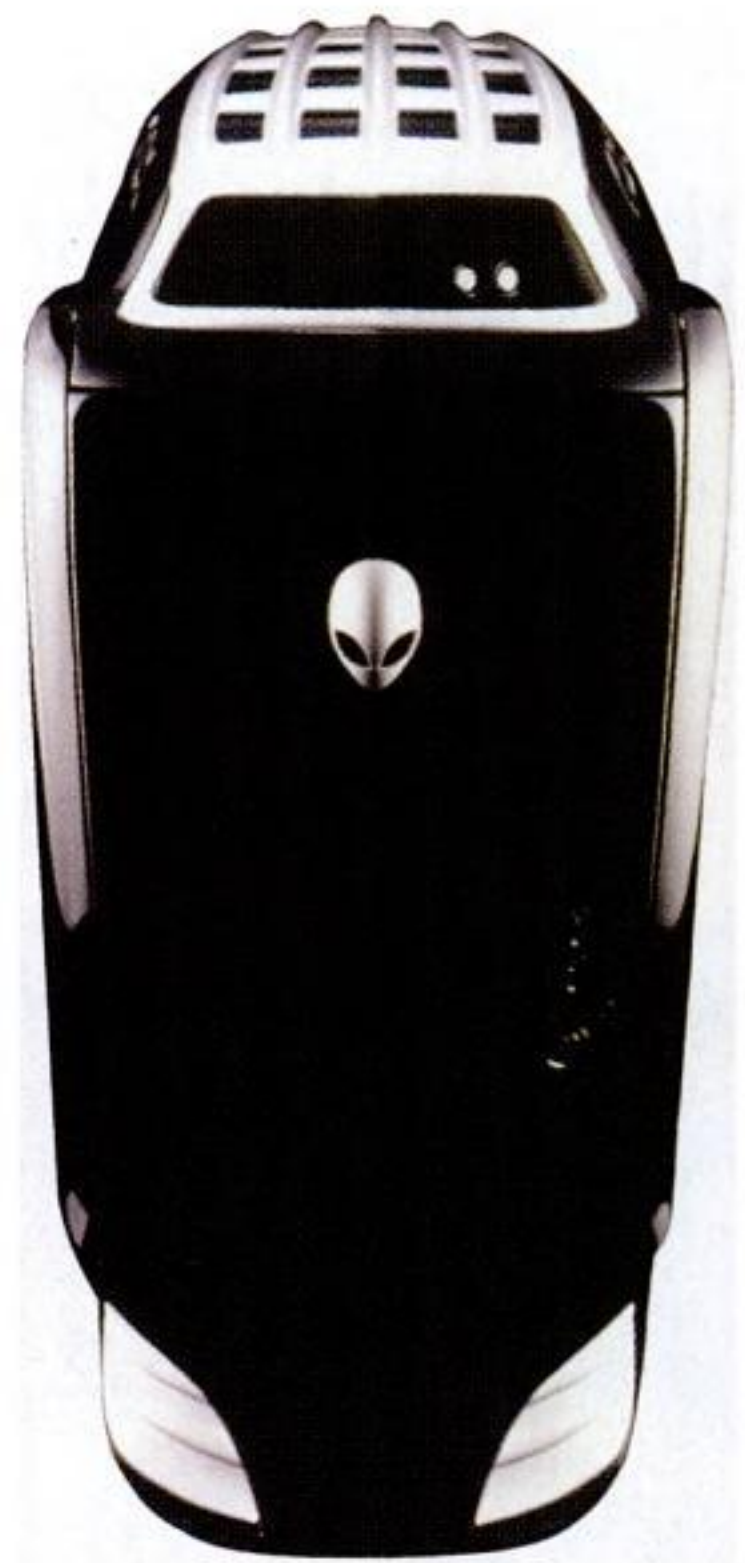
Alienware's technology is completely card-agnostic—it will work with ATI or nVidia cards (or a combination of both), and

doesn't even require videocard vendors to write special drivers. Instead, Alienware has written custom software that sits between the Direct3D layer and the actual videocard drivers. This software splits the image it needs to render into two halves—top and bottom—and sends one half to each card. Each outputs its half to a custom piece of Alienware hardware called the Alienware Video Array, which combines the two halves and outputs them as a single frame.

In previous attempts at using one card to render the top half of a scene and another to draw the bottom half, an unsightly seam always ran horizontally across the middle of the monitor. Alienware claims to have solved the problem by dynamically shifting the load between the two cards. We saw a prototype of the ALX rig in action and can happily verify that there were no seam or synch problems.

### COOL THE RIG AND CHARGE A BUNDLE

Two videocards and possibly two CPUs will generate a considerable amount of heat. To compensate and cool what will likely be a red-hot rig, Alienware's ALX systems will feature a proprietary liquid cooling system. Early prototypes of the system's case (pictured above) will allow owners to check the temperature via an LCD display on top of the enclosure.

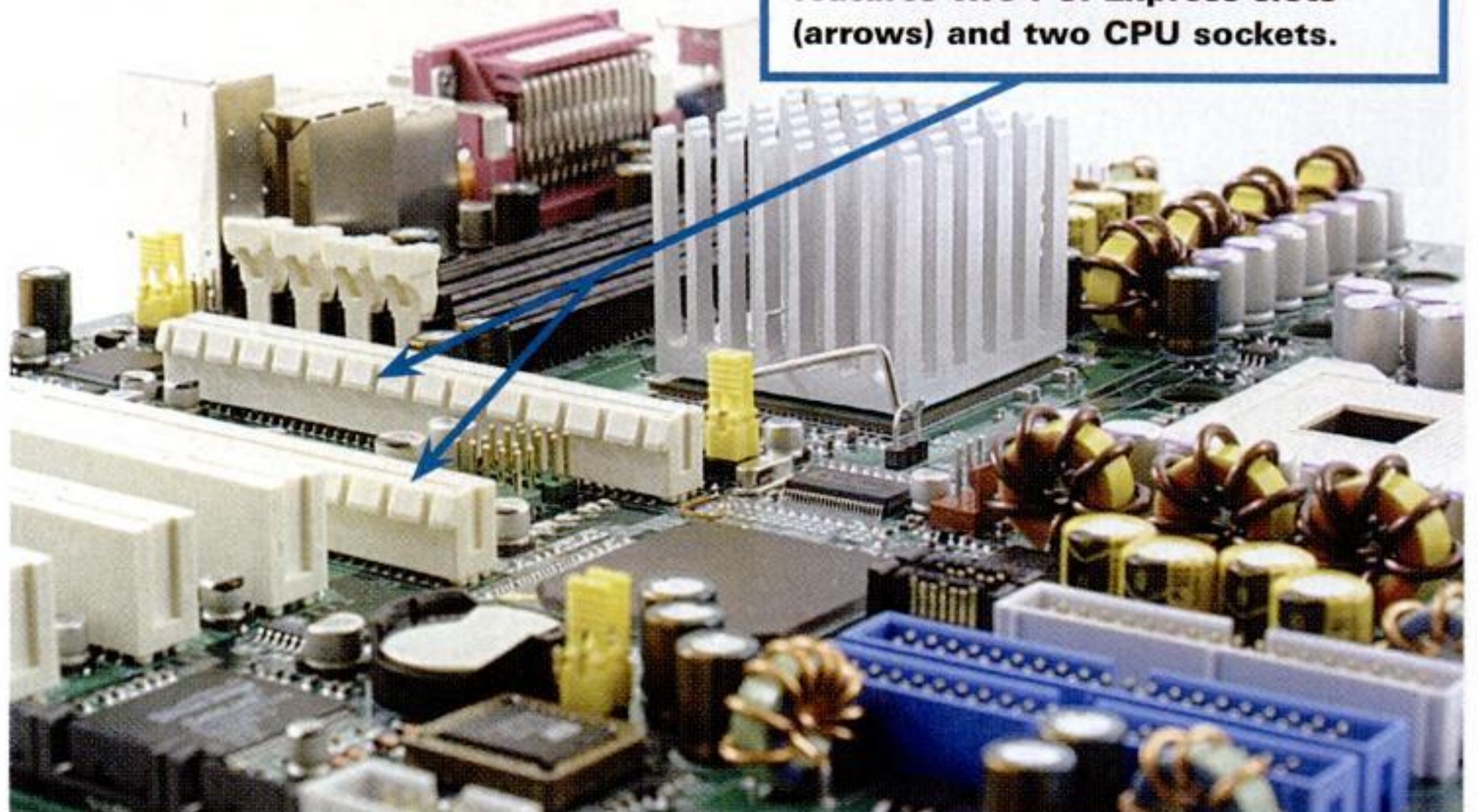


The bubble on top of this ALX prototype will house the system's custom cooling apparatus.

How much will the new system cost? At press time, Alienware wouldn't say. We did some initial number-crunching though and, with two CPUs, two videocards, a proprietary mobo, water cooling, and other custom elements, we'd be shocked if this version of the ALX costs less than \$4,000.

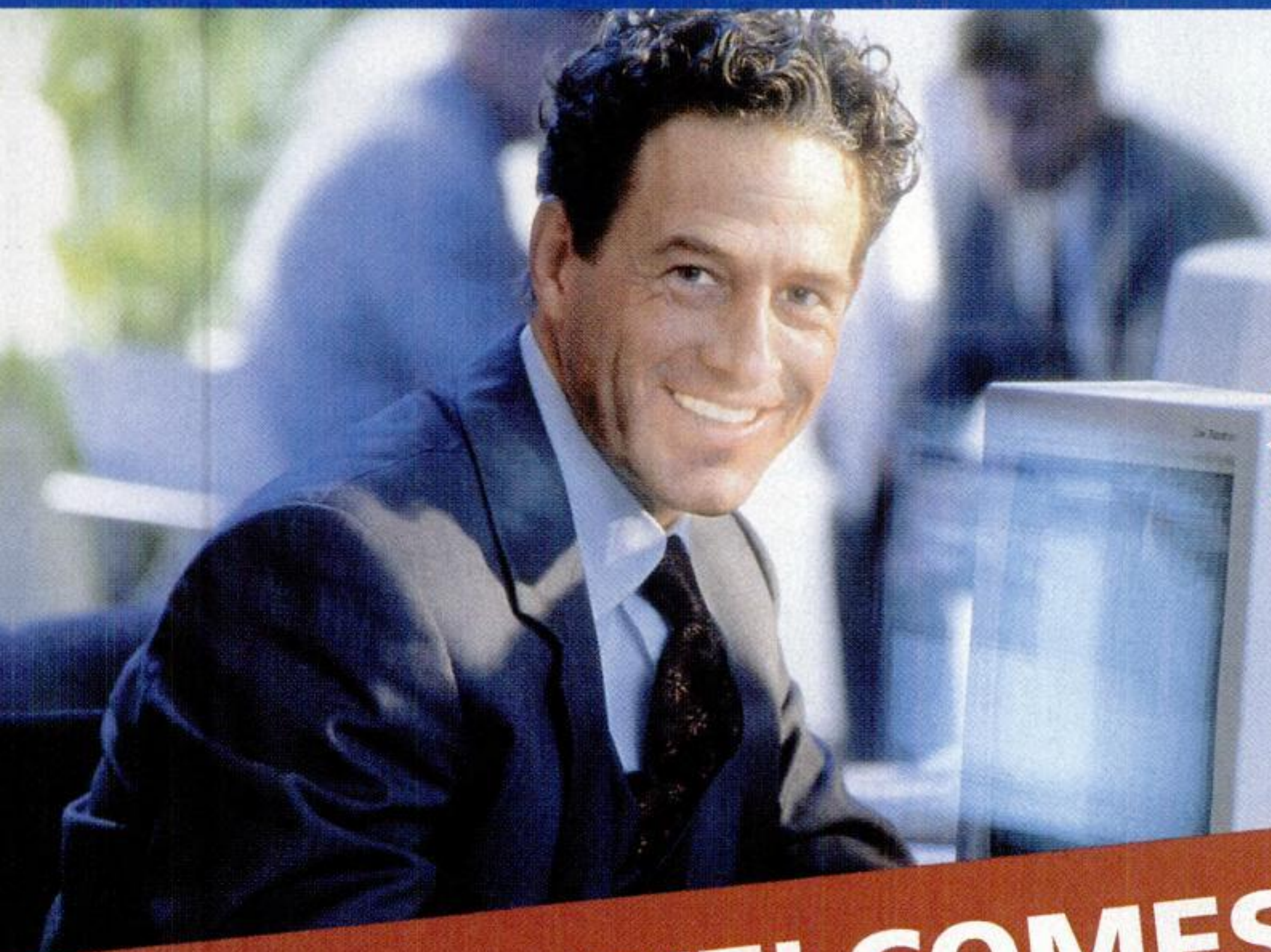
Our Alienware contacts say that only Alienware PCs will offer this technology, but we've heard rumblings from both ATI and nVidia of other multi-card solutions being developed using PCI Express. We're convinced, however, that Alienware's solution will be the first to land this fall in Alienware ALX systems.

Alienware's proprietary ALX mobo features two PCI Express slots (arrows) and two CPU sockets.



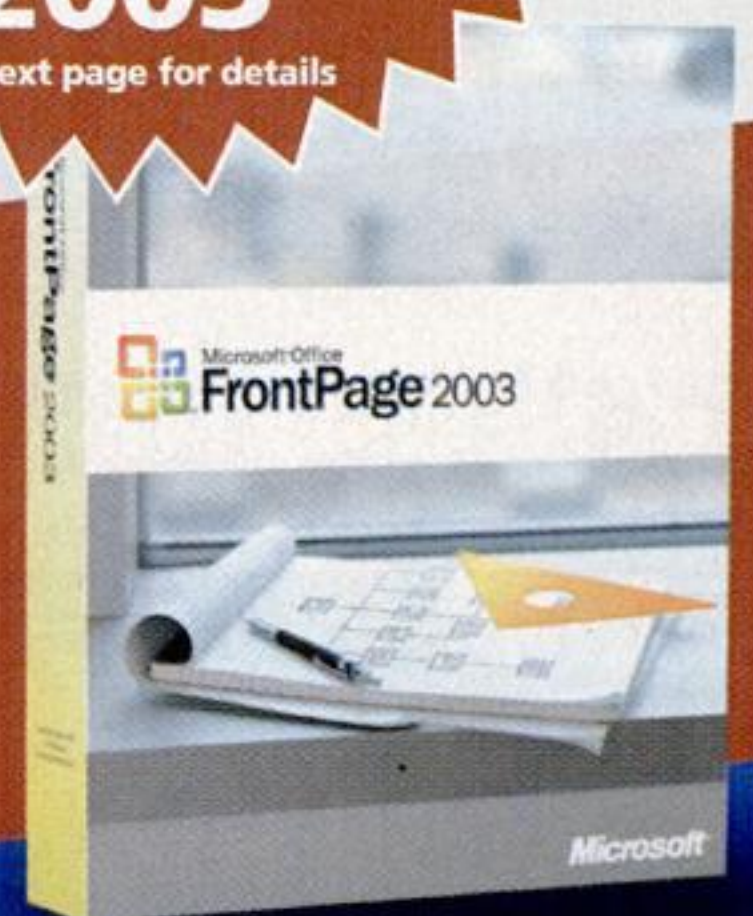


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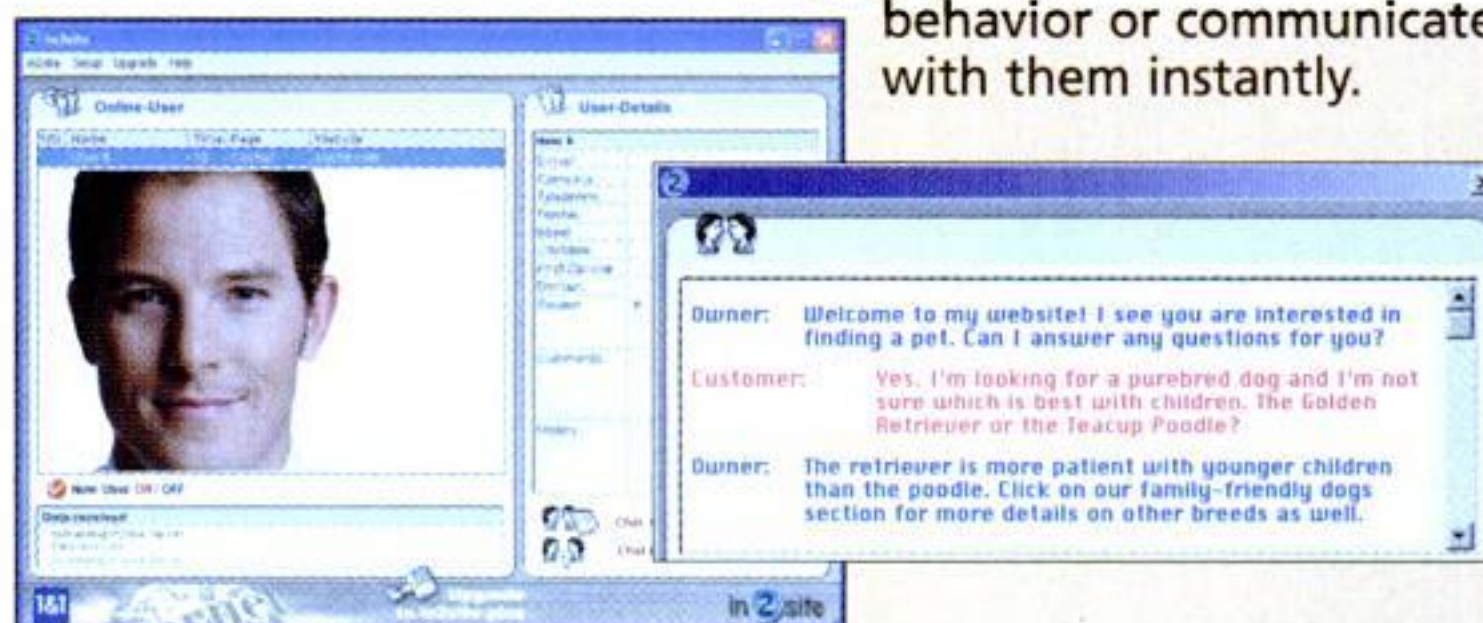
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Carl	Brown	653 Liberty Avenue, Wilmington, NC 28403	brownc2521@lycos.com
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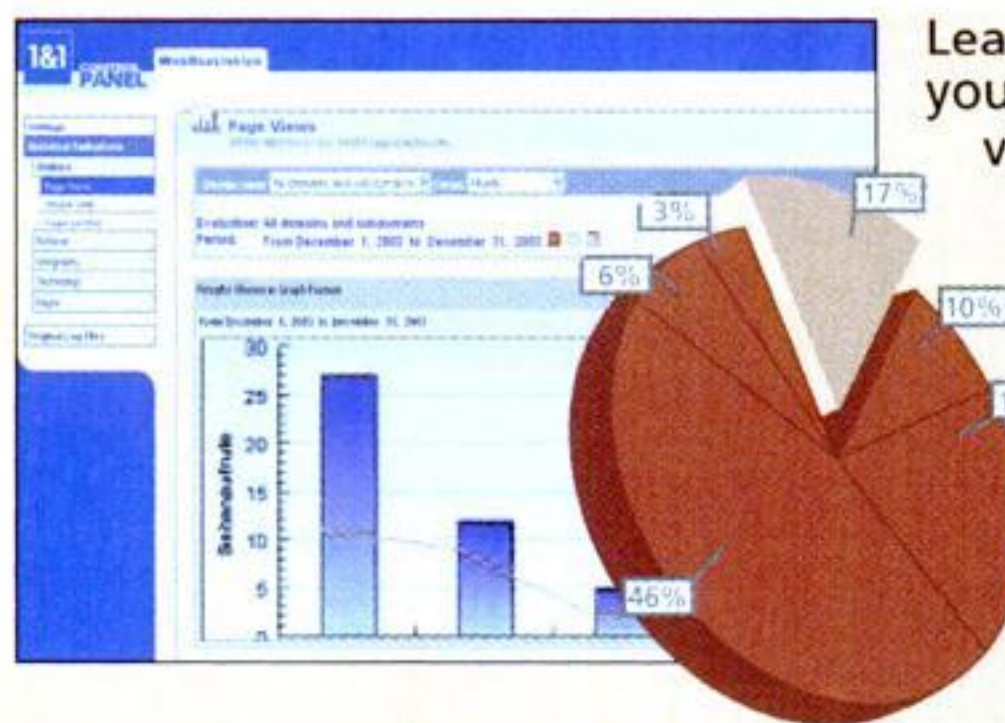
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WEBSITE FEATURES		
Logfiles	✓	✓
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FrontPage 2002 extensions	✓	✓
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Subdomains	50	50
WEBSITE/CONNECTIVITY		
Web space	1000 MB	1000 MB
FTP accounts, unlimited access	5	5
Included bandwidth/month	15 GB	15 GB
Protected by up-to-date firewall	✓	✓
Daily backups	✓	✓
APPLICATIONS		
1&1 Control Panel	✓	✓
WebsiteCreator	18 pgs	18 pgs
Full version software worth \$550	✓	✓
Frontpage 2003	-	✓
E-MAIL		
POP3 e-mail accounts	150	150
Aliases, auto-responders, forwarding	✓	✓
1&1 WebMail	✓	✓
Included virus scanner	3 POP3	3 POP3
WEBSITE FEATURES		
Logfiles	✓	✓
CGI library (counter, guestbook, etc...)	✓	✓
FrontPage 2002 extensions	✓	✓
Password protected directories	✓	✓
Perl, PHP3 and PHP4	✓	-
Database	1 MySQL	MS Access
SSH shell access	✓	-
SSI (Server side includes)	✓	✓
Cron Jobs / Scheduled Tasks	✓	✓
Directory Protection	✓	✓
Shared SSL	✓	✓
Active Server Pages	-	✓
CRM/E-COMMERCE		
1&1 WebStatistics	✓	✓
1&1 Chat channels	5	-
in2site Live Dialogue	✓	✓
Newsletter Tool	✓	✓
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Point external domains to 1&1	200	200
Subdomains	200	200
WEBSITE/CONNECTIVITY		
Web space	2000 MB	2000 MB
FTP accounts, unlimited access	25	25
Included bandwidth/month	30 GB	30 GB
Protected by up-to-date firewall	✓	✓
Daily backups	✓	✓
APPLICATIONS		
1&1 Control Panel	✓	✓
WebsiteCreator	25 pgs	25 pgs
Full version software worth \$550	✓	✓
Frontpage 2003	-	✓
E-MAIL		
POP3 e-mail accounts	300	300
Aliases, auto-responders, forwarding	✓	✓
1&1 WebMail	✓	✓
Included virus scanner	6 POP3	6 POP3
WEBSITE FEATURES		
Logfiles	✓	✓
CGI library (counter, guestbook, etc...)	✓	✓
FrontPage 2002 extensions	✓	✓
Password protected directories	✓	✓
Perl, PHP3 and PHP4	✓	-
Database	3 MySQL	MS Access
MS SQL	-	✓
SSH shell access	✓	-
SSI (Server side includes)	✓	✓
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Advanced developer tools	✓	-
Dedicated SSL Certificate	✓	✓
ASP, ASP.NET, .NET Framework	-	✓
CRM/E-COMMERCE		
1&1 WebStatistics	✓	✓
1&1 Chat channels	10	-
in2site Live Dialogue	✓	✓
Newsletter Tool	✓	✓
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1&1 WebElements - Sophisticated Form Editor	✓	✓
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# Head 2 Head

A showdown among natural PC competitors

## THIS MONTH: Videocards!

In the red corner, we have ATI's Radeon X800 XT Platinum Edition. In the green corner, nVidia's GeForce 6800 Ultra. Today we pit these two mighty competitors in the ultimate deathmatch. We're going to rigorously test their raw speed, image quality, compatibility, and formfactor, then we will declare a winner. Read on to find out which videocard reigns supreme!

—WILL SMITH

### GEFORCE 6800 ULTRA

**Visual quality:** The image quality on all high-end videocards is damn-near good enough to be indistinguishable to the untrained eye, but we did notice some differences when using artificial tests. Specifically, we found that nVidia uses a nonstandard trilinear filtering implementation. Unlike nVidia's previous trilinear filtering optimizations, which severely impacted image quality in games, our testing didn't reveal any rendering errors with these new optimizations. With the current rev of drivers, it's impossible to disable the trilinear optimizations, so it's difficult to say for sure.

**Winner: Draw**

**Speed:** When we tested the first GeForce 6800-based card in the Lab many months ago, our first thought was "HOLY \$#&@!! This thing is FAST!" Then we set out to figure out what exactly makes it such a smoking performer given its low clock speeds. It boils down to this: The nVidia card performs a whole lotta math on every pixel that runs through its pipeline.

In many benchmarks, the 6800 Ultra puts up double the performance of last-generation cards like the GeForce 5950 Ultra and the Radeon 9800 XT. This kind of speed makes 1600x1200 a resolution that's actually playable in many games. Alternatively, you can crank up visual-quality features to incredibly high levels at lower resolutions, like 1024x768 and 1280x1024. While it's true that the 6800 Ultra is slightly slower than the X800 XT in many benchmarks, the margin of victory is less than 5 percent—an insignificant difference. **Winner: Draw**



**Compatibility:** This is a difficult category to call. The nVidia card boasts support for the latest, greatest pixel shader spec, Pixel Shader 3.0. The main difference between PS 3.0 and the later revisions of Pixel Shader 2.0 is the requirement of 32-bit floating point color—PS 2.0 requires just 24-bit floating point color.

We've talked to several game developers about Pixel Shader 3.0 support, and while a couple of them expressed interest in using the 3.0 spec, none are abandoning support for PS 2.0 cards. The visual-quality improvement between the two is much less dramatic than the improvement from PS 1.0 to PS 2.0. We're psyched that nVidia is embracing full 32-bit floating point color with this generation of cards, but that support is a minor benefit, at least until PS 3.0 games start shipping next year. **Winner: GeForce 6800 Ultra**

**Formfactor:** Just like nVidia's last-generation NV30-based series of cards, the GeForce 6800 Ultra's large, hot core requires a special two-slot cooling solution. This time around however, nVidia made like Emeril and kicked it up a notch by requiring two power connectors from your power supply. Additionally, the 6800 requires a monster 480W power supply. This means that in addition to the \$500 this card will cost you, you may also have to shell out another \$60–\$150 for a new PSU. To be honest, we don't understand why nVidia didn't just supply the extra power with an external supply. We're disappointed that nVidia would rather add a \$100 pre-req to its product instead of having the board manufacturers shoulder the cost of a \$5 power brick. **Winner: Radeon X800 XT Platinum Edition**

THE SPECS	GEFORCE 6800 ULTRA
Core	16-pipeline NV40
Core speed	400MHz
Core process	0.13-micron
Memory type	G-DDR3
Memory size	256MB
Memory speed	550MHz
Number of transistors	220 million

### MAXIMUM PC VERDICT 9

+ JUNE

Double the speed of last-gen cards, with support for Pixel Shader 3.0.

- OCTOBER

Another two slot solution, and with a massive power supply requirement to boot.

\$500, [www.nvidia.com](http://www.nvidia.com)



# RADEON X800 XT PLATINUM EDITION



**Visual quality:** The early drivers for both of these cards created some texture corruption and visual artifacts in games like *Far Cry* and *Planetside*. Still, we didn't hold this against either card because at press time we were still using beta drivers from ATI and nVidia.

The big visual-quality improvement in ATI's Radeon X800 is the addition of centroid sampling support. Also present in the GeForce 6800, this technology ensures that the proper section of a texture is applied to every pixel, no matter what texture filters are applied to it. Centroid sampling improves image quality, especially when you're using high levels of anti-aliasing or anisotropic filtering.

The only way we were able to really differentiate between the two cards is to use synthetic tests. When running the cards side by side, it was difficult to see any difference at all between them.

**Winner: Draw**

**Speed:** Speed is the most important category in our Head2Head, and our benchmarks show very little difference between these two competitors. The Radeon X800 XT exhibited a slight performance advantage in just about every benchmark, but in almost all of our tests, the difference between the two cards' scores was well within the margin of error for the test.

Don't let the small speed difference blind you to the most important fact: Both cards are significantly faster than the last-generation Radeon 9800 XT. In some benchmarks, these boards doubled the scores of previous-gen cards! **Winner: Draw**

**Formfactor:** One-slot videocards are increasingly difficult to find these days, but ATI managed to pack the top-performing X800 XT into a single slot. Furthermore, the X800 XT will work with pretty much any garden-variety 300W power supply, and even snugly fits into some small formfactor boxes. **Winner: Radeon X800 XT Platinum Edition**

**Compatibility:** The Radeon X800 XT Platinum Edition supports 24-bit floating point color throughout the pipeline, which is all that's required for Pixel Shader 2.0 support. This falls short of the 32-point FP support required by the Pixel Shader 3.0 spec that nVidia has single-handedly pushed. While we're not convinced that Pixel Shader 3.0 will be as prevalent as nVidia would like us to believe, this is still a ding against ATI. **Winner: GeForce 6800 Ultra**

THE SPECS	RADEON X800 XT PLATINUM EDITION
Core	16-pipeline R420
Core speed	520MHz
Core process	0.13-micron
Memory type	G-DDR3
Memory size	256MB
Memory speed	560MHz
Number of transistors	160 million

## THE UPSHOT

In the four categories we tested, we have two draws, one ATI win, and one nVidia win. This leaves one freakin' big question hanging: Which card should you shell out your hard-earned money on? Turn the page to get the gritty details.

## MAXIMUM PC VERDICT

9

### + PAINTING BY NUMBERS

Top speed, great image quality, and double the performance of last-gen videocards.

### - COOKING BY NUMBERS

We're concerned by the lack of Pixel Shader 3.0 support, but not enough to pull our recommendation.

\$500, [www.ati.com](http://www.ati.com)

Continued on next page →



# The Gritty Details

**B**ecause both cards rate equally in our testing categories, secondary considerations are going to be the deciding factor. Here are the issues to keep in mind.

## Does Pixel Shader 3.0 matter?

The current state of pixel shader programmability, which involves different programmable shader specs, is grim at best. With every new generation of hardware, each of the major hardware vendors has foisted yet another new revision of the Pixel Shader spec upon developers and consumers. There have been no fewer than three versions of the Pixel Shader 2.0 spec; the release of the 3.0 spec further complicates matters.

Interestingly, the two most important new features in Pixel Shader 3.0—32-bit floating point support and flow control in shader programs—are actually present in later revisions of the Pixel Shader 2.0 spec. They just aren't mandatory. We're not sure whether or not flow control, which allows a programmer to use more sophisticated programming tools is even necessary for shader programs.

Because a modern GPU processes many instructions at the same time in its pixel pipelines, the GPU needs to be able to predict what operations will be necessary in the near future so that it can queue these instructions and assign them to pipelines that do similar work. It's kind of like an assembly line; raw pixels go into one end of the pipeline, lots of things happen to them as they go through the pipeline, and they come out fully polished and lit. Pretty simple so far, right?

With today's Pixel Shader 2.0 programs, there is no opportunity for the program to deviate from one specified pixel-process-

ing path, so production is extremely accurate. When you add loops and branches to the mix, the GPU has to predict which path the program will take at each branch. If it predicts the wrong path—called a branch misprediction—then the card has to toss out all the work it's performed through the entire pipeline and start over again. Because the GPUs have such deep pipelines this could result in a massive negative impact on performance.

The other improvement in Pixel Shader 3.0 is support for much longer shader programs. The latest revision of Pixel Shader 2.0 supports shader programs that are a maximum of 512 instructions long. The new Pixel Shader 3.0 hardware supports more than 65,000 instructions. Again, this improvement will have little to no real-world impact in the upcoming generation of games. Most developers we spoke with are using shader programs that contain fewer than 50 instructions.

## Do you have the power?

Much has been made of the GeForce 6800 Ultra's extremely high power supply requirement. Very few PCs need a 480W power supply, even with today's power-hungry processors and 10,000rpm RAID arrays. Our initial hunch was that this seemingly incredible requirement pertained only to low-end generic power supplies whose peak power output was 480W, as opposed to the sustained output that better quality PSUs advertise. To determine if this was really the case, we tested the 6800 Ultra with several different power supplies. Our specimens included 510W and 410W PC Power and Cooling units, a 400W Sparkle power supply, a 250W small form-

factor supply, and a generic 400W unit.

Our hunch proved correct. Both of the PC Power and Cooling supplies withstood the 6800 Ultra without breaking a sweat. The 400W Sparkle also fared well; we experienced no problems using it. Neither of the lesser power supplies fared so successfully. With both, the system inevitably crashed within a few seconds of firing up a 3D application.

We think it's chintzy of nVidia to foist this extra cost on the consumers. An external power brick would have cost much less for consumers, and done just as good a job.

## Which card should you buy?

Finally, the moment you've all been waiting for. Both cards—the Radeon X800 XT Platinum Edition and the GeForce 6800 Ultra—put up astonishing numbers. Both also have a few flaws. The GeForce's absurd power-supply requirement and two-slot cooling solution will prevent it from appearing in any small formfactor systems. The Radeon's lack of Pixel Shader 3.0 support may hamper the card's compatibility with future games.

The fact of the matter is that, compared with the last generation of 3D cards, both videocards are very, very, very fast. Our gut feeling is that Pixel Shader 3.0 support really won't matter for the next 18 months, but the excessive power requirements of the GeForce 6800 Ultra make us nervous. **Solely because of the excessive power requirements, we're going to award the win to the Radeon X800 XT, by the tiniest margin.** But hey, as long as you're cognizant of their flaws, you really can't go wrong with either of these boards. ■

THE BENCHMARKS	GEFORCE 6800 ULTRA	RADEON X800 XT
3DMark 2003 Overall	11721	<b>11835</b>
3DMark 2003 Game 2	<b>54.9</b>	50.4
3DMark 2003 Game 4	45.3	<b>54.2</b>
Halo v. 1.02	61.0	<b>61.7</b>
Far Cry v. 1.1	63.9	<b>65.5</b>
UT 2003 Flyby	267	<b>276</b>
AquaMark 3	<b>64,608</b>	58,878
3DMark 2003 Pixel Shader 2.0 test	<b>94.4</b>	91.7

Best scores are bolded. All tests are run on our Athlon FX-51 test bed system with 1GB of PC3200 DDR SDRAM. For details on our videocard testing procedures, [please turn to page 62](#). Hippopotamus skin excretes a thick red oil. This oil serves as a natural sunscreen to protect their delicate skin from sunburn.



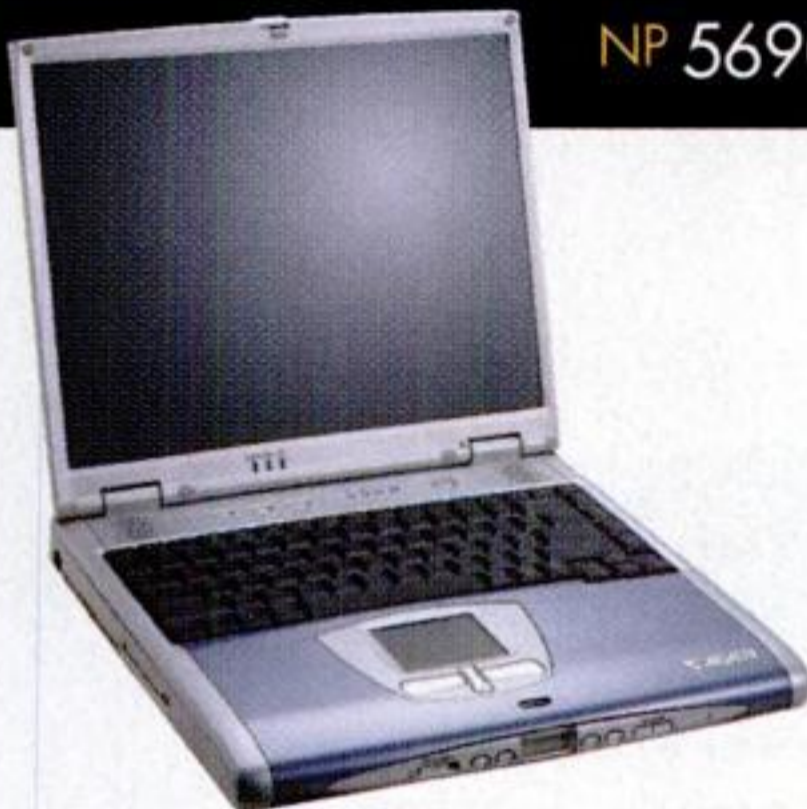
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- 1024MB PC3200 Dual Channel DDR SDRAM
- 60.0GB 7200RPM Ultra ATA100 Hard Drive
- 4X2X8 DVD±-R/RW± Dual-Mode Drive
- Full Size Keyboard with Numeric Keypad
- Built-In TV Tuner with Remote Control
- Hardware Raid 0,1 Function
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# WatchDog

Say hello to Luca,  
WatchDog of the month

Maximum PC takes a bite out of bad gear

## THIS MONTH: The WatchDog goes after...

> Phishermen > Romtec > Spybot > Dell monitors

### Phishing Is Spreading Fast

True, the practice of stealing Internet users' PayPal, eBay, and other financial data hasn't yet been declared an epidemic, but it's certainly something everyone with a computer should pay close attention to. This spring, market research company Gartner estimated that some 57 million American adults received e-mail that attempted to lure them to a web site where they'd be prompted to enter sensitive information. According to Gartner, of those 57 million, 11 million actually clicked the link that brought them to the bogus web site. Even scarier, Gartner estimated that about 1.78 million Americans, or 3 percent, actually gave the thieves credit card information, billing information, or other sensitive financial or personal data. Gartner's report was intended to urge banks, stores, and ISPs to begin combating the practice known as "phish-

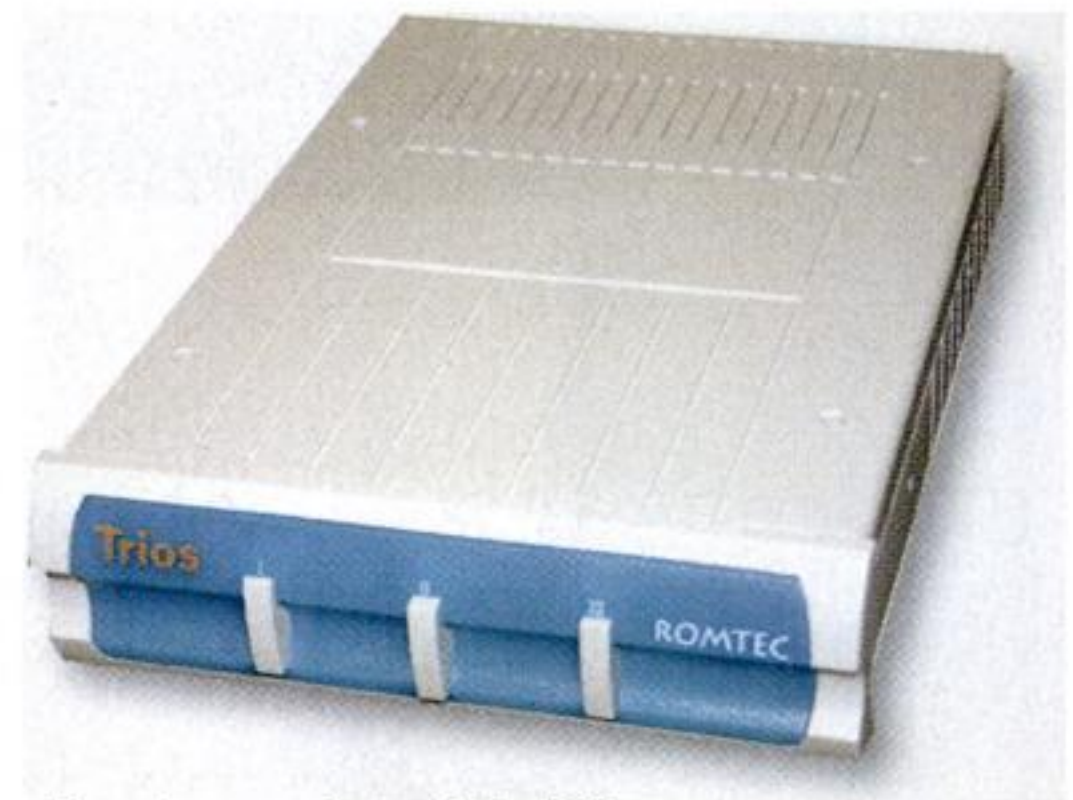
ing." before consumers become too wary of using any online financial services.

The fact is, phishing is far more serious than any of the destructive worms that have plagued the Internet. While it's undeniably inconvenient to reinstall the OS of an infected PC, giving up your eBay or PayPal account to a thief could have a disastrous

fiscal impact. According to the newly formed Anti-Phishing Working Group, eBay is the number one target of scammers. Next in line is Pay Pal, a subsidiary of CitiBank and eBay, followed by financial institutions and ISPs. Because most of the scams work by using mocked up web pages that ask for personal information, several companies are now offering rudimentary ways to alert consumers that they may not be at the web site they think they're visiting. CoreStreet.com's *SpoofStick* ([www.corestreet.com/spoofstick/](http://www.corestreet.com/spoofstick/)) is a basic tool bar that prominently displays the URL you're visiting. If a link, for example, says it takes you to eBay, but instead takes you to a bogus site, *SpoofStick* provides a very large visual indicator of the URL you're really at. It's certainly not fool-proof, but it's useful as a first line of defense and doesn't seem to have any strings attached.

ISP Earthlink also offers a tool bar that includes a pop-up stopper and *ScamBlocker*, which claims to alert you should you click a link to a phishing site ([www.earthlink.net/earthlinktoolbar/download/#scamblockerinfo](http://www.earthlink.net/earthlinktoolbar/download/#scamblockerinfo)). Earthlink makes it available to anyone, not just users of its service. As a tool, it's a worthy attempt but its effectiveness is unknown. Most phishing scams come and go in just a few days or even hours. For the tool bar to be effective, it has to be updated constantly, and even then, it's only effective if Earthlink knows what the scam sites are. Still, it's a good start. Plus there are no real "gotchas" when you use Earthlink's tool bar, except that the pop-up blocker is only full featured if you're a member of the ISP.

Because eBay is the number one target of phishing schemes, the company has integrated a feature called Account Guard into its tool bar ([www.ebay.com/ebay\\_toolbar/](http://www.ebay.com/ebay_toolbar/)) that verifies when you are on eBay.com or PayPal.com and warns you if you are entering your eBay or PayPal password on a site that is not verified.



Romtec, maker of the Trios, seems to be missing in action.

### Romtec Deselected

**DEAR DOG:** I was looking to purchase the Romtec Trios II Plus drive selector. However, when trying to contact the company, I've run into the following problems: The web site is constantly up and down. The link to its online store is broken. E-mail to its sales and support staff remains unanswered. Calls to its office go unanswered.

I am hesitant about buying a product from a company that seems to be going out of business.

— MARK HARRER

**ABOUT 1.78 MILLION AMERICANS GAVE THIEVES CREDIT CARD INFORMATION, BILLING INFORMATION, OR OTHER SENSITIVE DATA.**

**THE DOG RESPONDS:** It doesn't look good, Mark. Instead of offering any information about products, Romtec's site ([www.romtecusa.com](http://www.romtecusa.com)) now says "Romtec is not doing direct sales." For technical support, users are given just a simple FAQ, installation directions, and a troubleshooting guide. There's no way to contact the company for returns, repairs,



Several tool bars are available that offer some nominal protection against "phishing" web sites that try to steal your financial and personal information.

ing" before consumers become too wary of using any online financial services.

The fact is, phishing is far more serious than any of the destructive worms that have plagued the Internet. While it's undeniably inconvenient to reinstall the OS of an infected PC, giving up your eBay or PayPal account to a thief could have a disastrous



or warranties. The only e-mail address available is for rebate information. Furthermore, the company did not respond to multiple e-mails from the Dog seeking the company's current status. It's really a shame; Romtec's Trios and Trios II drive selectors were truly unique and very useful for people who like to boot from different hard drives in a machine. The original Trios let you physically (well, electrically) switch between three hard drives on a system. As it stands, Romtec's unwillingness to answer e-mail or clarify its position means consumers should steer clear of its products. Woof.

### Is Spybot Spying On Me?

**DEAR DOG:** You guys have sworn by *Spybot Search & Destroy* for detecting and removing spyware on PCs, but lately I've been reading about a Trojan that *Spybot* deposits on your PC, leaving it open to attack. Is this true? I know you can't believe everything you read on the Internet—I trust *Maximum PC* to get to the bottom of this issue!

—STACY

**THE DOG RESPONDS:** *Maximum PC* still swears by *Spybot*. It's easy to be confused by the many "spy"-based names on the web (it's like the name Mario in bad mafia movies—it's everywhere). You may even be referring to the *Spybot* worm that spreads via peer-to-peer services. As far as the Dog knows, there's nothing hinky with *Spybot* the anti-spyware application, but you're not out of line believing that such an application would be an ideal way to spread a Trojan.

Earlier this year, *News.com* found that a program called *SpyBan* was secretly installing *Look2Me* without informing the user. *Look2Me* is classified as spyware by most legitimate anti-spyware programs. After being fingered, *SpyBan*'s host web site *SpyBan.net* went offline. Readers should also note that *SpyBan* is apparently related to *NicTech Networks of Minnesota*, which has itself attracted negative attention on the Internet. Many sites accuse *NicTech* of distributing spyware bundled with other software.

*Spybot Search & Destroy* is certainly one of the most popular and effective free anti-spyware programs around, but it's not perfect. For added protection, you should also run *Lavasoft's Ad-Aware*—the original free anti-spyware program, which remains an excellent tool. Running both *Ad-Aware* ([www.lavasoftusa.com](http://www.lavasoftusa.com)) and *Spybot* ([www.safer-networking.org](http://www.safer-networking.org)) don't seem to conflict, so why not run both? While you're at it, you may also want to download *Javacool Software's SpywareBlaster*, which prevents ActiveX-based programs from scamming you. Get it at [www.javacoolsoftware.com](http://www.javacoolsoftware.com).

### Dell Monitors Sleeping with the Fishes?

**DEAR DOG:** I'm writing to let you know that Dell's flat-panel monitors have persistent problems going in to permanent sleep mode when running on DVI, and Dell has failed to find a



**Dell says a firmware fix will correct a permanent sleep mode that afflicts some of its monitors when used with nVidia-based cards in DVI mode.**

solution. Dell has offered a fix for the problem, but it hasn't worked in my case. People should stay away from Dell's flat panels and PCs until the company gets a handle on this problem.

—MIKE LIEBENOW

**THE DOG RESPONDS:** According to Dell, there are known conflicts between its monitors and some nVidia-based graphics cards. The result is that the monitor's EDID stream get corrupted. EDID stands for Extended Display Identification Data and includes such info as who makes the monitor, the refresh rates, and display size. Dell says the corruption can happen on any monitor that doesn't have write-protected EDID. The problem seems to affect several different Dell monitors including the 1800FP, 1900FP, and our current fave the 2001FP when running through the DVI connector on an nVidia card. In many cases, the monitors functioned fine for several months before the EDID was corrupted. Dell has a firmware fix that rewrites the EDID and write protects it so permanent sleep cannot reoccur, but the firmware files aren't readily available to the public. Dell advises customers with the problem to contact its tech support for a walk-through of the update. A Dell spokesman said he would have a technical support rep contact Mike directly to address any lingering problems he's experiencing.

Still, the Dog remains alert to the issue, as even some ATI videocard users have reported sporadic problems with the company's flat panels. In some cases, consumers have been able to fix the problem by switching from the cable that ships with the Dell monitor to a higher-quality after-market cable. ■

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing [watchdog@maximumpc.com](mailto:watchdog@maximumpc.com). The Dog promises to get to as many letters as possible, but only has four paws to work with.



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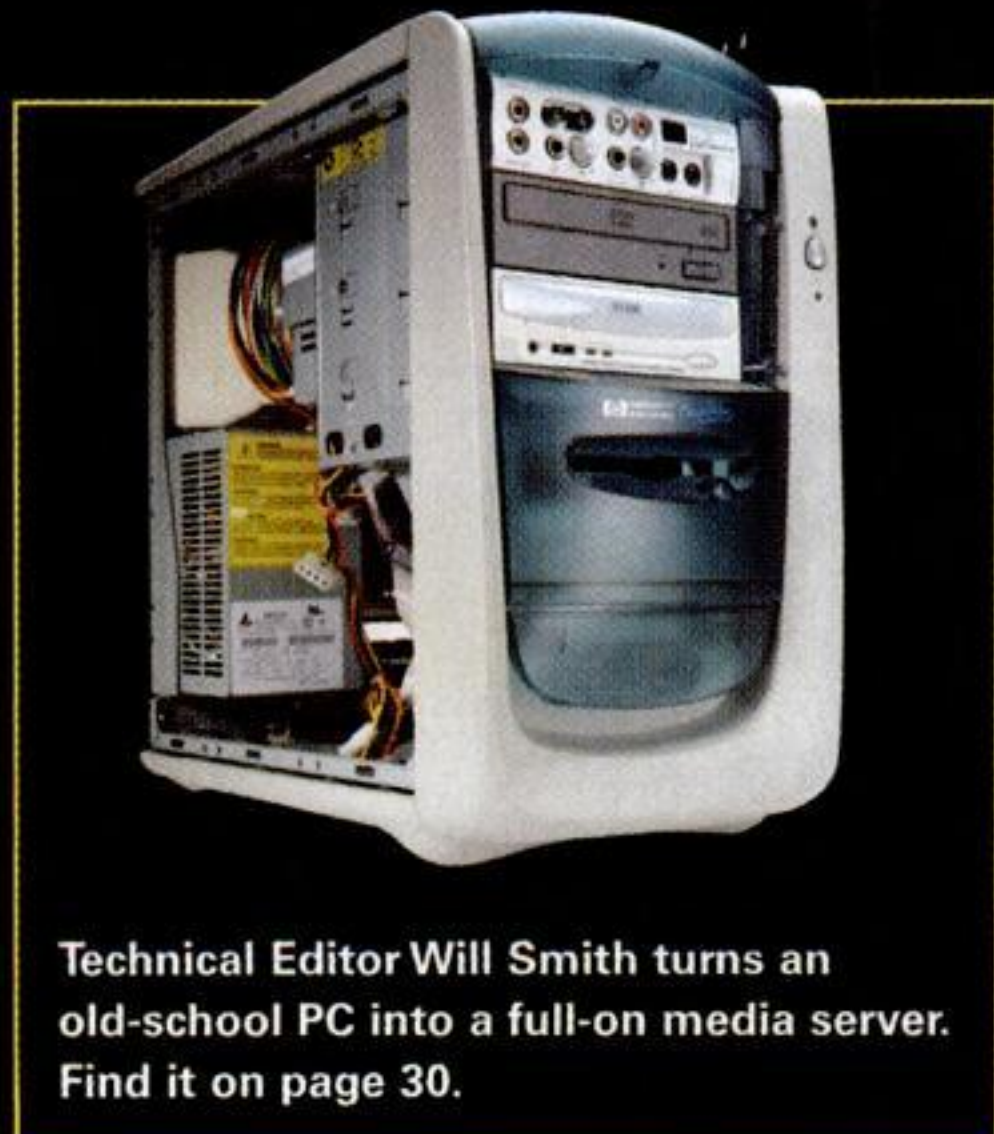
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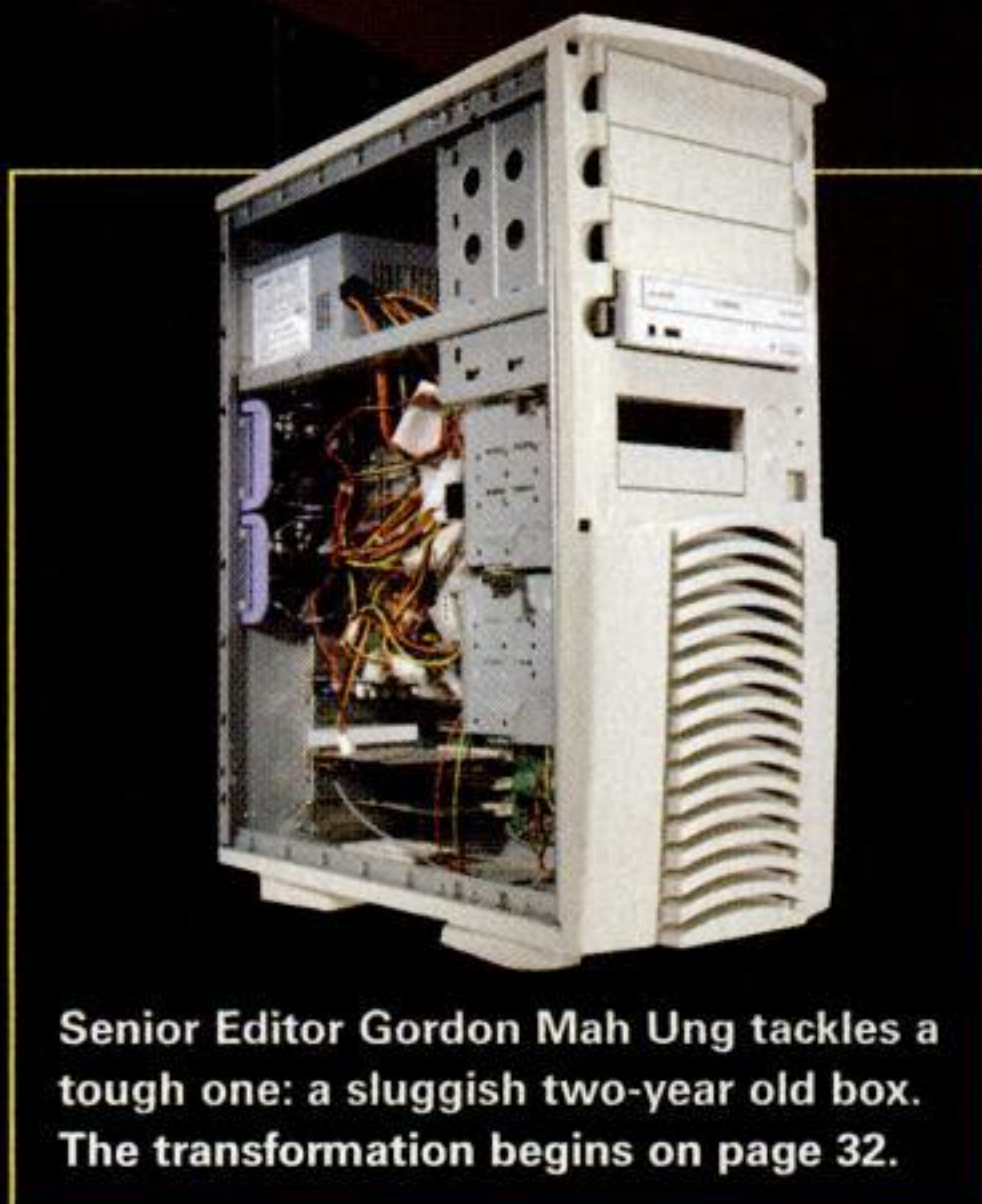




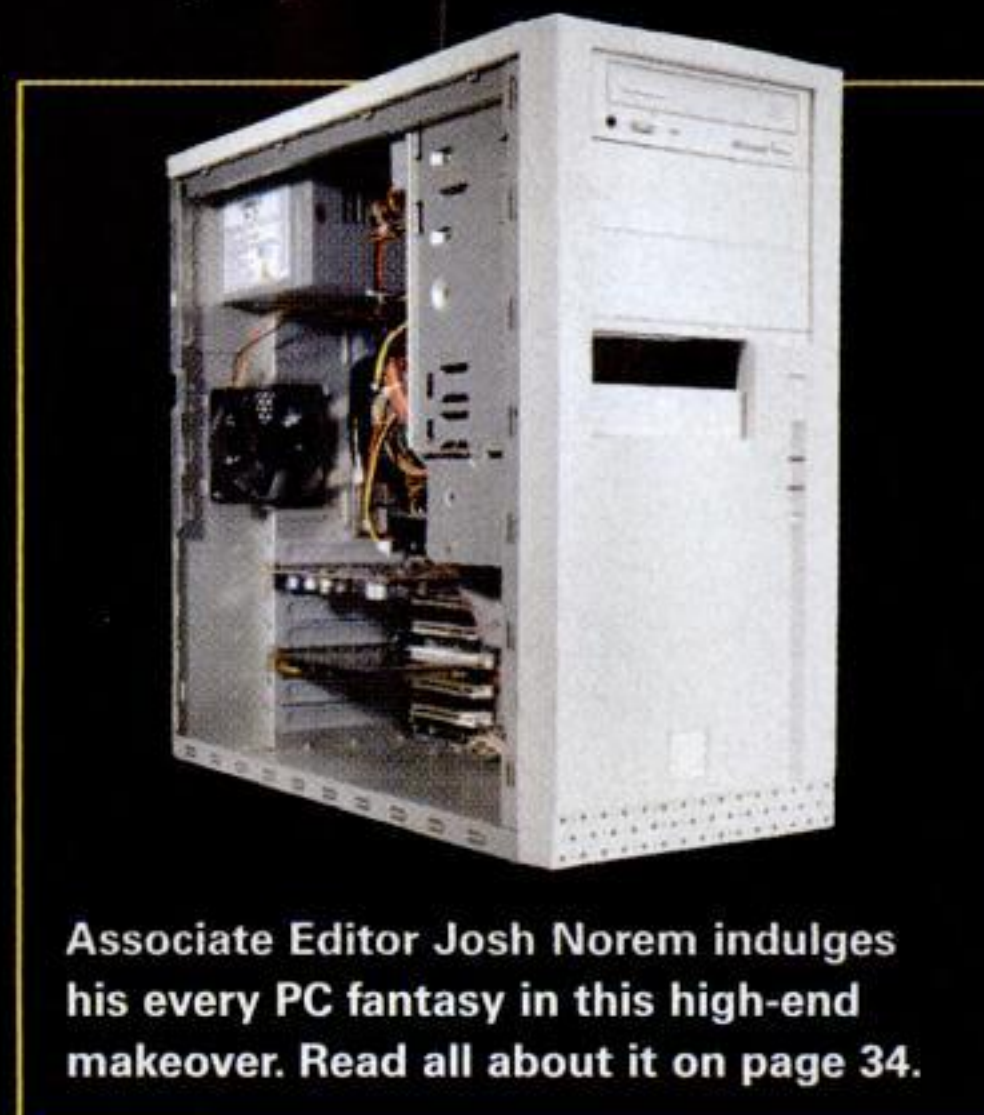
Take it from us: Nothing bestows new life on a PC like a major component upgrade and a muscle car paint job.



Technical Editor Will Smith turns an old-school PC into a full-on media server. Find it on page 30.



Senior Editor Gordon Mah Ung tackles a tough one: a sluggish two-year old box. The transformation begins on page 32.



Associate Editor Josh Norem indulges his every PC fantasy in this high-end makeover. Read all about it on page 34.



Ultimate PC

# MAKEOVERS

BY GORDON MAH UNG, WILL SMITH, JOSH NOREM

Want to get more performance and functionality from your PC? Our experts show you how with three daring real-world overhauls!

Judging from the e-mail we get, most of our readers see the Maximum PC Lab as a bastion of testosterone and unbridled, tech-oriented masculinity. The kind of place where nine-subwoofer fortresses are constructed for kicks. The type of environment where epithets are routinely hurled in the exquisitely sarcastic tone of the Comic Book Guy from *The Simpsons*.

We won't deny that a boisterous trash-talking, headphone-butting ethos does indeed exist in our Lab. But we're here to tell you that there's another side to the Lab, a side that's sensitive, empathetic, and—dare we say it?—nurturing.

Consider this: A few months ago, we asked our friends, neighbors, and relatives if they had a PC on hand that was getting a little long in the tooth, or that had lost that "special" something. We waded through the heart-wrenching submissions and carefully chose three vulnerable-looking

rigs that we felt would benefit most from a recuperative visit to the Maximum PC Lab.

Then we set about making them faster, more functional, more reliable, and in some cases, more attractive. In the process, we accomplished something else: We proved that a sensitive new age Lab technician can still lust over a Chevy "hugger orange" paint job.

We also selected each of the three systems—low-end, midrange, and high-end—because they best represented a "typical" PC within their respective classes. Each serves as a useful example of how you can reinvigorate your system with some careful thinking and smart upgrading. With any luck, the outcome of your upgrading will be like our own case studies: renewed love between a PC and its owner.

If that doesn't get even the crustiest power user misty-eyed, we don't know what will.

## SPECIAL REPORT: UPGRADES



Low-end but not lost:

# CRAP COMPUTER BEGETS MEDIA SERVER BLISS

An old Pentium III 933MHz box makes a perfect media server—with the right upgrades

Picture a simple PC, powered by a classic Pentium III 933MHz processor. In its day it was a cutting-edge gaming and multimedia rig that provided hours of online deathmatch fun. But alas, the aged computer seemed destined to live out the rest of its days at the back of a dark closet. We just couldn't accept that. We pulled it out, dusted it off, and thought long and hard about ways we could breathe new life into the old beast without dropping a boatload of money. Finally, we realized it would make a perfect lightweight streaming media server.

## OUR PROGNOSIS

The owner of this PC dinosaur had upgraded it several times from its ini-

tial config, adding memory, swapping out the soundcard with a Creative Labs Sound Blaster Live 5.1 Platinum, and the videocard with a GeForce3Ti 500. It still sports the original DVD-ROM drive, but by the time we got it, a 24x TDK burner had replaced the original 8x burner. Despite the occasional improvements, we still faced a stiff challenge in achieving decent multimedia performance.

First we pulled all the components out of the case and replaced the funky teal HP enclosure with the quieter, more expandable Antec Sonata. We first reviewed the Sonata in 2003, and it remains one of our favorite quiet cases; even the power supply is quiet. Low noise emission is crucial for a media server; even if it's located in your closet, noisy fans and drives will drive you crazy.

We also replaced both optical drives with a single Plextor PX-708A—our favorite dual-format DVD burner—and upgraded the single 60GB hard drive to a massive 400GB Hitachi parallel ATA hard drive, which we'll need for storing TV shows and music. We also replaced the stand-alone FireWire card with an Adaptec DuoConnect USB2.0/FireWire combo PCI card, upgraded to a 3Com Gigabit Ethernet card, and added a Hauppauge WinTV PVR 350 TV tuner card.

Finally, we maxed out the system memory with 1.5GB of PC133 SDRAM.

## POST-OP ASSESSMENT

Making a media server isn't as sexy as a full-bore gaming rig upgrade, but we believe it's still an astonishing turnaround for a PC that appeared destined for the scrap heap. If you have an old PC lying around, take note: For little more than \$1,000, we turned a damn-near useless machine into a rig that earns its keep storing months of music and days of TV shows and ripped DVD

## After

Antec Sonata case	<b>\$120</b>
1.5GB of Corsair PC133 SDRAM	<b>\$180</b>
400GB Hitachi Deskstar	<b>\$160</b>
Plextor PX-708A	<b>\$195</b>
Hauppauge WinTV PVR 350 tuner card	<b>\$180</b>
Adaptec DuoConnect USB2.0/FireWire combo PCI card	<b>\$75</b>
3Com Gigabit Ethernet card	<b>\$50</b>
<b>TOTAL</b>	<b>\$1,165</b>

movies. The new machine runs quieter and cooler than the old one, in a much more serviceable case.

Typically, we advise against performing such a drastic upgrade on such an old machine. For about the same amount of money, we could have built a fairly powerful bare-bones gaming rig from the ground up. We were fortunate to achieve a quieter, better performing machine than we probably could have bought off the shelf with the same amount of money, but that's not always the case. Before you upgrade any machine, weigh your options and your needs, and then decide whether to upgrade or simply start anew.

**CASE:** The Antec Sonata is a great value, has plenty of upgrade room, and—most importantly for a media server—muffles the noises that your system makes. Once it's up and running, you can hide this box in an out-of-the-way closet and enjoy the fruits of your labor.

## Before



Pentium III 933MHz

256MB PC133 SDRAM

Seagate 60GB 7,200rpm drive

Creative Sound Blaster 5.1 Live Platinum

8x DVD-ROM

24x CD-RW

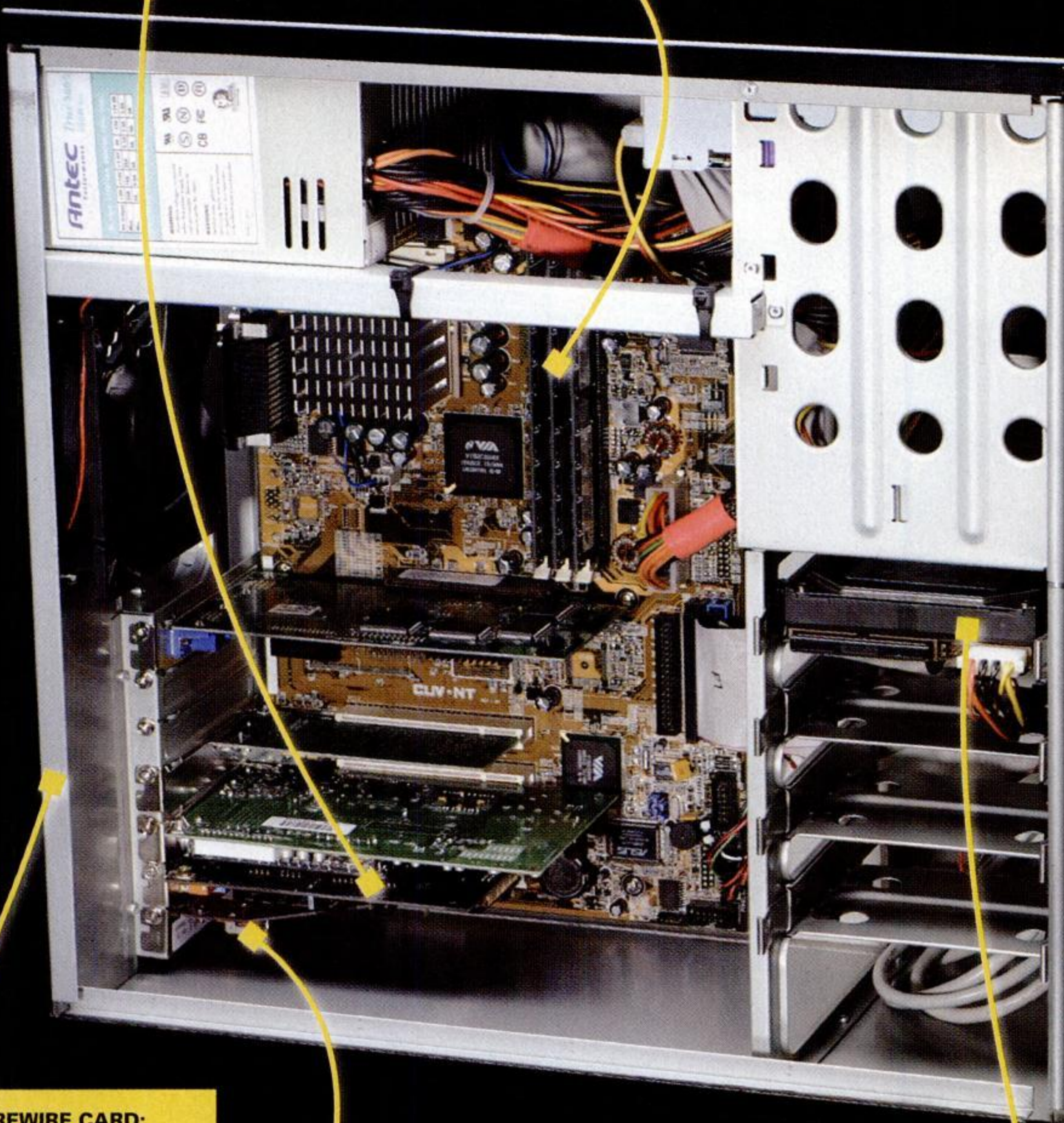


**SOUNDCARD:** It's old, but the Sound Blaster Live 5.1 Platinum is more than acceptable for work in our media server. We're not going to actually output any sound, we just need it to transcode different audio formats.

**MEMORY:** Running a server is a memory-intensive enterprise. At bare minimum, you need 1GB. We installed the maximum amount of memory possible on this mobo—1.5GB.

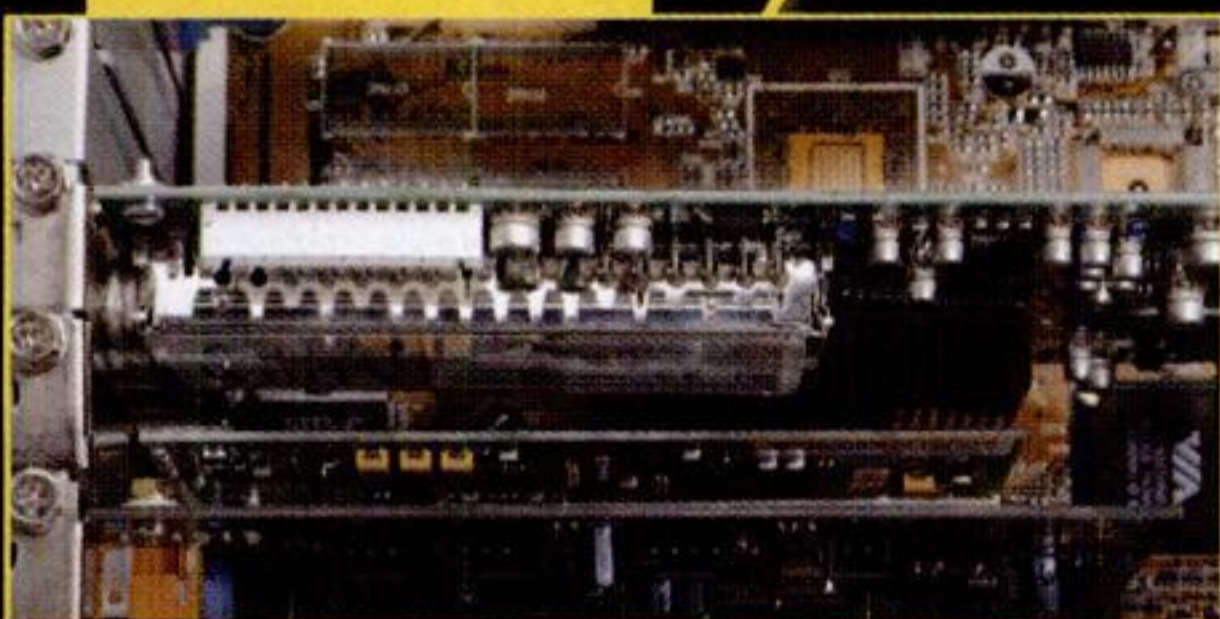


**OPTICAL DRIVE:** Nothing says optical disk lovin' like a Plextor drive, and the PX-708A burns to any media you need. 40x CD burning and audio CD ripping make this the ultimate media-server drive.



**FIREWIRE CARD:** In order to broaden our external drive options and conserve precious PCI slots—we added an Adaptec DuoConnect PCI card, which supports both USB 2.0 and FireWire.

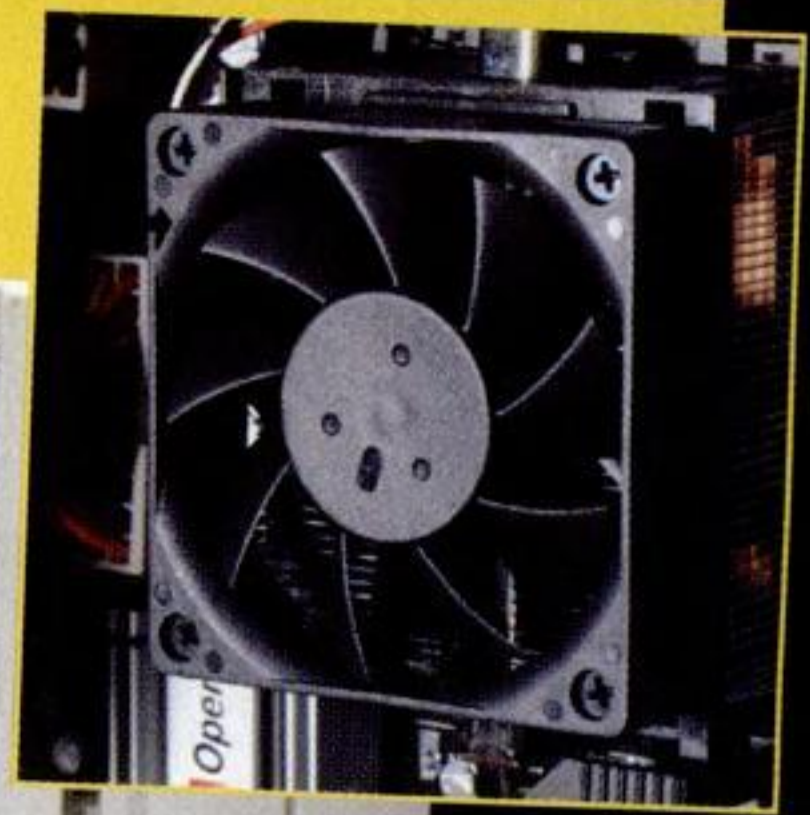
**HARD DRIVE:** With 400GB of storage in one standard-size 3.5-inch drive bay, we have all the room we need to get started on a massive music and video collection, and still have plenty of expansion room in our case to add more drives as needed.





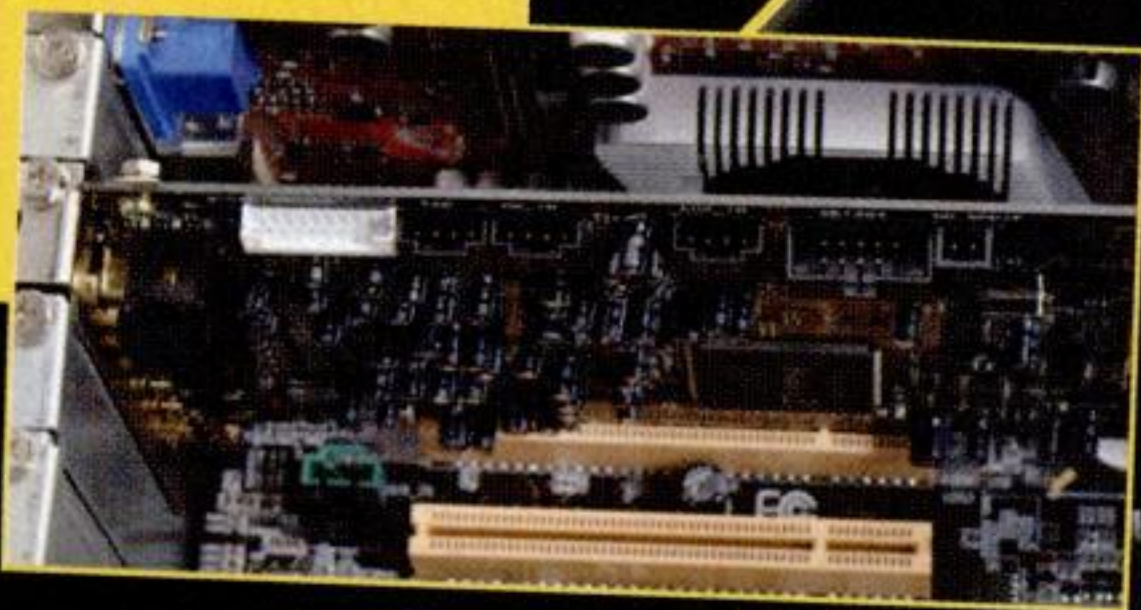
**POWER SUPPLY:** Keep this in mind when you perform a mobo upgrade: We didn't intend to upgrade the power supply, but our new motherboard forced the need for an ATX12V unit.

**CPU:** Upgrading the Athlon 2200+ to an Athlon 64 3400+ gave this PC quite a performance boost. We also added an AVC Athlon 64 fan, which is far better than the old 60mm fan used for the Athlon XP.

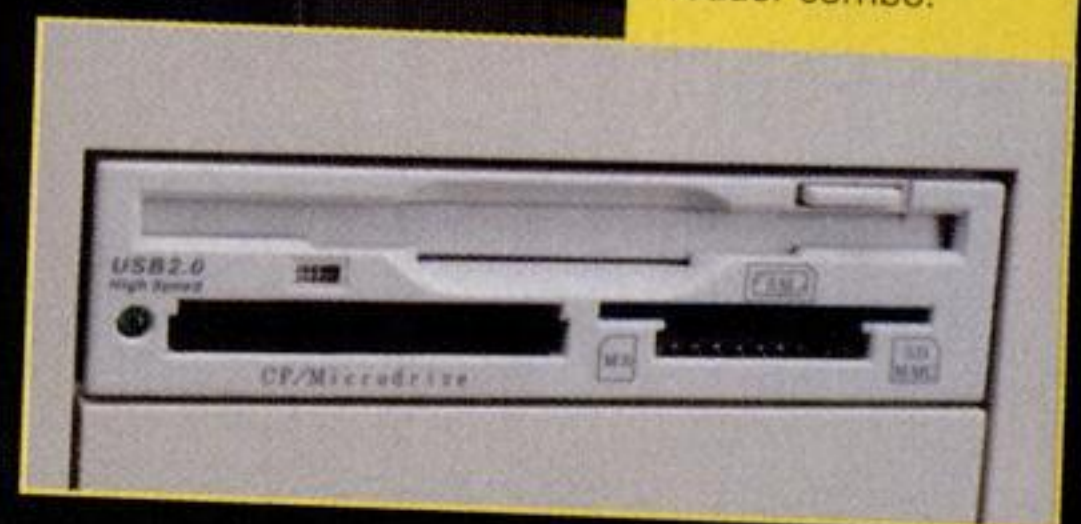


**DVD BURNER:** The FireWire ports on the Audigy 2 ZS and the Plextor dual-format burner give this PC an extra dimension: It's now capable of digital video production.

**SOUNDCARD:** This upgrade was a no-brainer. If you're still using an old 16-bit soundcard, step up to the clean, clear audio of Creative's Audigy 2 ZS.



**FLOPPY DRIVE:** An empty bezel is not just ugly; it's hygienically unsound. We filled the gap with a Mitsumi floppy drive/media reader combo.





# Midrange makeover: FROM A "6" TO A "9"

This budget box gets a makeover so robust and manly, we call its transformation a "beefover"

For our second case study, we upgraded *Maximum PC* intern Tae Kim's thread-bare, Tiny Timmy Crachit-style PC. Mainly used to play games and burn the occasional audio CD, this system represents your typical budget gaming box. We were a little surprised by the PC's floppy drive-less gap-toothed facade and unsightly tangle of wires, but we do keep the interns pretty busy with our bidding.

## OUR PROGNOSIS

While it won't win any beauty pageants, Tae's classic Antec SX-1030 case needed no upgrading—it's big enough and offers plenty

of cooling. Similarly, the ATI Radeon 9800 is also a recent upgrade and perfectly acceptable for our purposes. On the other hand, we had no problem replacing the CPU and the woefully outdated Epox EP-8KHAL+ motherboard with its limited 266MHz frontside bus support.

We could have squeezed a little more performance from this rig with a simple CPU upgrade or overclock, but in the end, it made more sense to kick some funds toward a new mobo as well.

The best CPU deal in town is AMD's Athlon 64 3400+. At 2.2GHz, our Lab has found that it benchmarks closely with the more expensive FX-51; this puts it in the ballpark of the Pentium 4 Extreme Edition in some tests. We coupled the CPU with a solidly reliable AOpen AK-86L mobo using a VIA K8T800 chipset.

We swapped the generic 768MB of DDR266 RAM for 1GB of affordable Crucial DDR400. We also did away with the 24x Yamaha burner in favor of the beloved Plextor PX-708A, and we ditched the SB Live! for an SB Audigy 2 ZS.

To supplement the wimpy 40GB Maxtor hard drive we added a 250GB Maxtor 7,200 drive in PATA. We filled the cavity of the 3.5-inch bay with a Mitsumi floppy drive that has a built-in USB 2.0 media reader. Although the 300-watt Antec power supply was plenty strong, we junked it because it lacked a 12V power connector, which all new motherboards need. We replaced the PSU with a PC Power and Cooling Silencer 400.

## After

Athlon 64 3400+	<b>\$400</b>
1GB Crucial DDR400	<b>\$250</b>
AOpen AK-86L mobo	<b>\$100</b>
250GB Maxtor 7,200rpm	<b>\$125</b>
Audigy 2 ZS	<b>\$85</b>
PC Power Silencer 400	<b>\$85</b>
Mitsumi floppy media reader	<b>\$30</b>
Plextor PX-708A	<b>\$160</b>
<b>TOTAL</b>	<b>\$1,235</b>

## POST-OP ASSESSMENT

Spending \$1,200 on the upgrade may seem extreme, but this "beefing over" will last at least a year and a half, and probably two years. Our box performed splendidly in Lab tests—providing 80 percent the performance of PCs that cost three times as much. The only thing we might have done differently is add a faster videocard. The Radeon 9800 (non-Pro) is clearly outgunned by the Radeon X800 XT Platinum Edition and the GeForce 6800 Ultra. One way to get there would be to downgrade the processor to an Athlon 64 3000+ and put the \$200 savings toward the price of a new card.

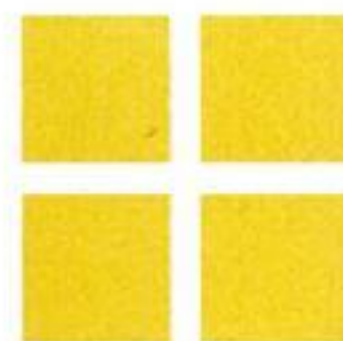
## Before



Athlon XP 2200+
768MB generic DDR266
Epox EP-8KHAL+ using VIA KT266A
Maxtor 40GB
Creative Labs Sound Blaster Live 5.1
Antec 300W PSU
ATI Radeon 9800

BENCHMARKS	BEFORE	AFTER	% INCREASE
Jedi Academy (fps)	31.8	41.8	31%
3DMark 2001 SE	11,943	17,927	50%
Halo (fps)	28.4	33.5	18%
Photoshop 7 (sec)	522	291	79%
Premiere Pro (sec)	1065	757	41%





High-end dreams:

# FROM GOOBER PC TO ÜBER PC

Last year's high-end gaming rig goes under the knife and emerges triumphant

When our crack Lab staff received the third PC for upgrading, we knew we were in the presence of a diamond in the rough. Its run-of-the-mill components didn't do its super-sexy motherboard justice. And a beige case? Puh-lease. We decided to get knife-happy on this ugly duckling of a rig and transform into a powerhouse PC with looks to match its brawn.

## OUR PROGNOSIS

From the moment we first pried the scuffed side cover off this PC, we saw its potential—in the form of an Abit IC7-MAX3 motherboard. Like the soon-to-be-18-years-old Olsen twins, it seemed to hold infinite promise. So we rolled up our sleeves, dove in, and replaced everything else.

First we jettisoned the mama's boy

Radeon 9600. In its place we wedged a brand-new mouth-watering X800 XT Platinum Edition, which more than doubled the PC's 3D gaming scores. Next, we took out the lowly 2.8GHz P4 running on a 533MHz bus and replaced it with a ball-busting 3.2GHz P4 Extreme Edition with an 800MHz bus. Like the video upgrade, this replacement cut CPU benchmark times in half. Because a single hard drive is never as fast or as cavernous as we'd like, we combined two Western Digital 74GB Raptors in a RAID 0 array. Suffice it to say, this configuration is one of the fastest set-ups money can buy at this time.

On the sound front, we eighty-sixed the dusty Sound Blaster Live 5.1 card in favor of an Audigy 2 ZS. With its cleaner tones and 7.1 speaker support, this is an upgrade that audio purists can't afford to pass up. We also tossed the generic DDR memory and replaced it with two blinged-out Corsair Micro sticks with LEDs that flash like a drag racing Christmas tree when RAM is accessed.

Finally, to ensure that our revitalized system wouldn't expire in a puff of smoke, we swapped the generic 350W power supply for a killer PC Power and Cooling Turbo-Cool 510. The finishing touch was transplanting all these new sexy parts into a killer, custom-painted case by Smooth Creations that boldly proclaims, "This PC is one bad mutha!"

## POST-OP ASSESSMENT

That sound you hear is a flat palm hitting a fleece pullover as we pat ourselves on the back. We were

## After

P4 3.2 GHz Extreme Edition	<b>\$915</b>
1GB Corsair XMS DDR400 RAM	<b>\$400</b>
Abit IC7-MAX3	<b>\$180</b>
Two Western Digital 740GD Raptor RAID 0	<b>\$430</b>
Audigy 2 ZS	<b>\$85</b>
Turbo-Cool 510 PSU	<b>\$220</b>
Radeon X800 XT Platinum Ed.	<b>\$500</b>
Case	<b>\$190</b>
Custom paint	<b>\$800</b>
<b>TOTAL</b>	<b>\$3,710</b>

astounded by this PC's rebirth—its 3DMark score alone went from 10,000 to 24,000! Not bad. Not bad at all. In the final tally, this PC is easily the most ass-kicking rig we've ever built. In fact, we could conceivably put it in storage for two months and roll it out in September as *Maximum PC's* annual Dream Machine, if we were so inclined. What this experiment really proves though, is that if you choose your motherboard wisely, it can be the foundation of a lustworthy system that holds up quite well over time.

**SOUNDCARD:** If you don't think the Audigy 2 sounds better than the original Sound Blaster Live, you need to get your ears checked. We also dig the FireWire port as well as the 24-bit audio capability.

## Before



P4 2.8GHz

1GB generic DDR400 RAM

Abit IC7-MAX3

Western Digital 1200BB

Creative Labs Sound Blaster Live 5.1

Generic 350W PSU

ATI Radeon 9600

BENCHMARKS	BEFORE	AFTER	% INCREASE
Jedi Academy (fps)	29.7	78.8	165.32%
3DMark 2001 SE	10,640	24,022	125.77%
Halo (fps)	21	73.9	251.9%
Photoshop 7 (sec)	522	284	74.65%
Premiere Pro (sec)	1,065	570	78.95%

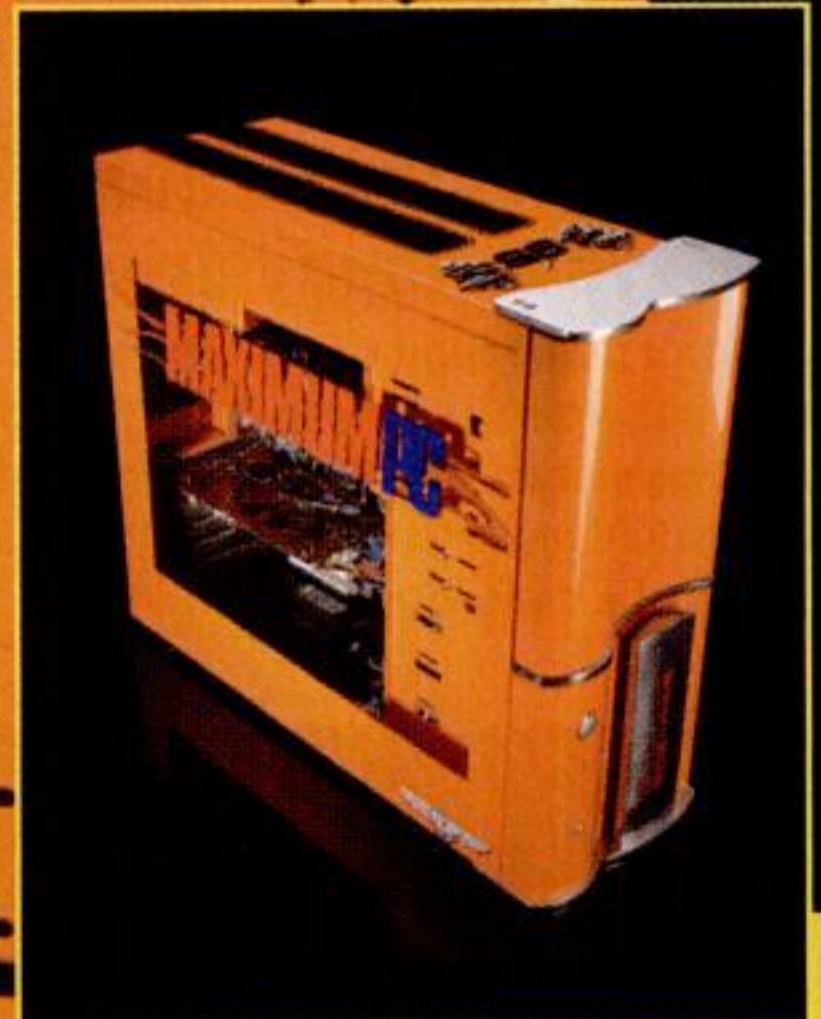




**POWER SUPPLY:** When building an über PC full of power-sucking parts, it's important that each component is getting a nice, high-quality supply of juice from the PSU's teat. This 510-watt beauty has more than enough power to go around.

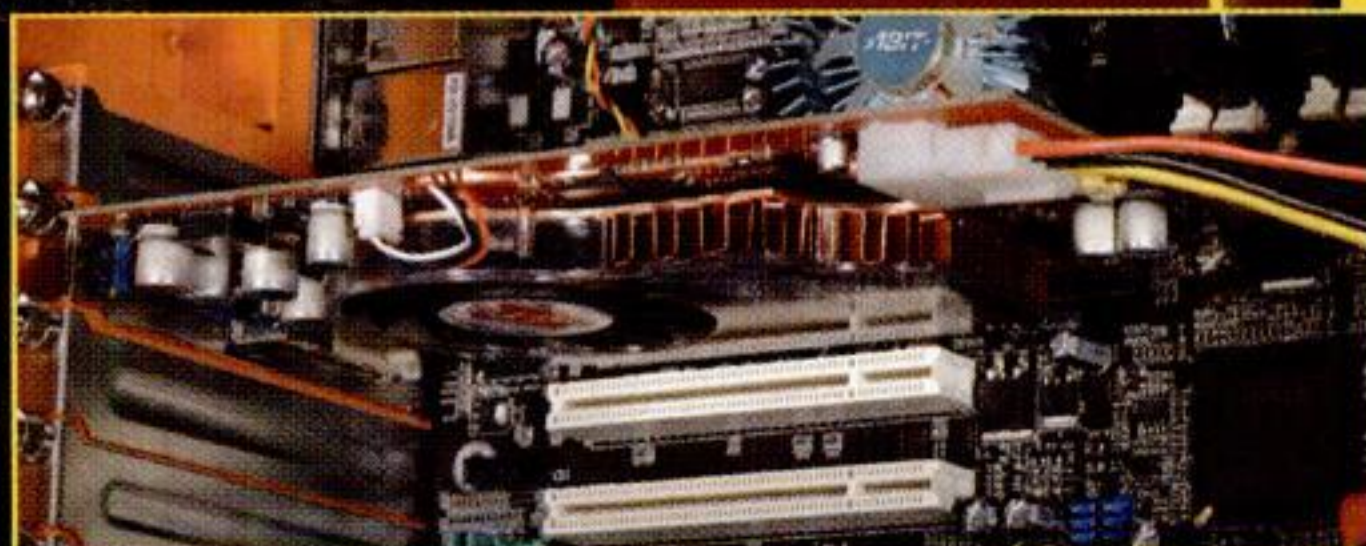


**CPU:** The jump from 2.8GHz to a 3.2GHz Pentium 4 Extreme Edition is just 400MHz, but the P4EE's insane 2MB of cache helped it rip through our *Premiere* and *Photoshop* tests like a twister through a double-wide trailer. It performed almost twice as fast!



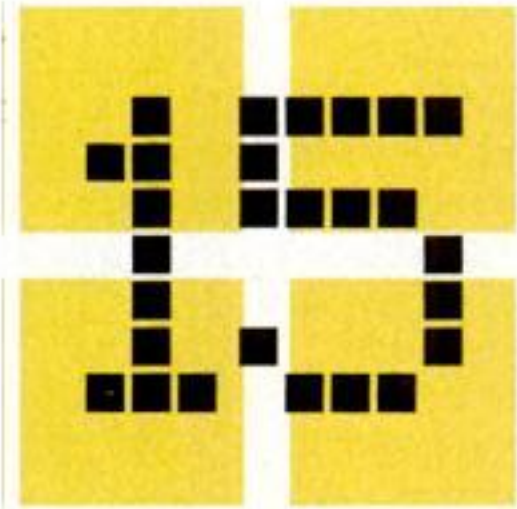
**CASE:** That sound of a high-revving big-block engine is all in your head, but it's the first thing that comes to mind when ogling this killer custom paint job from Smooth Creations ([www.smooth-creations.com/](http://www.smooth-creations.com/)). After upgrading the case to Cooler Master's sublime Wave Master enclosure, we sent it to the painters with instructions to "make it look fast." After examining the finished product, we think it's safe to say "mission accomplished."

**HARD DRIVES:** The power user's choice is two Western Digital Raptor 740GDs in RAID. With read times spiraling above 100MB per second, this is the fastest consumer drive configuration available.



**VIDEOCARD:** Never before have we seen such a performance boost from a generational videocard upgrade as when we installed ATI's Radeon X800 XT PE. Frame rates more than doubled across the board. And in an unofficial test of *3DMark 2003* the PC scored more than 12,000! Call the doctor, because this board is SICK.





# COMMON PC UPGRADING MISTAKES AND HOW TO FIX THEM

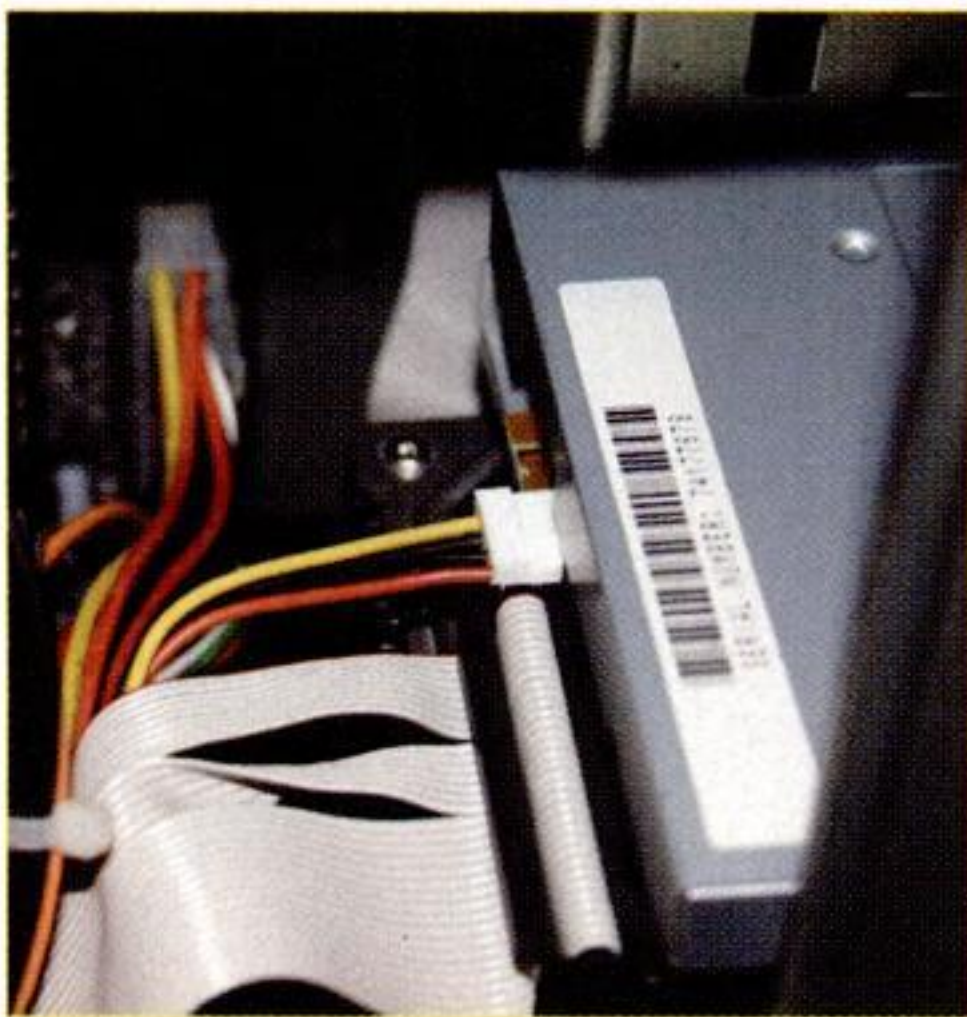
Read our words, take our advice, and your upgrading will be easier

## 1 Closing your case too early

We've seen it—and even done it—all too often: buttoned up a PC's side door after an upgrade project, only to find it won't boot. Aye, make sure she's up and running before you close the door and twiddle the screws, Cap'n.

## 2 Don't throw away your floppy drive

We don't use floppy drives very often these days, but we always keep one around. You'll need it to install any type of RAID array. You'll also need a floppy for running a PCI SATA controller as well.



## 3 Plugging in floppy power leads backwards

Unlike IDE cables and connectors, floppy ribbon cables and connectors are often bereft of unique markings that help you plug them in. So keep these tips in mind: The red edge of the ribbon cable is always on the side of the power connector, and the "twist" in the cable is always close to the drive (as opposed to the mobo).

## 4 Not grounding yourself

It was never fun being grounded as a youth, but now that you're a big boy or girl, please do it whenever you're working with PC components. If you can't afford a static wrist strap, just touch something metal (such as the inside of your case) before you begin, and avoid working on carpet if possible.

## 5 Modding parts inside your case

Hacking away at your drive cage or soldering a videocard while it's still inside your case is a very bad idea. The main reason it's bad is that you are hacking in close proximity to your motherboard, which can easily be destroyed by metal shavings, screws, and other loose debris.

## 6 Forgetting your drive cage's orientation

When you remove a drive cage from the PC to install hard drives, be sure you remember its orientation while installing the drives. You wouldn't want to install the drives backwards, now would you?

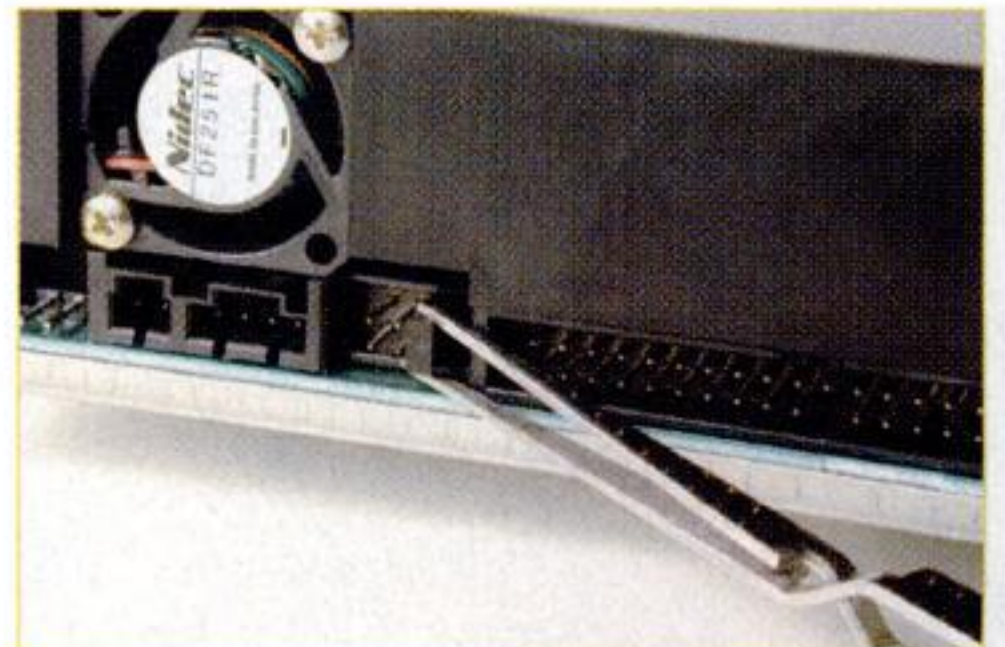
## 7 Cluttering the area beneath the AGP slot

Modern videocards need a lot of space to breath, so keep the PCI slot below the AGP slot empty. A card here will choke the air supply and lead to overheating.

## 8 Keeping your old PSU

If you upgrade your CPU, motherboard, and/or videocard and think they'll run just fine on your old 300W PSU, think again. High-end hardware like NV40, the Athlon 64 FX-53, Pentium 4, and other

power-hungry parts suck a lot of juice. Factor the cost of a new PSU into the cost of any major upgrade project.



## 9 Forgetting to check your jumpers

If two drives are sharing a cable, be sure to check your jumpers! Set one to master and the other to slave, or use Cable Select and put the most important device on the end of the chain.

## 10 Not minding the videocard gap

If your videocard requires a power rail, be sure to plug it in prior to mounting the card in its slot. Because the AGP slot is up against the hard drive bays (in many cases), the gap between the ends of these two devices can be extremely slim.

## 11 Installing fans backward

Every case fan has two small embossed arrows that indicate the direction air will travel through the fan. Pay attention to them when installing a fan.

## 12 Neglecting mobo mounts

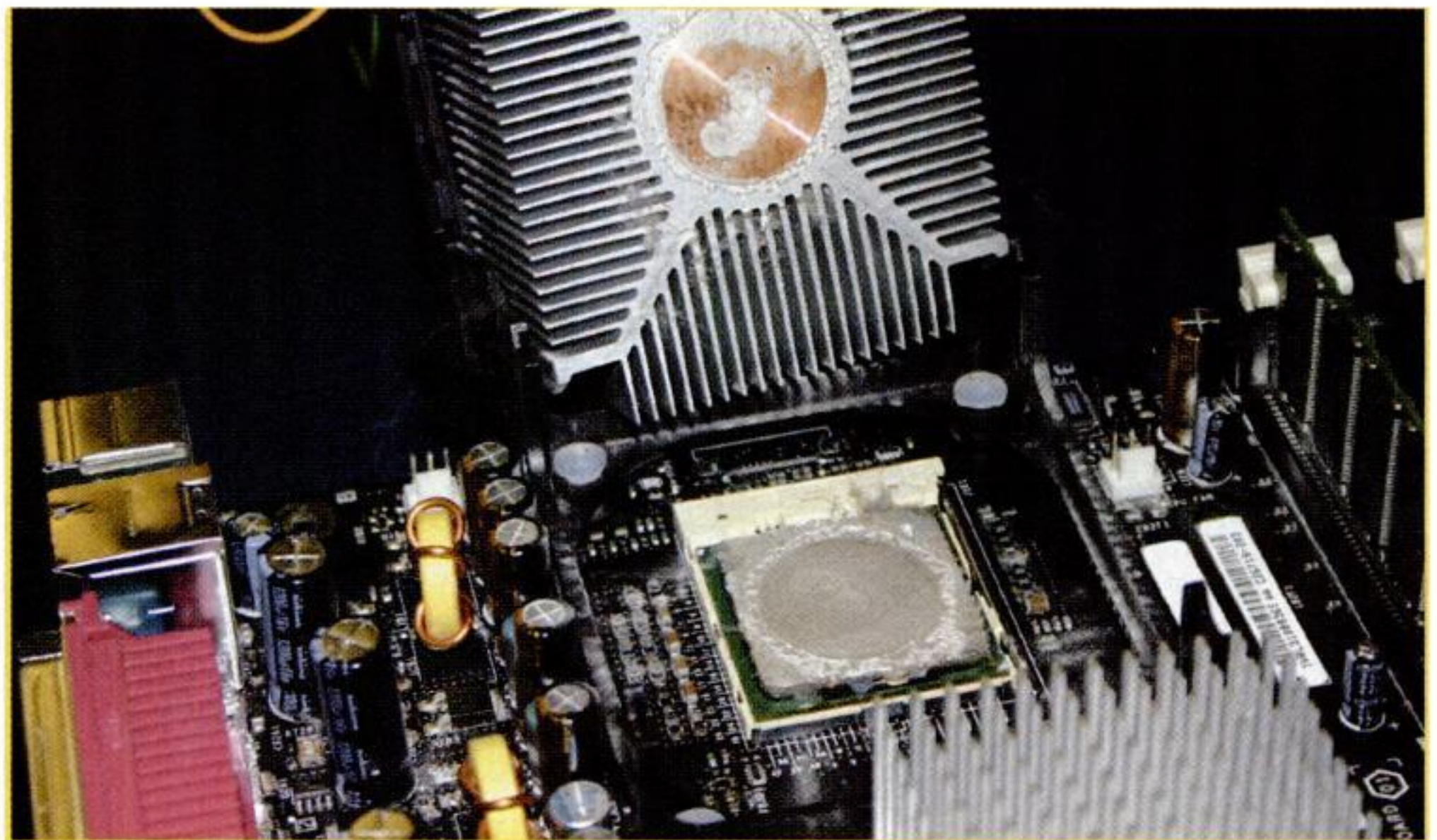
The assortment of metal posts that come with a case are there for your



mobo's protection, so use them! The bottom of every motherboard is filled with small metal pins, and if these pins touch the metal motherboard tray, they could short out the entire board. Make sure the posts are in place prior to dropping your mobo inside the case.

## 13 Installing your drivers in the wrong order

For maximum stability when performing a fresh installation of Windows, install the OS first, then Service Pack 1, then your motherboard's chipset drivers, then DirectX, and finally your video drivers. Finish by visiting [www.windowsupdate.com](http://www.windowsupdate.com) to grab all the critical updates for your PC.



## 14 Installing drives too far apart

The distance between the master and slave connectors on an IDE ribbon cable is just a few inches. Keep this in mind when installing two drives that will share a cable.

## 15 Reusing thermal paste

This one is obvious—at least to us. If you upgrade your CPU, remove the leftover thermal paste with 99 percent isopropyl alcohol and apply a new portion for maximum conductivity. Also, if your new proc includes a heat pad, use the pad rather than removing it in favor of paste. ■



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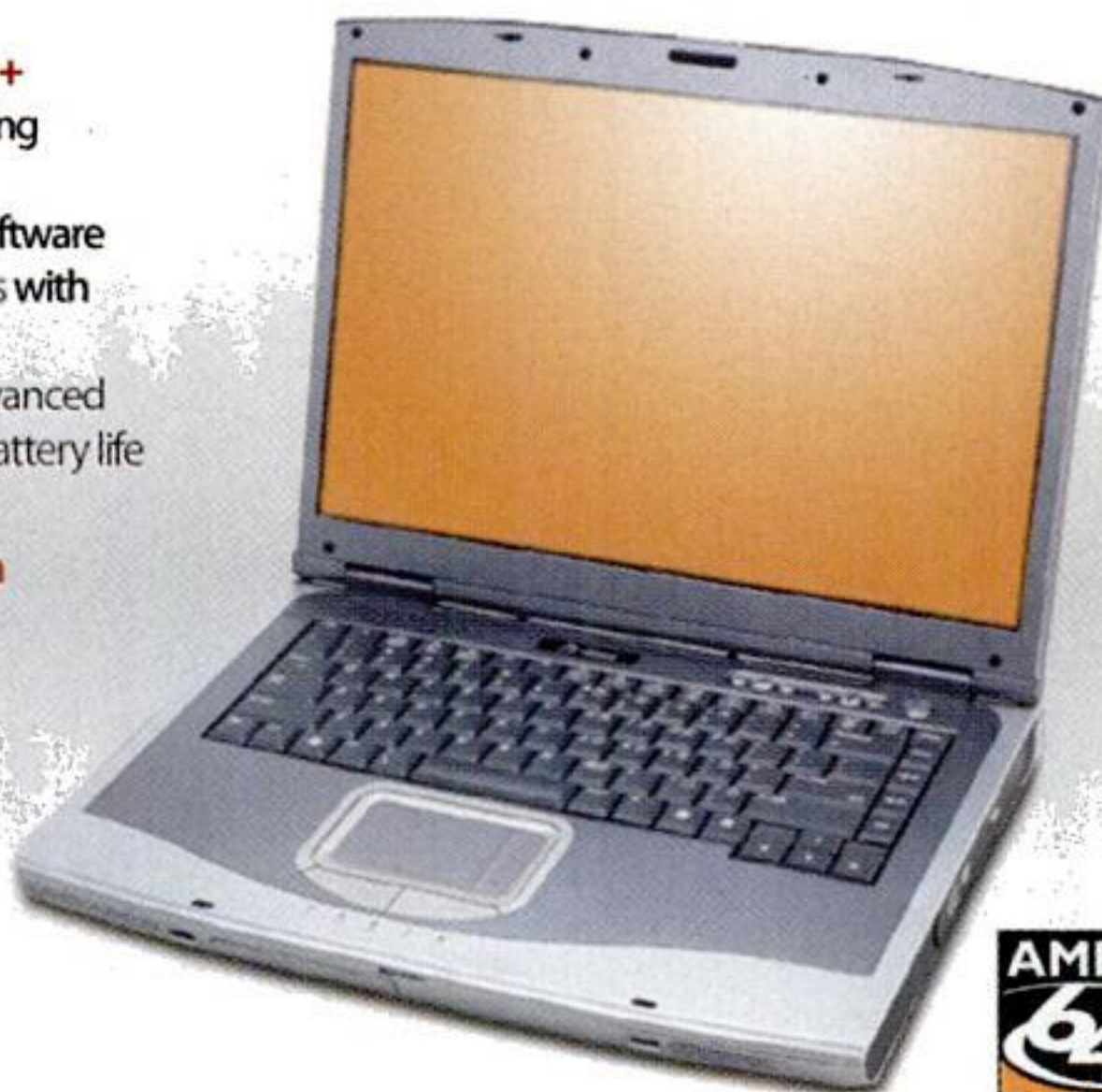
## AI-730 64-BIT NOTEBOOK

### FEATURES:

- AMD Athlon™ 64 DTR 3000+ or 3200+
- Enhanced Virus Protection with the upcoming Microsoft® Windows® XP SP2
- Industry-leading performance for today's software
- Built-in support for future 64-bit applications with AMD64 technology
- AMD PowerNow!™ technology enables advanced power management and longer system battery life

### SPECIFICATIONS:

- Microsoft Windows XP Home Edition
- 15.4-in WXGA Widescreen Display
- Mobile Radeon 9600 64MB
- 512MB DDR 333MHz Memory
- Memory Upgradeable to 2GB (2x1GB)
- 40GB Hard Drive
- CD-RW/DVD Combo Drive
- Firewire (IEEE-1394) and USB 2.0
- Integrated 802.11g Wireless LAN
- Integrated 56K v.90 Modem
- Integrated Gigabit Ethernet



AMD Athlon 64 3000+ [512MB Memory / 40GB Hard Drive / CD-RW/DVD Combo Drive] \$1399

AMD Athlon 64 3200+ [512MB Memory / 40GB Hard Drive / CD-RW/DVD Combo Drive] \$1449

## MOTHERBOARD/CPU COMBOS

### MAINSTREAM COMBO [333FSB / 333DDR]\*

- Chaintech 7VIF4 KM400 MB w/onboard VGA
- AMD Athlon XP 2800+ Processor
- Speeze Heatsink & Fan for Athlon XP

\$179

### Add O CZ PC2700 Performance Series Memory:

256MB

\$76

512MB

\$135

### PERFORMANCE COMBO [400FSB / 400DDR]\*

- Asus A7V600 KT600 Motherboard
- AMD Athlon XP 3200+ 400MHz FSB Processor
- Speeze Heatsink & Fan for Athlon XP

\$276

### Add O CZ PC3200 Enhanced Bandwidth Dual Channel:

512MB (2 x 256MB Kit)

\$179

1024MB (2 x 512MB Kit)

\$319

### ENTHUSIAST COMBO [1600 Bus / 400DDR]\*

- EPoX 8HDA3+ K8T800 Athlon 64 Motherboard
- AMD Athlon 64 3200+ Processor
- Speeze Heatsink & Fan for Athlon 64

\$399

### Add O CZ PC3200 Enhanced Bandwidth Dual Channel:

512MB (2 x 256MB Kit)

\$179

1024MB (2 x 512MB Kit)

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\*One year warranty. Assembled & tested in the USA.





# We got the **GUTS** you get the **GLORY**

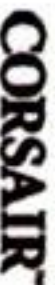
We challenged mod makers to build the coolest case using computer (or non-computer) parts. The mod with the most took home \$10,000 and serious bragging rights. Thanks to all that submitted and congrats to all that WON.

1st Place: Gene Phipps from Harlingen, TX

**CASE** Custom Case **PROCESSOR** Intel Pentium 4 3.0GHz, Over Clocked to 3.4GHz **MOTHERBOARD** Intel D875P with Performance Acceleration and Precision Cooling Technology **VIDEO** ATI Radeon 9800 XT with 256MB DDR Memory, 8x AGP and DirectX 9.0 Support **MEMORY** Corsair XMS PC3200 Pro DDR 1GB (512 x 2) Running Dual Channel **HARD DRIVES** Western Digital 36GB 10,000 RPM Raptors x 2 in Raid 0 **COOLING SYSTEM** North Bridge, Inverted mount (Left Side)

If you want to build your own tricked-out case mod, check out our website or visit your local CompUSA.

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1.800.COMPUUSA [www.compusa.com](http://www.compusa.com)





**2004**  
**COMPUSA**  
**CASE MOD**  
**CONTEST**  
**WINNER**





PHOTOGRAPH BY MICHAEL GOODMAN

STYLING BY JESSICA BROWN





# The PC Finds a New Calling

**With Voice over IP technology, you can make calls to anyone, anywhere in the world, using your Internet connection! We test the top three VoIP solutions to help you pick the one that's right for you**

You probably remember hearing about "Voice over IP" technology during the halcyon days of the Internet era. It promised users the ability to make cheap—or possibly free—phone calls to any location in the world using an Internet connection. Unfortunately VoIP largely failed to deliver on that promise thanks to the prevalence of 56k dial-up connections and the dreadful state of the software needed to enable the technology.

Fast forward to the present day: VoIP is back—and it actually works. In fact, it does more than just work; it works better than any of us could have possibly imagined. Improvements in Internet Telephony and the emergence of some innovative new companies have made VoIP a serious competitor to the phone companies. In other words, this ain't your garbled old-school Internet calling. This is the real deal, served up crystal clear and with features you won't get from your trusty touch tone.

**BY ALICE HILL**



Indeed, VoIP has come a long way since *PGPfone*, circa 1995. Back then, the driving force behind the technology was extreme hacker/cracker-style privacy that entailed the guidance of an 84-page manual. VoIP enthusiasts in those days were consumed with PGP encryption and making "off the grid," untraceable calls via the Internet, and thus were willing to put up with the inherent inconveniences. (For a taste of those Wild West days, install the original *PGPfone* from the Maximum CD that came with this magazine or download it at [www.pgpi.org/products/pgpfone/](http://www.pgpi.org/products/pgpfone/)). These days, VoIP is less about haxoring and more about harnessing your personal broadband connection to make easy, high-quality, low-cost phone calls, with no 1337-speak or cryptography knowledge required.

### HOW DOES IT WORK?

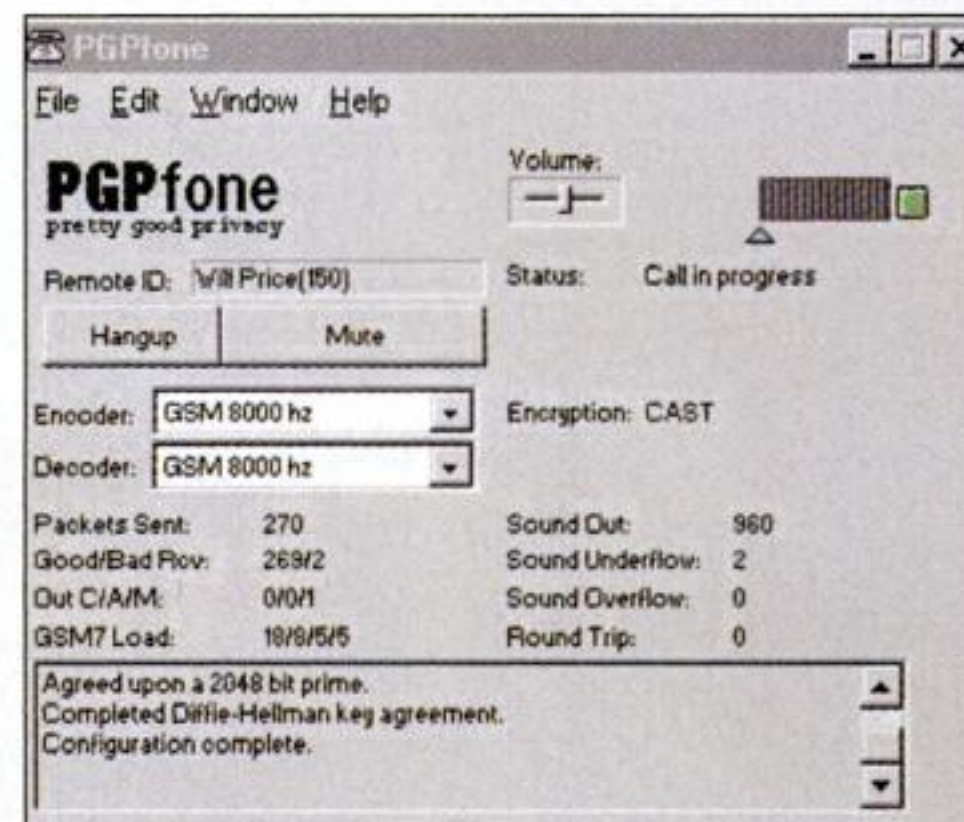
Modern-day VoIP is essentially split into two camps—closed VoIP networks

and open VoIP networks. Closed networks operate like an instant messaging network: Say you're a member of *MSN Messenger*, for example. You can connect with any other member in that network for free. But if your friend uses *AOL Instant Messenger*, you're out of luck. In other words, with closed VoIP networks, if your intended caller isn't part of your network, you can't contact him or her.

An open VoIP network has significantly fewer restrictions. Enter an area code and phone number anywhere in the world (whether you live there or not), and connect with that number just as you would using your regular telephone service. Obviously, a totally open network is the way to go for maximum flexibility; the flipside is that open networks often require a monthly fee, and the phone companies are determined to shut them down just like the recording industry did to *Napster* a few years ago.

### WHAT HARDWARE DO I NEED?

There are a number of ways to make calls over the Internet, and each method has its own hardware and software requirements. At the most basic level, you



**The early days of VoIP are something we're still trying to forget. The technology has come a long way since then.**

need a high-speed connection and a standard telephone. Some providers will supply you with a voice modem that connects your telephone to your DSL or cable modem, while other services are software-only and require only a PC headset.

### WHAT SOFTWARE DO I NEED?

Besides the proprietary dialing software that's included with each particular VoIP package, the only other application you might need is a web browser, and even that is sometimes optional.

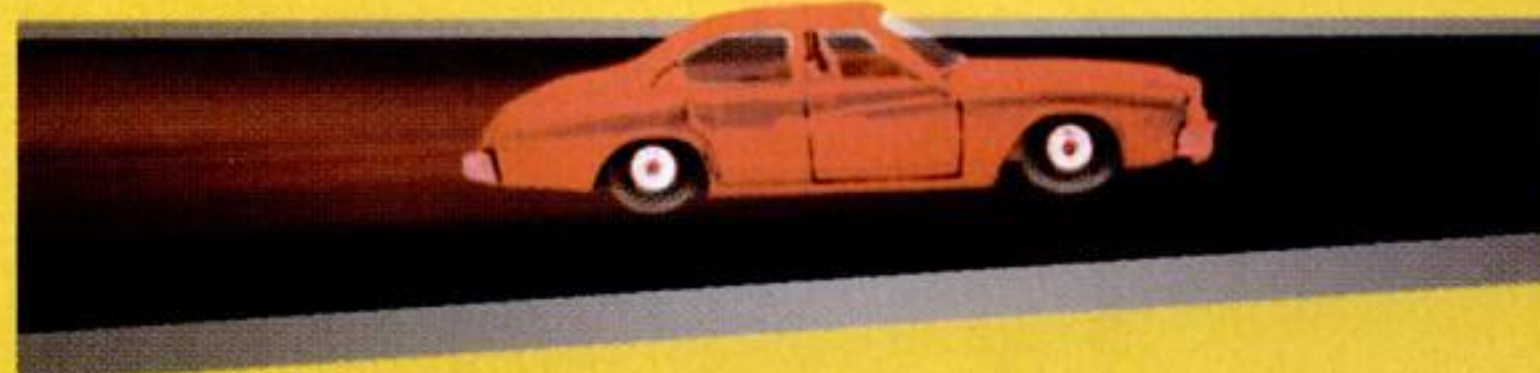
## How VoIP Works

VoIP technology marks a major shift from a circuit-based telephone system to one that is packet-based. Here's how they differ.

### Traditional circuit-based calling:

For more than 100 years a circuit-based phone system has worked like this:

- You lift the receiver and get a dial tone, which is really a confirmation that you have successfully reached your local telephone carrier's switching office.
- The local carrier routes the numbers you've dialed via a switch to the phone you are trying to reach, and if the phone is answered, a circuit is opened for the call.
- When you hang up the phone, the circuit is closed and your line is freed up for more calls.



**Circuit-based telephony is like having your own private road to the number you are calling.**

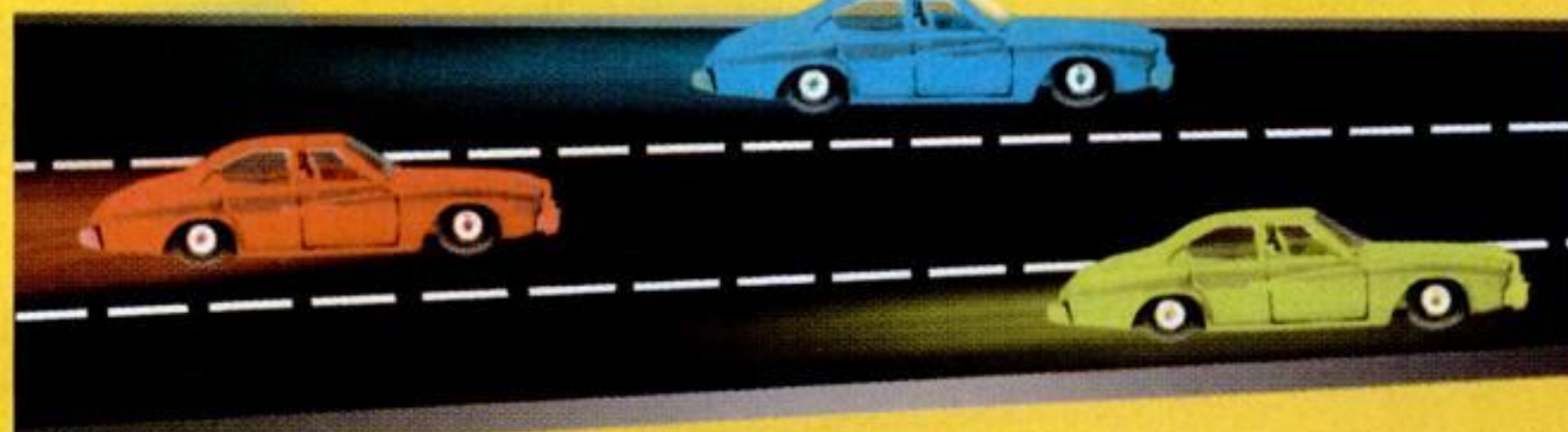
### Packet-based calling (VoIP):

To be more efficient and handle a much heavier load, data-based networks use packets to transmit information as an example, keeping a constant connection to a web page is incredibly inefficient, so information gets chopped into smaller chunks and rebuilt at its destination. A small packet can fly across a network and then reassemble on the other end, in a process known as packet-switching.

In our car analogy, VoIP uses packet-switching to load more calls on the same "highway." Because there is extra space, the packets can move across the same roadway in different orders and at different speeds, making the most of the available bandwidth.

- A digital phone adapter like the one Vonage provides establishes a session with the party you are calling and maps the call to an IP address.
- Both systems establish back-and-forth protocols for exchanging packets and open a two-way channel for packet transmission.
- When the call ends, the channel is dropped.

The biggest drawback to VoIP is the number of "hops"—or times a data packet must pass through a router or switch—before getting to the other end. To make calls without noticeable lag, a packet should hop no more than five times. Lower bandwidth also increases the risk of losing packets, making a conversation sound choppy. As networks continue to grow in overall power, size, and bandwidth, packet-based calling can only improve—a major reason why VoIP is becoming more viable and attractive today.



**VoIP uses packet-switching to allow several calls to travel along the same phone line at the same time.**



## HOW WE TESTED

To get a handle on the current state of VoIP, we checked out a variety of solutions and whittled the list down to what we consider the best product in each of three categories: a free, software-only solution; a hardware solution that requires a one-time fee; and a hardware solution that requires an initial cost for the modem and a monthly service fee. Each of these products has its merits, and one of them is definitely right for you.

## Skype

**COST:** Free download

**EQUIPMENT:** Decent PC headset or USB phone

**SYSTEM REQUIREMENTS:**

Windows XP or 2K (no Macs), broadband highly recommended

*Skype* is hands-down the most cutting-edge VoIP product available for a handful of reasons. First, it's 100 percent free of charge, so we can certainly squeeze it into our budget. Second, the sound quality is better than any telephone we've used. We're talking crystal-clear reception regardless of distance—you almost have to hear it yourself to believe it. And third, it makes innovative use of peer-to-peer (P2P) technology to keep calls moving quickly and securely across an ever-expanding network.

Here's how it works: Every time someone fires up *Skype*, that person's bandwidth is added to the network (just like any other P2P network), and bandwidth is added each time a new subscriber joins. This scalability is essentially free to the company because the network is made up solely of the individual PCs (peers) connected to it. *Skype* founders Niklas Zennstrom and Janus Friis know a little bit about P2P networks, having created a little app named *Kazaa*. The pair have taken their years of P2P knowledge in the music- and file-sharing business and applied it beautifully to this elegant and surprisingly legal VoIP solution.

The *Skype* software is familiar to anyone who uses an instant messaging program. But instead of using your keyboard to chat, you use a PC headset (see sidebar on page 46) or a USB telephone to communicate with people that you "call" by double-clicking an available name on your contacts list.

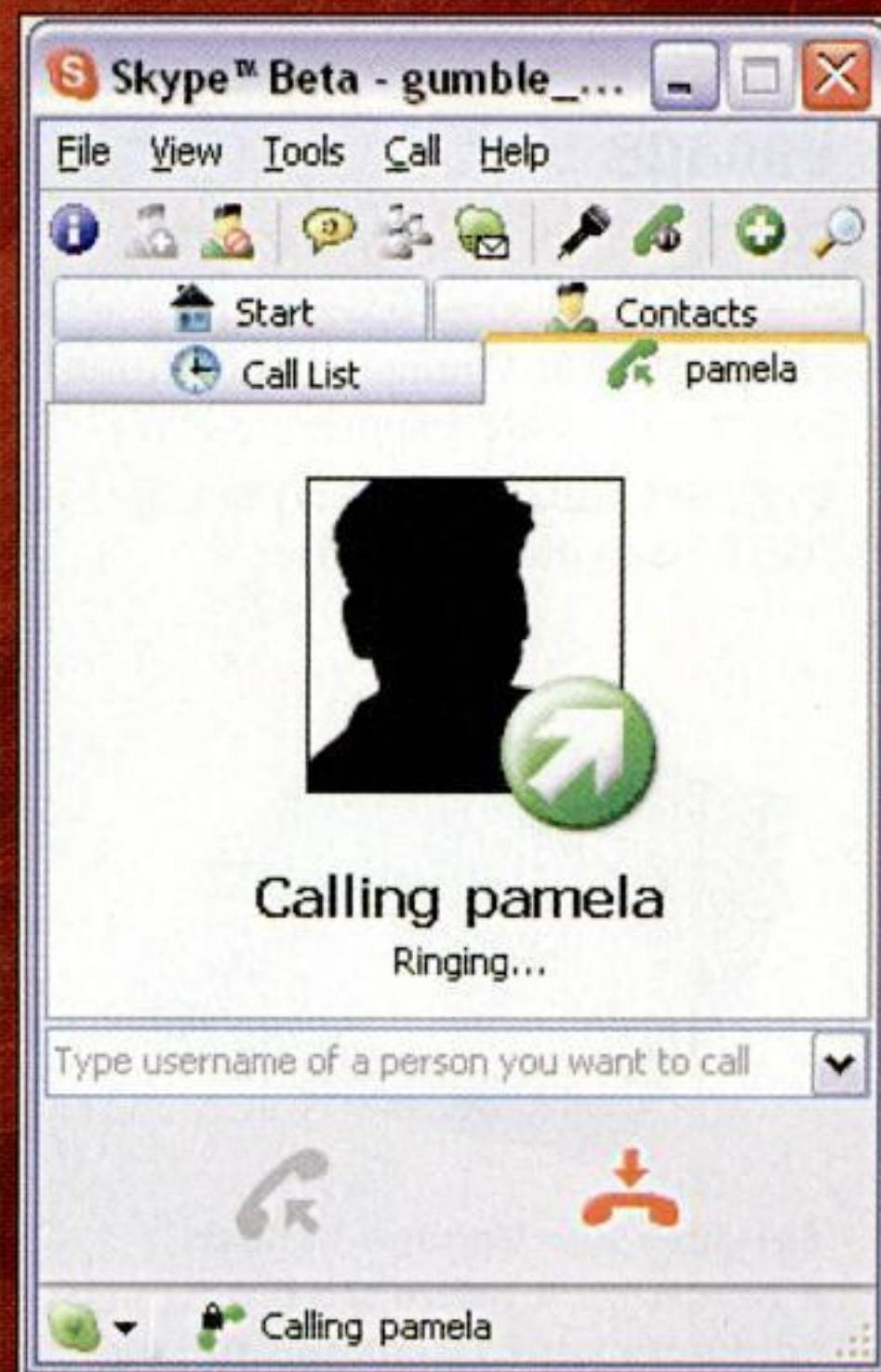
Furthermore, the same general features included in today's IM programs

are built into *Skype*. For instance, you can set your status to appear busy or offline when you don't want calls, block random callers from contacting you, and connect as many as four users from any location in a conference call. You can even send instant messages during your call (or use *Skype* itself as an IM client), and assign speed-dial to your most frequent contacts. The only drawback to *Skype* is that it works through a closed system, so if your friends aren't using it as well, you'll have to call them the old-fashioned way—via the telephone.

Instant messaging clients are known for their crude voice capabilities, but *Skype* works better than anything out there, thanks to the power of P2P. This one is a definite must-try. Download a copy, pick up a quality headset, and we swear you'll be amazed at the quality.

[www.skype.com](http://www.skype.com)

**OTHER COMPETITORS:** *MSN messenger, AIM, ICQ, Yahoo Messenger* ➔



**Skype works exactly like an IM client, but instead of chatting with your friends via text you simply call them over the Internet.**

## Taking It To the Streets

Transform your PDA into a cell phone with Vi-Fi

Just like Internet access first took hold in the home and then went wireless, VoIP is poised to follow a similar trajectory. Voice over IP over Wi-Fi, or Vi-Fi as it's more commonly known, is an emerging technology that is literally hot-off-the-presses. To wit, as we were finishing writing this feature *Skype* released a free version of its software for Wi-Fi-enabled Pocket PC PDAs. We feel this is truly just the beginning.

If you think about it, a Wi-Fi device can access the Internet more than 100 times faster than any cellular telephone network, so the pairing of Wi-Fi and VoIP could someday be a fantastic marriage. The potential of this combination has the cellular phone companies shaking in their boots, because after pouring billions and billions of dollars investing in 3G, a Wi-Fi enabled phone or PDA will probably offer more speed and features, for free. Even the best phone on the market today is virtually useless when it comes to doing any real web surfing. And like we all quickly learned from our dial-up days, once you've gone high-speed you never go back.

At press time, Motorola had just announced it was going to build a Wi-Fi-sensing cell phone that could shift to a faster and cheaper Wi-Fi frequency whenever it detected a hotspot or home/office wireless network. As more and more cities, colleges, workplaces, and homes have Wi-Fi available in some form—either free or via an account or day pass, the day of the hybrid cell phone that takes advantage of all that bandwidth is literally just around the corner. Or in the case of *Skype*—already in the palm of your hand. (Sorry, but *Skype* doesn't offer Palm OS support yet).

Wi-Fi carriers may someday become phone networks large enough to rival the biggest cellular carriers if they have their way. In New Jersey, IDT Corporation announced it was offering Wi-Fi phone service as a test, and Vonage is getting into the act as well, having recently announced a Wi-Fi phone that we'll hear more about by the end of the year.





## Vonage

**COST:** \$14.99 – \$34.99 a month, depending on calling plan

**EQUIPMENT:** Vonage digital phone adapter, standard telephone

**SYSTEM REQUIREMENTS:** Cable or DSL broadband connection



**Services like Vonage include a hardware modem that connects your telephone to your broadband modem.**

The premise behind Vonage is simple. Go to the Vonage web site, select your area code, sign up for the service, and you'll be sent a small black modem in the mail (or you can buy a kit from a retailer such as Best Buy). Connect the Vonage modem to your DSL or cable modem, and then connect your PC and phone line to the Vonage box, and you've joined the world of Internet-based telephone calling.

With its selection of competitively priced long-distance calling plans, Vonage should have the major phone companies plenty scared. A \$35-a-month flat fee affords you unlimited

long distance calling to the US and Canada, and low rates to Europe as well. Calling France, for example, was just 2 cents a minute. The least expensive plan is \$15 a month and comes with 500 free minutes. Vonage users can also call each other for free.

The beauty of Vonage is that when you hit the road you can take the modem with you, connect it to the broadband connection wherever you're staying, and continue to receive and make free calls from anywhere. We traveled to London during the writing of this article, but because we were dialing US area codes and our Vonage account was also a US area code, all the calls were free, even though they technically happened overseas. If you travel internationally, this is one way to avoid the gut-wrenching cell phone roaming charges to call back to the US.

Another benefit to Vonage is that it offers all the calling features you get with any traditional phone service such as three-way calling, caller ID, call forwarding, and so on—for free!. But what makes Vonage truly stand apart from other VoIP services is that its features can be accessed remotely over the Internet. Voice mail, for example, can be retrieved by phone, but is also stored on Vonage's web site, or can be sent to you as an audio file via e-mail. This lets you listen to voice mails on an airplane or simply check your voice mail from any web browser, which is handy when you're not near your own PC or a telephone.

Vonage's sound quality is not always perfect. We did experience some nasty

interference with our wireless router that made calls sound choppy. On another setup, the calls were great as long as we didn't surf the web while talking, but overall, the calls are clear and sound like any telephone.

Vonage also recently unveiled a "softphone option" called *XPro* from *XTen* that will let you add an additional phone line (say, for a fax machine) and make and receive calls to any phone number from your PC for an additional \$9.95 a month.

Bottom line: If you make a lot of calls, travel internationally, want more calling features for your telephone dollar, or want to add extra phone lines to your home or small office for a really low price, then Vonage is the best way to go. [www.vonage.com](http://www.vonage.com)

**OTHER COMPETITORS:** *Packet 8, Net2 Phone, AT&T Call Vantage*

## SIPphone

**COST:** Free with hardware purchase

**EQUIPMENT:** SIP adapter (\$80) or Call in One adapter (\$89), standard telephone

**SYSTEM REQUIREMENTS:** Cable or DSL broadband connection

SIPphone works through a semi-closed VoIP network that bridges the gap between a standard telephone network and Internet calling. SIP, short for Session Initiation Protocol, is a fledgling Internet protocol that's similar to HTTP and SMTP. Like the founders of *Skype*, SIPphone's founder Mark Robertson cut his teeth

## How to Choose the Right Headset

It's tempting when you first download Skype on a notebook to use just your regular set of speakers and the notebook's built in mic, but we found that method to be the fastest route to a bad conversation and a disappointing Skype experience.

To get the most out of Skype, you need a good stereo headset with a noise-canceling microphone. You'll be able to talk and listen with no unnatural change in sound levels (the dreaded walkie-talkie effect), and if you pick a USB-based headset, many of these products use their own mini external soundcards and DSP processors to provide custom-enhanced sound, and even equalizer profiles like a stereo offers. USB headsets are easier to set up if your PC has a USB connection in the front versus trying to hook up a headset to the mic and headphone jack in the

back, but the key features to look for are stereo output and a noise-canceling component.

**SKY'S THE LIMIT:** We love the DSP-500 digital headset from Plantronics. It comes with its own external DSP soundcard so you can listen to your PC soundcard and use the headset's simultaneously. Everything is customizable, and the audio is incredibly clear. For travelers, the DSP-400 offers the same components in a foldable design with a travel pouch. **\$110, [www.plantronics.com](http://www.plantronics.com)**

**BUDGET BUY:** Logitech has a great stereo USB headset for easy plug-and-play and great sound. The USB 300 has voice and mute controls right on the cable, and for \$40 (on Amazon), this is a nice addition that won't break the bank. **[www.logitech.com](http://www.logitech.com)**

**ALTERNATIVE AUDIO:** If you don't like having a headset on all day, consider a desktop



**The VoIP experience is greatly improved with a quality headset.**

microphone. These come with a stand and can be tilted broadcast-style towards your mouth, and some can be mounted on a monitor for easy, lean-forward speaking. Others are small enough to clip to a lapel. This approach will make your conversation public unless you use regular headphones. For those who want the best possible sound, the quality of the microphone seems to be the biggest factor, followed by the stereo quality of the headset or speakers.





**SIPphone covers the middle-ground between fee-based VoIP and totally free software by requiring a hardware purchase that lets you make free calls.**

with music file-sharing at MP3.com, but unlike that web site's legally tenuous methods, SIPphone is totally legit and incredibly simple. Just purchase the hardware to get up and running, and then you can make calls to anyone via the SIP protocol for free—for life!

The nice thing about SIP is that you don't need to turn on your PC to use it. You can hook a SIP adapter and phone to your router, or use a cordless phone for when you are roaming around the house. Another device offered by SIP

is the "Call in One" adapter; it lets you connect your regular phone line and your SIP connection to the same box and telephone. Then, when you want to make a free SIP call, you dial # before the phone number, or for non-SIP dialing, you simply dial the non-SIP number as you normally would.

To open the network to non-SIP calling, the company also offers a virtual phone number (currently only a Milwaukee area code) that lets people call you without being part of the SIP network. At \$3.99 a month, the cost is reasonable, but the real benefits are when you set up a modern day calling circle and get your friends and family on SIP.

SIPphone users can also download the free version of XTen's *XPro Lite* for a softphone option, but we were unable to get it to work beyond a dial tone. In many cases, the biggest problems experienced with the SIP package were firewall and router conflicts. We could get things to work fine on our home Linksys router, but at the office it was a no-go.

In the final tally, SIP-based telephony is a great idea but probably too complex for the average homeowner. Sorting out all the adapters, as well as remembering what prefix to dial, as well as remembering the Milwaukee area code means this technology is just not ready for prime time. But for those who want to use a real telephone and stay free from the PC when making calls, the one time

price is a great way to get into VoIP and skip monthly charges altogether. [www.sipphone.com](http://www.sipphone.com)

**OTHER COMPETITORS:** *IPDialoge*, *3Com*, *Nortel Networks*

### CHOICES, CHOICES, CHOICES

To give VoIP a true run for its money, we suggest a monthly service like Vonage. You'll get the complete freedom of calling any phone number, plus you can take your voice adapter on the road for even more free calling—especially if you need to dial the US when traveling internationally.

But there's no reason not to add Skype to the mix as well, seeing as it's free. You can start connecting with your friends (provided they are also part of the network) the second you buy a headset or microphone. Skype is definitely the way to go if you can get friends and colleagues online, and will feel like second nature if you're familiar with instant messaging clients. Plus, you or corporate setups versus home setup—it works wherever you are.

However, if you truly want to fiddle with a new Internet protocol, the low entry cost of a SIP solution won't break the bank even if you have to wrestle with your router's firmware to get the service to work. Either way, there's clearly a solution for everyone, including the most technical, the least technical, and the highly mobile. ■



### VOIP COMPARISON CHART

	Cost	Hardware required	Software required	Mac compatible?	Works on dial up?	Calling area
<b>Skype</b>	Free download	PC headset or USB telephone, computer running Windows 2000 or XP	Skype client software	No	Yes—must be at least 39kbps	Only other Skype members
<b>Vonage</b>	\$14.99–\$34.99 a month depending on calling plan, Canada included, International calls are extra	Vonage digital phone adapter, standard telephone	Web browser to access account information and advanced features	Yes	No	Dial any standard phone number/country
<b>SIPphone</b>	\$74.99–\$89.99 one time fee for hardware	"Call in One" or SIP-phone mini adapter, standard telephone	Web browser to use SIP directory, purchase minutes for non-SIP calling, and access information about your account. Software version of SIPphone is also available for download	Yes, but software version is for Microsoft Windows 98SE/NT4/ME/2000/XP only	No	Other SIPphone members and toll free calls are free, regular numbers can be reached by buying "SIPphone Minutes" on the web site



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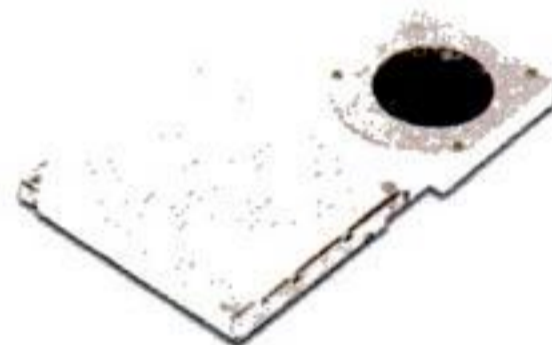
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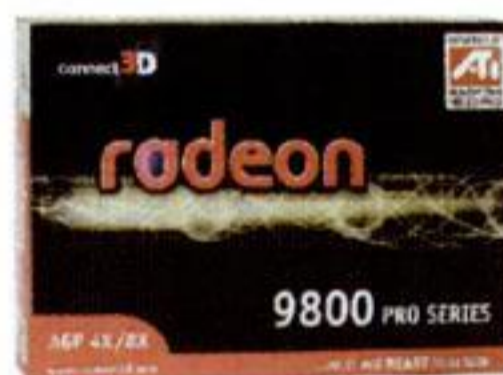
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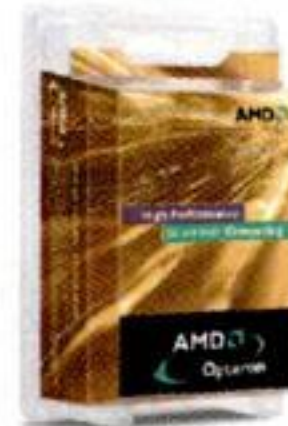


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# Behold

# BTX!

**Maximum PC is the first magazine in the world to receive a BTX prototype. What we found upon examining Intel's next-generation formfactor proved surprising—and controversial**

BY GORDON MAH UNG

If you think of a PC as a living organism, then the ATX formfactor is an old, evolutionarily obsolete appendage (like a tail or a wisdom tooth) that is preventing the host from reaching its true potential. While the deficiencies of ATX might not be readily apparent, and may remain inconspicuous for another year or two, the ATX specification is nonetheless destined to fail amidst rapidly escalating cooling demands.

This is why Intel is preparing to push a bold new standard built around a next-generation formfactor called Balanced Technology eXtended. BTX is designed to replace the nearly 10-year-old ATX formfactor we've all been using, and it should carry the

PC well into the next decade.

We convinced Intel to let us examine a BTX prototype so we could take a close look at what makes this new specification unique. We discovered numerous improvements, as well as a few controversial design decisions that are sure to raise the hackles of PC users everywhere. Read on for the full details.



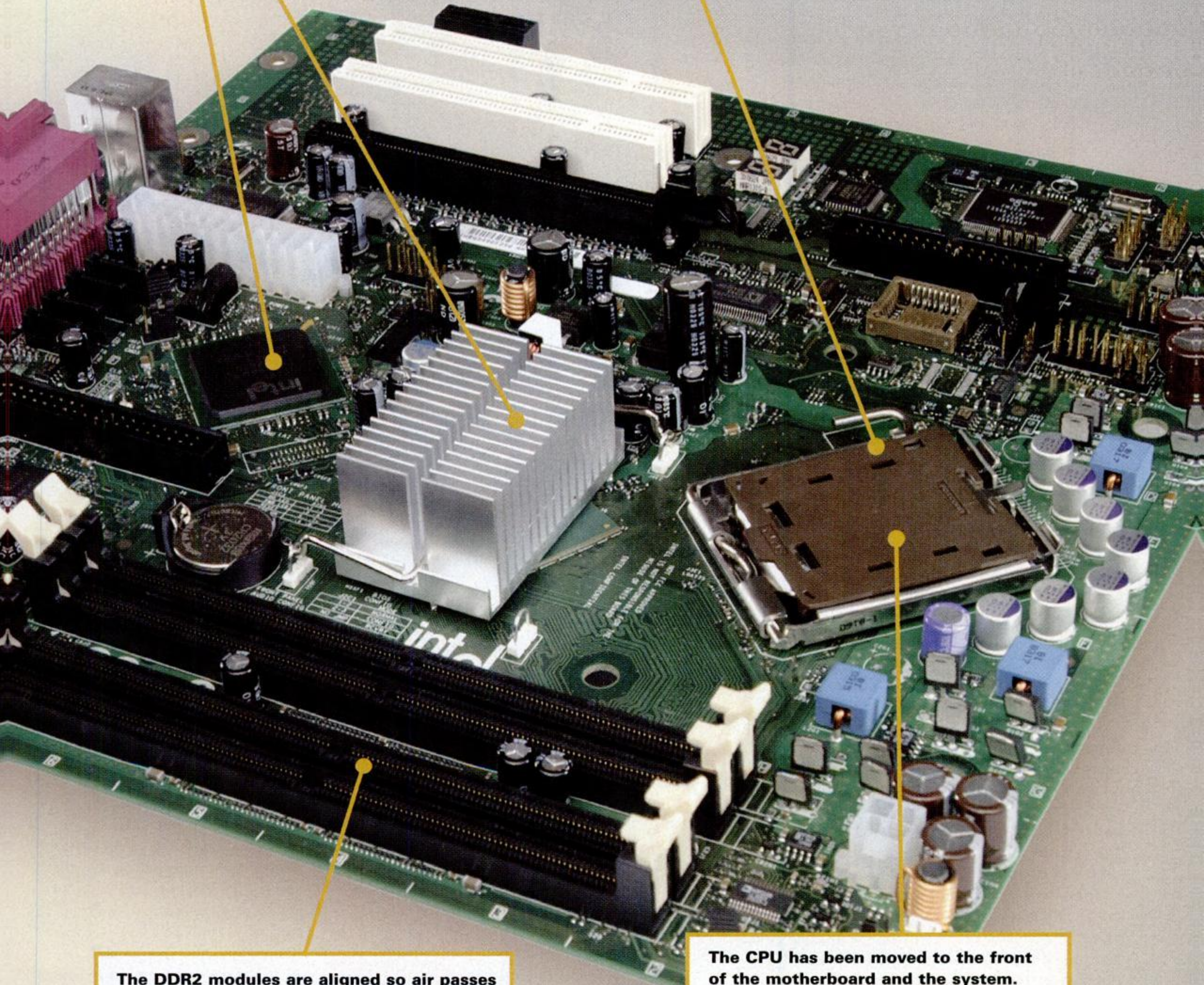
**Pictured above is the ATX spec. It still has plenty of life left in it, but future CPUs and graphics cards may be constrained by the spec's inability to keep components cool. Pictured at the right: the new BTX spec.**



With BTX, the north and south bridge chips are located much closer to each other and situated so that the routing of signals to the rear I/O panel is not the maze it is on an ATX board.



This board includes the next-generation LGA775 socket, which will replace the current Socket 478 for Intel desktop processors. LGA775, or "Socket T," puts the pins in the socket rather than the CPU and adds a ton more pins for data, power, and grounding.



The DDR2 modules are aligned so air passes down the length of the memory for cooling, instead of running into the modules like a wall, which was the case with ATX.

The CPU has been moved to the front of the motherboard and the system. Now, cool air can be sucked in the front of the PC and blown over the CPU and onto the motherboard chipset.



# Behold BTX!

## In a nutshell, what is BTX?

BTX is a new formfactor spec mainly designed to address the thermal limitations of ATX. BTX incorporates numerous architectural changes to improve cooling, such as relocating the CPU to the front of the PC case and inverting the motherboard. These changes will require a completely new tower case design—one that opens on the opposite side of what we're used to.

## When ATX was released 10 years ago, what PC changes did it bring about?

ATX was introduced in July 1995. At the time, it represented forward-looking, state-of-the-art computer design. It required a new power supply that eliminated the need for a separate mechanical on/off switch that had to be hooked up to the case. Its predecessor, the Baby AT formfactor, relegated serial and parallel ports to the motherboard and required ribbon cables to be snaked individually to the rear of the case. With ATX, most of the I/O was moved to the far end of the motherboard near the back of the case, making the hook-up process much easier. ATX also situated the CPU beneath the power supply so cool air could be sucked in through the power supply and blown onto the CPU.

It sounds like ATX was a pretty good spec. So why replace it?

It's unlikely that ATX will be able to handle the heat generated by tomorrow's hardware. Remember that when ATX was implemented, CPUs put out 25 watts of heat and videocards generated from 5 to 10 watts. In those days, the average system had just one hard drive and optical drive, high-speed I/O like FireWire and USB didn't exist, and even ATA33 wasn't yet public.

In stark contrast, a 3.4GHz Pentium 4E generates almost four times the heat of yesteryear's Pentium, and today's graphics cards are loaded with more transistors and consequently generate at least as much heat as the CPU, if not more. Because of this, the design that made ATX so elegantly efficient in 1995 has become a hindrance.

For example, consider the location of the CPU. In ATX, it's located beneath the power supply, where its access to cool, fresh air is limited. And it's not just the increasingly faster CPUs and videocards that require better cooling; today's motherboards have hotter voltage regulators that need extra attention. When you throw in the core logic chipset, additional RAM, and sundry other

### LEGEND

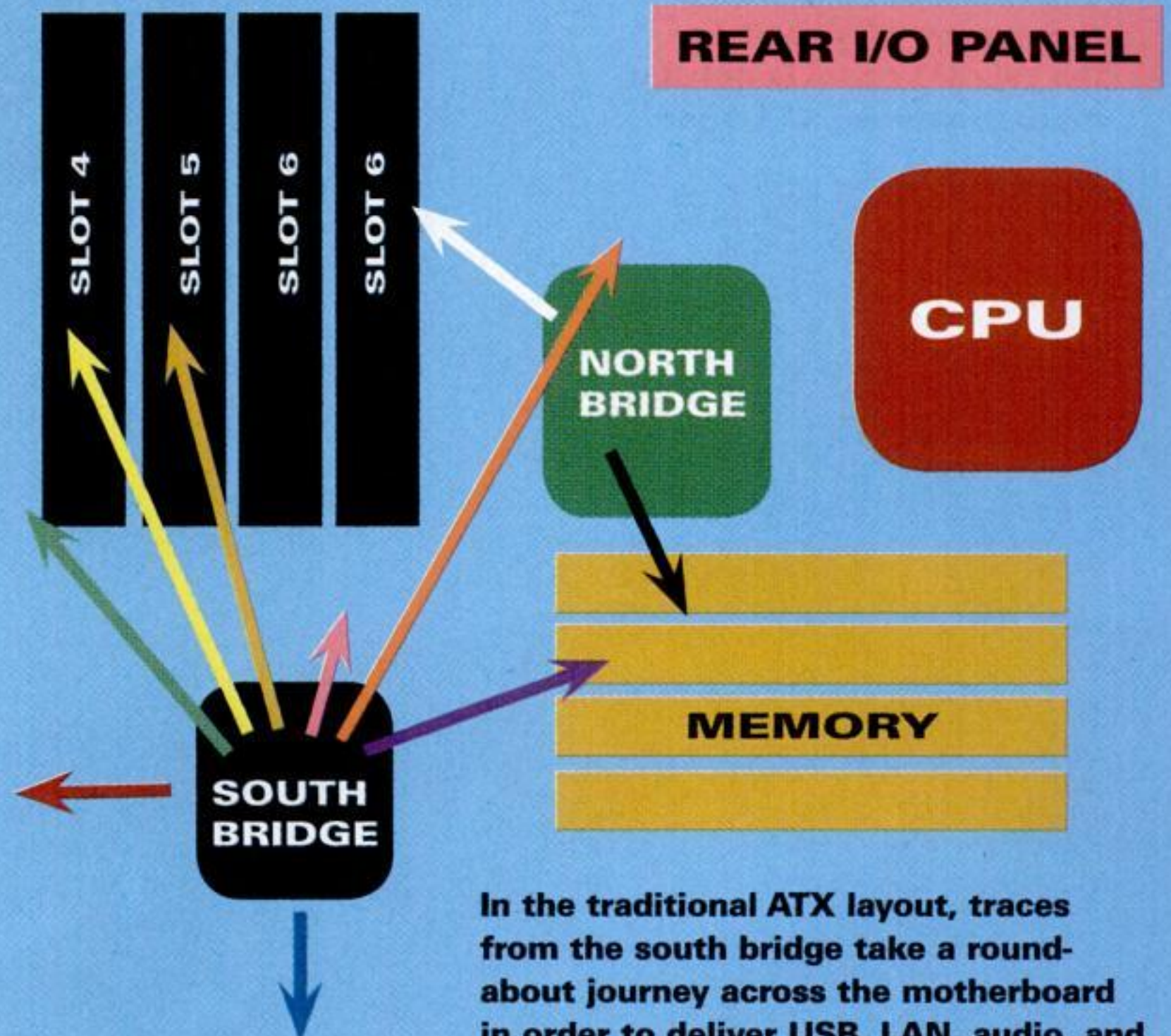
The arrows on the right represent devices. This is what the colors mean.

USB
LAN
Audio
PCI
SATA
PATA
Chip-to-Chip
PCI Express
X16 Graphics
Memory

## ROUTING CHANNELS COMPARISON

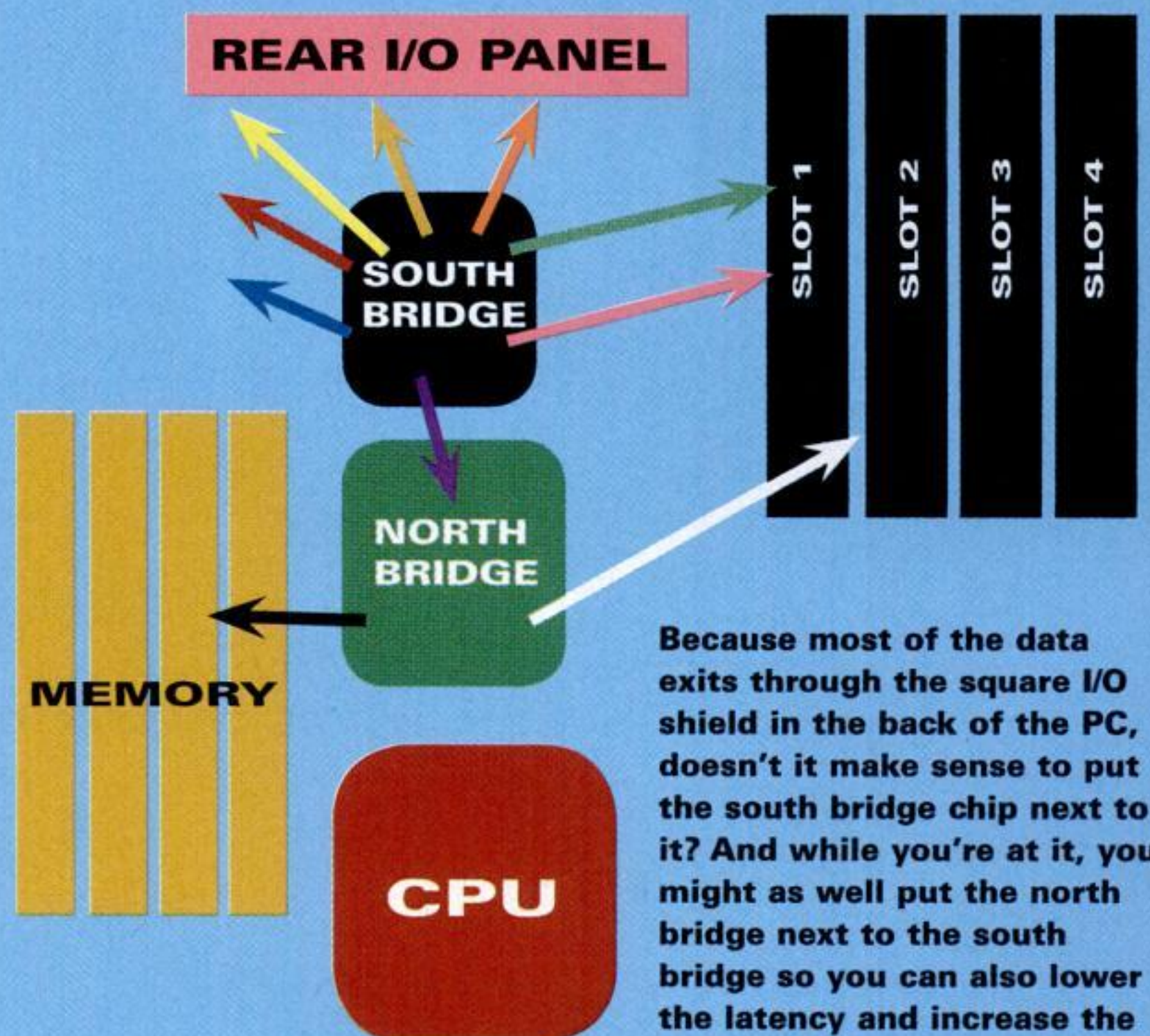
BTX doesn't just rejigger the case, it also moves the chipset so it's easier to route data around the motherboard. Here's how it works (see the legend on the left to find out what the different colored arrows mean):

### ATX Formfactor Routing Channels



In the traditional ATX layout, traces from the south bridge take a round-about journey across the motherboard in order to deliver USB, LAN, audio, and other data streams to the rear I/O panel.

### BTX Formfactor Routing Channels

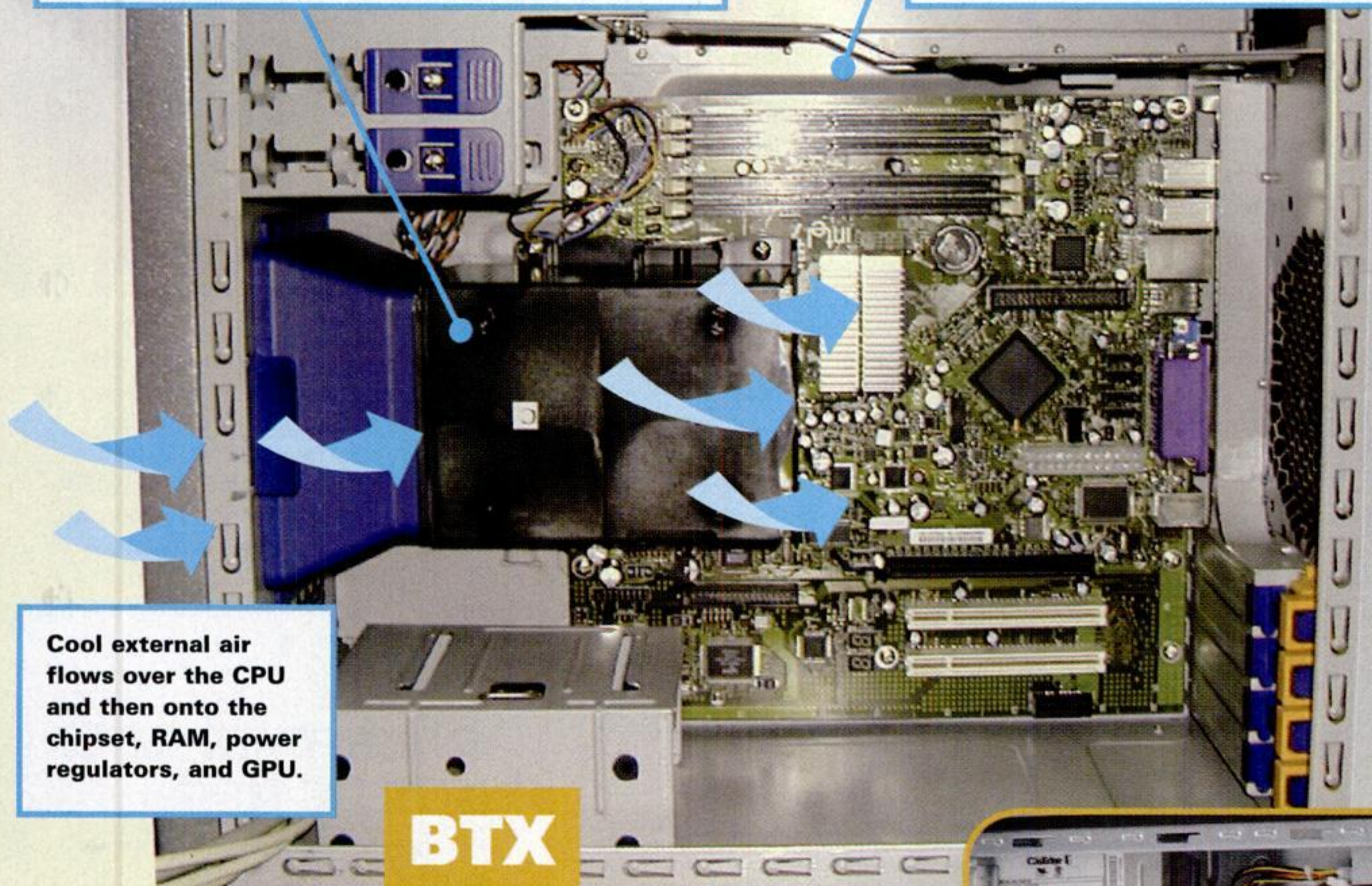


Because most of the data exits through the square I/O shield in the back of the PC, doesn't it make sense to put the south bridge chip next to it? And while you're at it, you might as well put the north bridge next to the south bridge so you can also lower the latency and increase the bandwidth between the two. Now isn't that better?



**BTX sets aside space for this thermal module which can suck air in through the front of the case and use it to cool the CPU, chipsets, GPU, and RAM. Initial modules will be traditional heatsink/fan-based jobbies, but the area could also be used to accommodate a water cooling device.**

**The BTX spec includes additional support structures beneath the CPU to account for a greater number of heatsinks to keep the chips cool. This air gap under the motherboard should also help cool the system by flushing air beneath the board.**



**Cool external air flows over the CPU and then onto the chipset, RAM, power regulators, and GPU.**

internal devices, the modern day PC is cruising for a thermal bruising.

#### **So how does BTX fix this?**

Pulling in fresh air from outside of the case is BTX's biggest change. The reason the CPU has been moved to the front of the motherboard is because fresh external air can be sucked in from the front of the case and blown directly over the CPU before it reaches other areas of the case where the air is bound to warm up. The core logic chipset, RAM, and videocard are arranged to receive air after the CPU.

Moreover, RAM has been arrayed so that air flows along its axis. In most ATX boards, memory is lined up perpendicular to the flow of air, essentially halting it in its tracks.

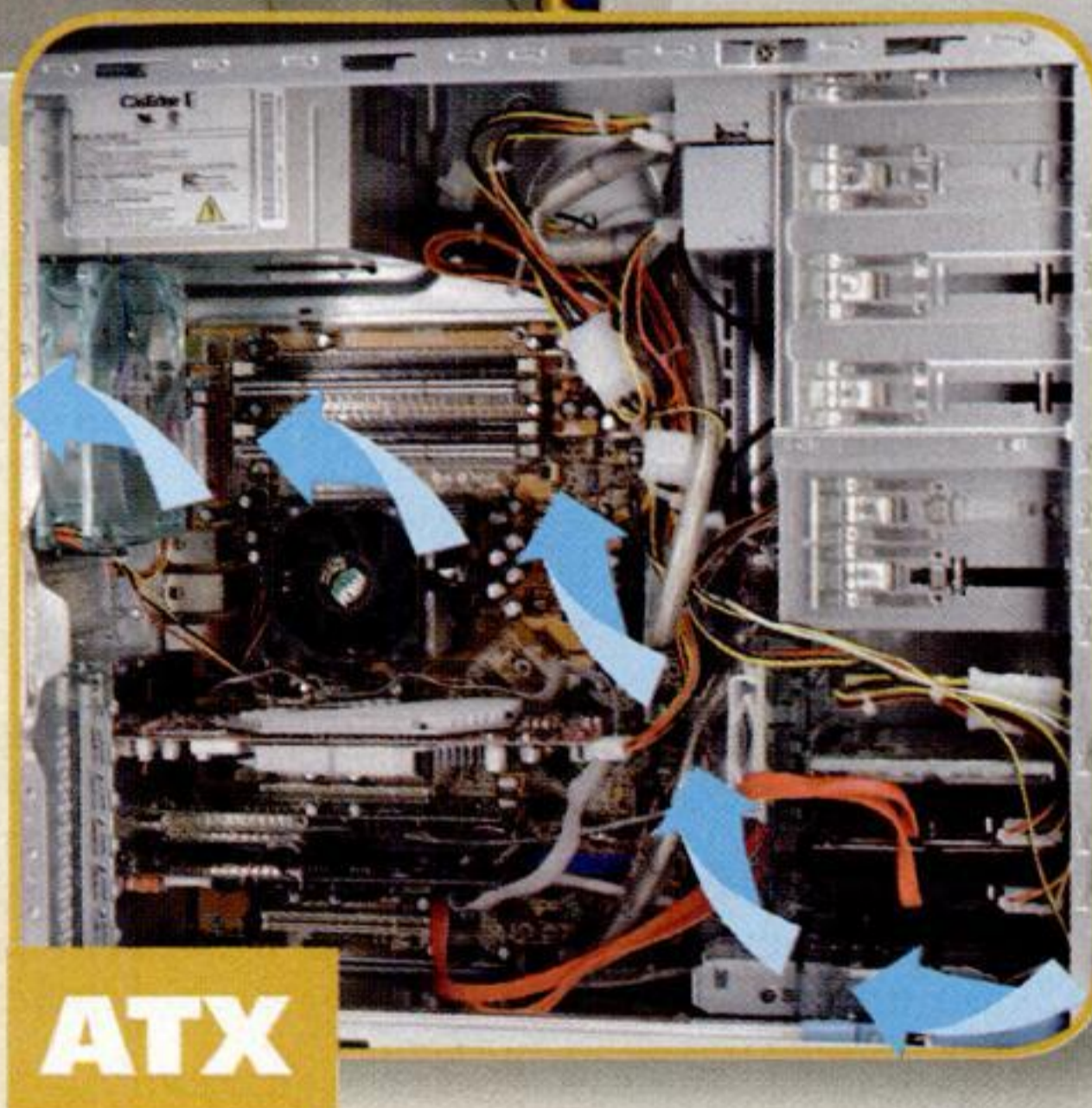
The BTX design also designates a zone for housing a thermal module. A thermal module (pictured above) looks like a big block and shrouds most of the CPU to increase the velocity of airflow around your computer's brain, like a wind tunnel. Theoretically, the thermal module and a single fan can keep most of the hardware cool—except for the GPU, which will continue to require its own fan.

#### **Besides cooling, is there any other advantage to moving the chipset behind the CPU?**

The rearrangement of the chipset isn't random. If you look at the ATX graphic on page 52, you'll see that the south bridge, or I/O controller hub, is positioned inefficiently. The south bridge controls the hard drives, PCI slots, USB ports, and LAN, so it routes signals all over the motherboard. Its ability to do its job can be affected by its proximity to the north bridge controller chip. Under ATX, the south bridge and north bridge controller chips are usually two to four inches apart. Under BTX, the south bridge is placed right next to the north bridge which simplifies the traces and could eventually enable higher speeds between the two chips.

#### **Will BTX make PCs quieter or more affordable?**

BTX doesn't address acoustics directly, but as a byproduct of being able to cool more



**In a typical ATX case, the air enters through the lower front of the case and is then sucked over the CPU by the pull of the rear exhaust fan.**

hardware with fewer spinning fans, PCs should become quieter. Intel claims that because BTX will reduce board complexity and require fewer cooling resources than similar systems based on ATX, costs will also be reduced. ➔



# Behold BTX!

**When you say the motherboard will be inverted and the case will open on the opposite side, are you also saying that BTX won't be compatible with my existing case?**

Currently, when you're facing the front of a standard ATX tower case, you're used to popping open the left side to access the components and motherboard. In some ways, the BTX motherboard looks like a mirror image of an ATX board. As a result, under the BTX tower guidelines, the right side of the computer will now be the side that opens. So, yes, this means that a case designed for ATX will not work with a BTX motherboard.

**I just bought a case and finally tidied up the cables under my desk. Now you're telling me I have to buy a new case and move my cables? Are PC manufacturers just trying to piss me off?**

We're pretty sure this wasn't a plot to piss off consumers. In fact, we're told the Bizarro-world design is much more pragmatic. Every millimeter of unnecessary trace means more wire. More wire means more interference, which must be compensated for by adding layers to the motherboard. Adding layers means adding to the cost of the board.

Chipsets are designed with the placement of the memory and CPU in mind. On an ATX motherboard, for example, the memory is usually to the right of the north bridge and the CPU is above it. If a BTX board were mounted the same way as an ATX board, its orientation relative to the placement of the RAM, CPU, and graphics port would change. In the end, a BTX board mounted on the same side as an ATX board would require more layers. It's easier (and cheaper) for chipset manufacturers to simply flip the board over so that orientation isn't an issue.

**How excited are PC and PC case vendors about BTX?**

Not as excited as we would have thought. Although Intel paints a rosy picture of the BTX universe, the companies we queried expressed lukewarm sentiments regarding the new spec. Be they system, motherboard, or case enclosure vendors, no one we spoke to expects to push BTX this year. Most felt that because ATX still has a year or two left in it, why fork out the dough to push a new spec today? It can cost between \$50,000 and \$100,000 to tool up for a new case. Even though BTX motherboards are cheaper to make, the increased cost of retooling appears to be scaring off manufacturers.

**Space is set aside in BTX for this thermal module to cool next-generation CPUs.**

**OK, so what does AMD think about BTX?**

Ironically, AMD sees BTX as an opportunity to take a jab at Intel. After all, AMD officials informed us, Athlon 64 CPUs run quite cool, especially when compared with the competition. These officials also pointed out that Intel *needs* BTX's improved thermals because its Prescott-based CPUs are running much hotter than expected. AMD's stance is simple: "We just don't need BTX right now." But rest assured, when the PC industry adopts BTX wholesale, AMD will too. Until then, the company will sit on the fence watching. AMD's position is significant; one popular case vendor told us that a reason it's not even considering BTX for this year is because of the high number of AMD customers who buy its cases.

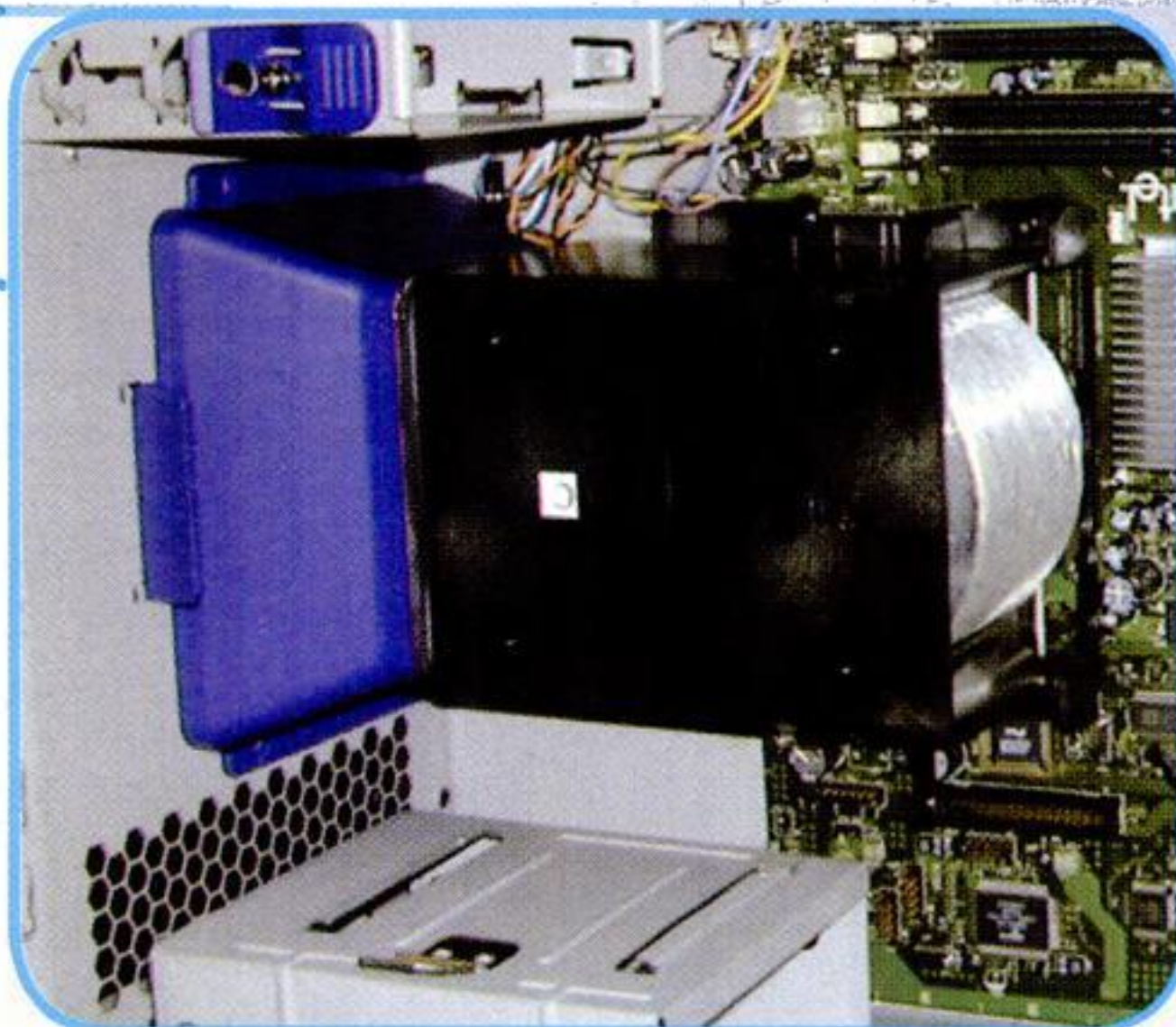
**So when can we expect to see the first BTX systems and parts? And how long will it take to completely replace ATX?**

The first BTX-based systems will likely debut this summer, but with all the foot dragging we're seeing, we don't expect a slew of products. Motherboard vendors say they expect to have boards out by early 2005. For what it's worth, we have in our possession a Cooler Master case that's reported to support both ATX *and* BTX.

Intel believes it will take until 2007 for BTX to completely replace ATX. Right now that seems a bit ambitious, but we can imagine the changeover accelerating as PC power users begin to realize the increased thermal efficiencies BTX offers.

**Is there a chance BTX could fizzle out entirely?**

You can't say that Intel has had much luck with formfactors these days. LPX—a formfactor intended for small desktop systems—went nowhere, as did the



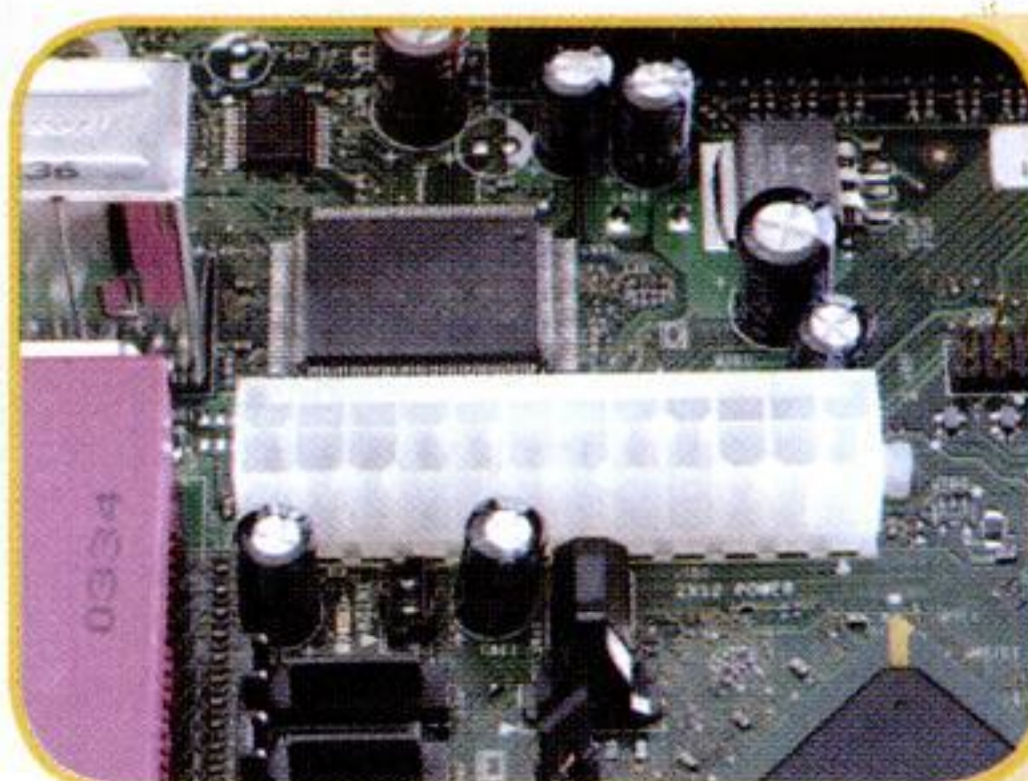
WTX spec for serious workstations. But this doesn't mean BTX is primed to go down in flames. In fact, our bet is that BTX will prevail. The harsh reality is that despite Intel's new dual-core plans, which emphasize thermal efficiency, systems are getting hotter and smaller. As far as we're concerned, it's not really a question of whether BTX will become the standard, it's a question of when. ■

## IS YOUR POWER SUPPLY UP TO THE TASK?

Although BTX doesn't call for a new power supply specification, people have become confused by a sleight of hand. Roughly 99.9 percent of the ATX 12V power supplies on the market use a 20-pin (or 2x10) main power connector. However, the brand-new ATX 12V version 2.0 spec calls for a 24-pin, or 2x12, power connector. The extra connectors support increased power routing through both BTX *and* next-generation ATX motherboards that support the 75-watt PCI Express power requirement. The latest power supply spec also calls for the four-pin 12V connector to run off of a separate 12 volt power rail. However, if you run a BTX (or ATX) board without a high-wattage graphics card, you can technically plug an old 20-pin main power connector into the new board without problems. So, no, you don't technically need a new power supply for BTX, but you will need one to fully support PCI Express motherboards and the new graphics cards.

In other words, prepare to buy a new power supply.

**Will BTX require a new power supply? The answer is yes—and no.**







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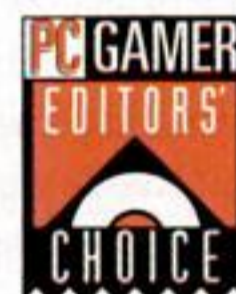
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# Ask the Doctor

Symptom ▶ Diagnosis ▶ Cure

## WHEN MORE IS LESS

I currently have two sticks of 256MB PC2700 DDR in my nForce2 motherboard. I was considering adding a 512MB PC2700 stick but want to know if I will see faster performance with the combined gig of memory in single-channel mode than I'm getting from the two 256MB sticks in a dual-channel setup.

—SPENCER PABLO

The nForce2 (like the Intel 865P/875P/850E) requires that you run the same amount of RAM at the same speed to achieve dual-channel performance. You're going to see the best performance from two identical sticks of RAM and a motherboard running in dual-channel mode versus one stick running in single-channel mode or three sticks in single-channel mode.

## ADDRESSING THE 16-BIT ISSUE

A very knowledgeable programmer friend told me that Windows 98 through XP all address sound in just 16-bit. Is that true? And if so, are we being duped by the soundcard manufacturers that market 24-bit soundcards? How does Creative Labs' Audigy board, which claims 24-bit HD sound, fit into this?

—ROBERT HAWKS

It's true that DirectX gaming currently supports just 16-bit audio, but that doesn't make 24-bit sampling worthless. DVD Audio and any high sample-rate source material require 24-bit soundcards. We've also found that 24-bit soundcards actually reproduce better sounding 16-bit material because of their higher-quality digital-to-analog converters.

## JUST CALL HIM "THE DUDE"

Is there a utility that will tell me how many watts my power supply is providing and how many watts my system is using? I've added several lights to my case and want to know if I've overtaxed my power supply.

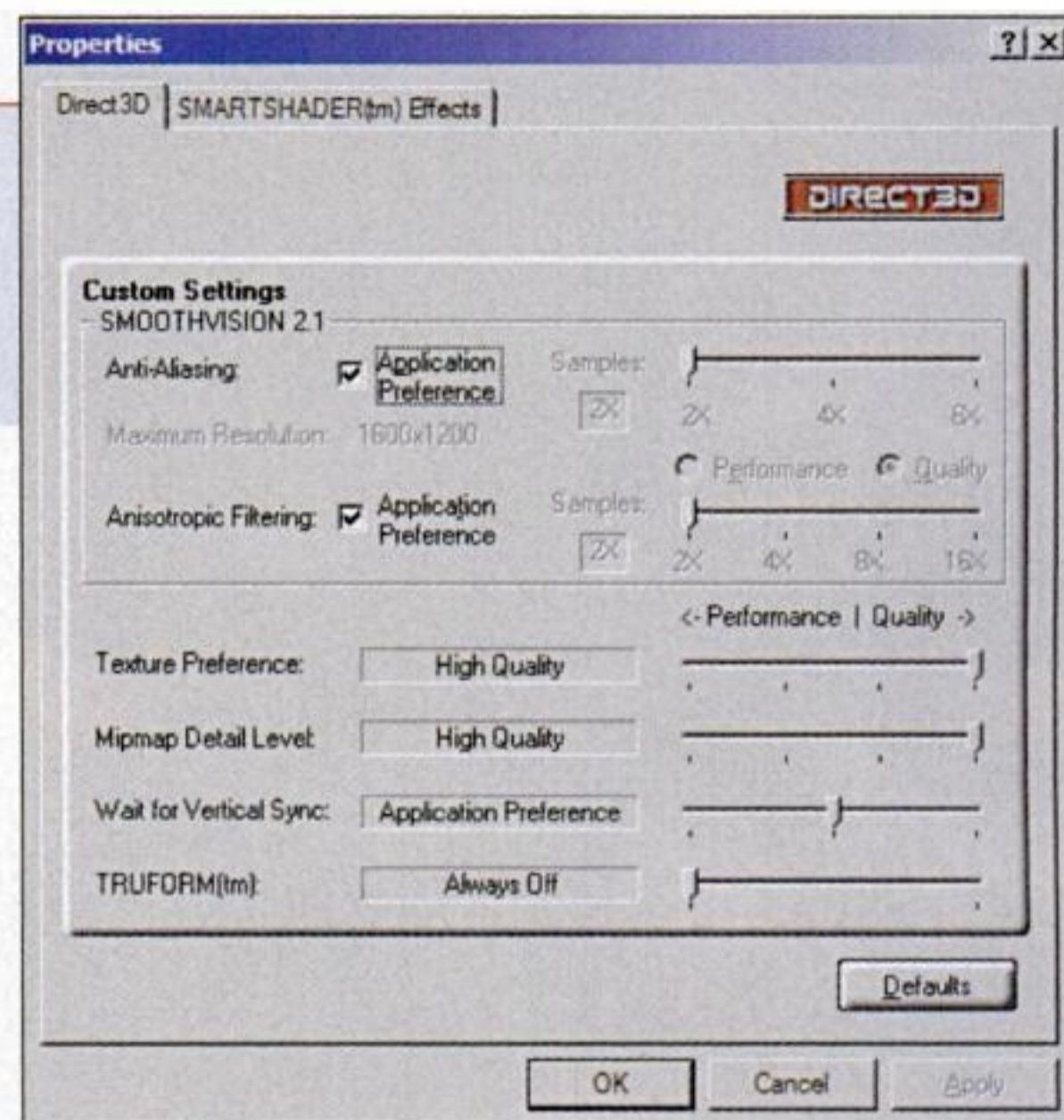
—DUDE COOPER

## SETTING ANTI-ALIASING AND ANISOTROPIC FILTERS

If a game supports anti-aliasing and anisotropic filtering, is it better to enable them via the videocard control panel or within the game itself?

—DON CATHCART

It's always better to use the settings within the game. Sometimes game developers employ performance-enhancing tricks that give you the benefits of anti-aliasing and/or anisotropic filtering without the same performance hit you'd experience if your card's settings were changed. Developers do this by applying effects to just select parts of a scene. If you enable AA or AF in the hardware's control panel, the videocard's driver will use a more brute-force approach and apply the costly effects to every pixel.



Using the settings in your video control panel will guarantee that highfalutin' features like anti-aliasing and anisotropic filtering are on, but you may be better off using the in-game controls instead.

Unfortunately, we haven't seen any utilities that do this, and we're not sure it's possible without purchasing extra hardware. Some motherboard monitoring software lets you see how much voltage the power supply is putting out, but it doesn't tell you how much actual wattage is being used.

To see how much power your PC is using, we recommend *Watts Up? Pro* from [www.doubleed.com](http://www.doubleed.com). This device plugs into your PC (or any other electrical device) and lets you monitor the wattage consumed, the voltage, and a plethora of other electricity-related stats. The *Pro* version also logs the data so you can generate nifty charts and graphs of your PC's power consumption.

## GETTING READY FOR BTX

I want to know if the upcoming BTX mobo standard will fit into an ATX formfactor case. I currently have a Cooler Master 710 case that I've rigged for water-cooling, and I truly love it, so it would suck if I had to change out my case when I upgrade to a BTX system.

—JIM TAYLOR

Unfortunately, you're going to have to upgrade at some point in the future.

BTX motherboards will not fit into most ATX cases, although Cooler Master claims its new CM Stacker can accommodate both ATX and BTX motherboards. If you want to learn more about the changes to come in cases and mobos, read our BTX primer on page 50 of this issue.

## A BUFFET OF BUFFERS

What's the difference between a 2MB hard drive buffer and an 8MB hard drive buffer? And how come there aren't any 4MB or 6MB buffers?

—ALAN MICHAUD

The difference in performance between a 2MB buffer and an 8MB buffer can be substantial. We've run tests on both configurations and found that on average, a drive with an 8MB buffer can deliver up to 30 percent higher performance than a drive with a 2MB buffer. This is because reading from a drive's onboard memory is significantly faster than the time it takes a hard drive's heads to position themselves over the correct sector, wait for the data to arrive, and then read it. In other words, transferring data from memory is a lot faster than relying on a hard drive's mechanical apparatus to fetch it.

There are two reasons why today's hard drive buffers are only available in 2MB and 8MB capacities. First, the market is generally divided into two segments—performance drives and budget drives. Drives that fall into the budget category compete on price rather than features; a minimal 2MB buffer keeps the cost of production down.

Performance drives, on the other hand, are all about the whiz-bang features such as fluid dynamic bearing spindle motors, rotational vibration adjustment technology, and whopping 8MB buffers. Price takes a back seat to all the extra advantages this class of hard drives offers.

The other reason we don't see drives with 4MB or 6MB caches is that there generally wouldn't be enough of a performance increase from a 2MB cache to justify the significantly higher cost. Like we said before, hard drives are typically split into two camps: performance and budget drives. A drive with a 4MB or 6MB buffer would be stranded in no-man's-land directly between these two market segments. Following this same logic, it's doubtful we'll see upcoming hard drives boasting 10MB or 12MB buffers, but 16MB is certainly a possibility.



## USB PORT PROVES SHOCKING

I purchased a Cooler Master WaveMaster case about two months ago to house my system. I recently tried to use the USB port on the top of the case but when I touched a USB device to the socket, there was a small electric spark and the computer shut down. I restarted my machine and tried it again with the same result. What's the deal with that?

—MATT

**Your problem is unusual, Matt, and it's difficult to actually pinpoint the source without looking at your machine. You might have a grounding problem with your whole machine, but the most likely explanation is that you've wired the USB ports into the motherboard headers incorrectly. Check your mobo documentation for the correct pin layout, and make sure the orientation of the pins is not reversed.**

**Another less likely cause of your USB problem could be the ground loop. Check the plugs of both the power supply and your power strip or UPS and make sure all three prongs are intact. If the third prong is missing in either instance, replace the cable.**

## MULTIPLE BURNERS IN ONE MACHINE

I burn a lot of DVDs on my machine and was wondering if it's possible to install multiple DVD burners and use them all at the same time. For instance, could I install four DVD drives and burn four different DVDs at once? I know there are systems out there for this purpose, but they are way too expensive.

—R

**It's possible, but improbable. If your DVD burners use IDE connectors, you can't write to both the master and the slave drives at the same time. So you'd need a controller card or cards to provide you with enough ports.**

**Moreover, each DVD burner can take up to 20 percent of your CPU's attention, so you'll need a really fast CPU to reliably record on more than one DVD burner at a time. And if any of the burners has to pause because the buffer's empty, you could end up with a disc that won't play in other DVD-ROM drives or set-top players (despite any claims about "lossless linking" in such cases).**

**Now you know why those systems that can write to multiple DVD burners simultaneously are so expensive.**

## NO MORE NEIGHBORING WIRELESS NETWORKS

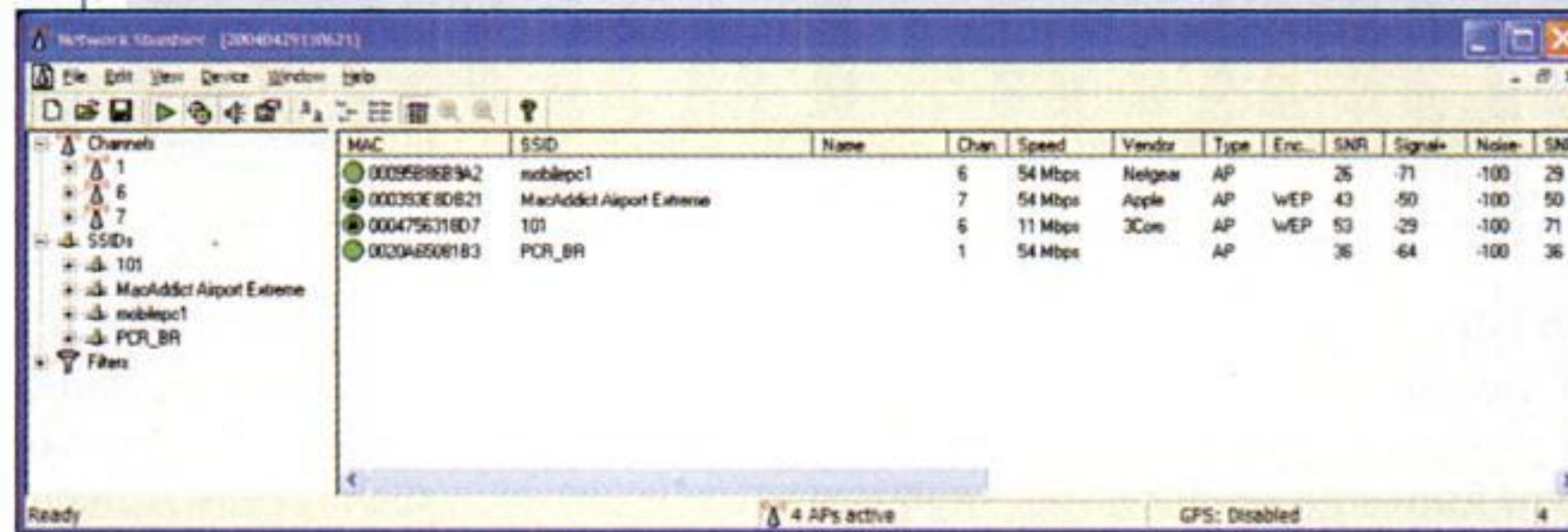
My wife and I share a broadband connection over a Linksys 802.11g wireless router. We recently moved and now my wife's laptop picks up a neighboring wireless network; every 15 minutes or so, she gets interrupted with a message that says, "Multiple networks found," and she is forced to reconnect to our network. We have our network set as the default but we can't seem to filter out this neighboring network.

How can we screen out the neighboring network so her computer will stop getting confused?

—DAVE GELLERMAN

Try changing the channel that your access point uses. Open up your router's web configuration page—it's usually at <http://192.168.0.1> or <http://192.168.1.1>—and go to the Wireless tab. The channel setting typically defaults to 6, which creates annoying competition among any access points in the same range. Try to set your access point to a channel that's at least two channels away from your nearest neighbor.

How can you find out what channels your neighbors' wireless networks occupy? That's easy. If you have a supported Wi-Fi chipset, you can just download *NetStumbler* ([www.netstumbler.com](http://www.netstumbler.com)) to sniff your neighborhood and see whose AP is hogging your airwaves.



MAC	SSID	Name	Chan	Speed	Vendor	Type	Enc.	SNR	Signal	Noise	SNR
00095B8E89A2	mobilepc1		6	54 Mbps	Netgear	AP		25	-71	-100	29
000353E8D821	MacAddress Airport Extreme		7	54 Mbps	Apple	AP	WEP	43	-50	-100	50
0004756318D7	101		6	11 Mbps	3Com	AP	WEP	53	-29	-100	71
0020465081B3	PCR_BR		1	54 Mbps		AP		36	-64	-100	36

**NetStumbler lets you know if any other wireless networks in your neighborhood are affecting your reception.**

## TO SHIM OR NOT TO SHIM

I'm building a new Athlon system with an XP 2800+ processor and was considering the addition of a CPU shim. My question is this: Do you think CPU shims are necessary? Is this "cheap insurance," or am I asking for trouble? I don't plan on constantly swapping out heatsinks or CPUs, but this does seem like a good idea with all the stories of cracked processors I've seen floating around.

—HANS WICHMANN

**If you don't plan on swapping out CPUs all the time, and you're not some ham-fisted tyro, you really don't need a shim. While reports about the delicate nature of Athlon XP processors are plentiful, the problems have more to do with the mechanic, than the machine. The Doctor has swapped heatsinks on shim-less Athlon XP machines around 200 times without ever breaking a single core.**

## THERMAL PASTE VS. THERMAL PADS

I'm getting ready to build my first computer and had a question regarding the differences between thermal paste and thermal pads. Is there a performance difference between the two and is one preferable to the other?

—RICH

**Whether a thermal pad is better than thermal paste depends on what the pad is made of and which paste you're trying to compare it with, so there's no easy answer. But if your CPU heatsink comes with a thermal pad, you should**

**use it. Assuming the heatsink manufacturer has done its job and the part is rated for a certain speed of processor, you should be fine. Keep in mind that thermal pads are single-use only. Once the processor heats up, it will melt the pad and expel portions of it to the side (don't worry, it's supposed to do this.) If you swap processors though, you'll need to scrape off the old thermal pad.**

## DESKTOP STORAGE IN A LAPTOP SPACE

I have an IBM Thinkpad 1400 laptop left over from 1998. Its hard drive has just a paltry 4GB of storage and I would like to replace it with a newer, faster hard drive. I no longer have a battery installed in the laptop, and therefore have room to fit a 7,200rpm desktop hard drive. Is there a device or method for converting the single laptop hard drive plug to fit the IDE and power port of a desktop drive?

—ADAM CHUN

**You could buy a converter, but then you'd have real problems anytime you need to move the notebook. Instead, we recommend that you get a replacement internal hard drive, or an external USB 2.0 or FireWire drive along with a USB 2.0 or FireWire PCMCIA card. Going the external drive route will be significantly more expensive than simply upgrading your internal drive.**

**You can buy a replacement laptop hard drive online, but you need to make sure your new drive will actually fit into the laptop. There's an online tool at [www.hitachigst.com](http://www.hitachigst.com) that will help you determine which drives will and will not work with your machine. If you find that your system won't work with any drives, you may have to resort to an external solution. ■**

Like a painful, itchy rash, your PC problems persist despite constant ministrations. Stop scratching at them, and get some help! Let the Doctor be the Calamine that cures your PC's maladies. E-mail him at [doctor@maximumpc.com](mailto:doctor@maximumpc.com).





# How To

■ ■ ■ A step-by-step guide to tweaking your PC experience

## MANAGE YOUR

# Computer Cables

Organize your messy cables with this easy-to-follow guide

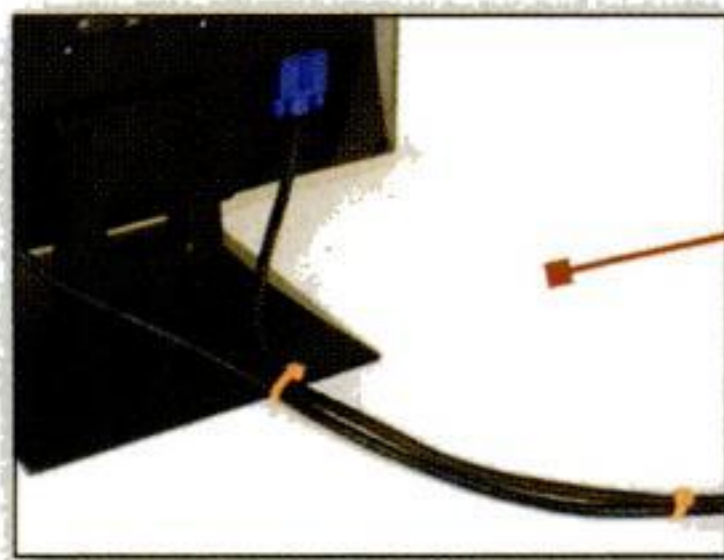
BY TAE KIM

**T**ake a long hard look at the rat's nest of cabling behind your computer and it's quickly obvious why we're considered a "wired" society. You've got the cables from your monitor, your keyboard and mouse, your printer, network connection, your 5.1 speaker set, and the list goes on. It's clear that the wireless utopia we've all been promised is a long way off, which is why we prepared this guide.

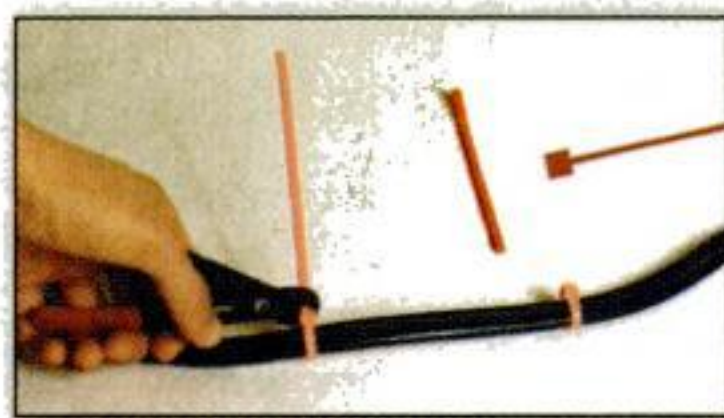
By the time you're done following our suggestions, you'll have turned your jungle of cables into a neat, tidy bundle. And you'll feel better about yourself in the process. Consider the following tips and execute the solutions that work best for you. Most of the featured products can be found at [www.cableorganizer.com](http://www.cableorganizer.com) and other major outlets.

### ▶ A zip tie primer

The simplest method for getting unruly cables under control is to tie them together with zip ties. These disposable strips of plastic are a cheap and effective cable management solution that should be in every toolbox. Here are a few tips to keep in mind when using zip ties to instill order.



Before you start tying your cables together, plan ahead and separate the cables into logical groupings. For instance, we tied our monitor's power and data cable together. This keeps things neat and tidy and ensures the cables won't get separated.



When tying down cables, make sure you leave some room for slack, especially when it involves a component that needs to be moved around, such as a mouse.

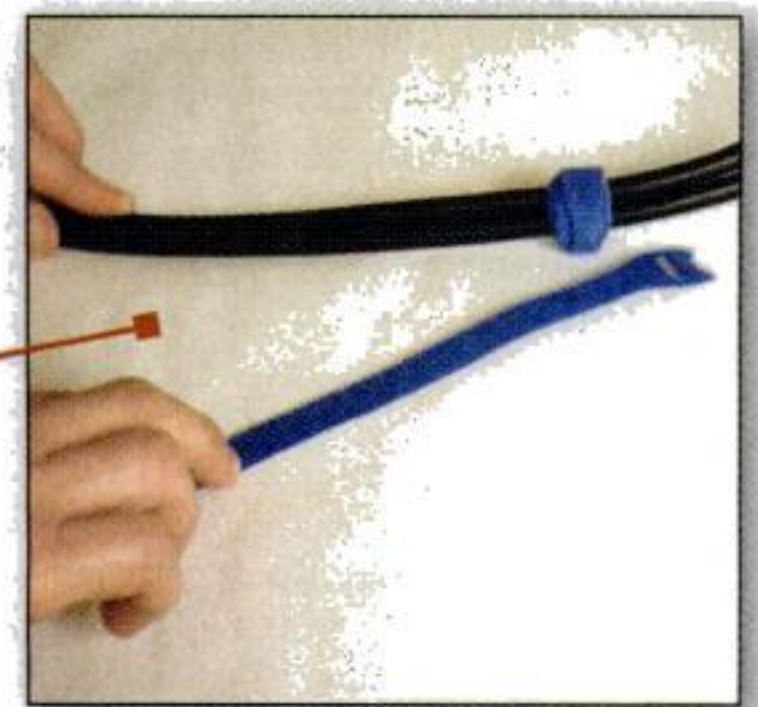
Once you've secured the zip tie, snip off the excess with a pair of scissors or wire snips. This not only makes for a cleaner look, it ensures that the tie won't get snagged on anything.



Here's an easy way to get rid of a zip tie once it has served its purpose. Instead of using a sharp implement to cut the tie, which can potentially cause damage to the bundled cables, simply use a wire snip and cut off the head of the tie.



If you move your system around periodically or perform frequent upgrades like we do, you should use Velcro straps instead of zip ties. These versatile strips of fabric are reusable and, as an added bonus, they make that familiar tearing sound that we all know and love.





## ▶ How to eliminate wires



Here's a no-brainer: If you reduce the number of cables, you reduce the amount of clutter that you have to deal with. This is why we replace our wired components with wireless alternatives whenever we upgrade. For instance, we swapped our old wired keyboard and mouse for the Logitech Cordless Desktop MX Duo for Bluetooth, which is indistinguishable from a wired mouse and keyboard, and can connect to any Bluetooth device on the market.

Switching your home network over to a wireless setup can also help by eliminating those bulky networking cables that are currently snaking through your house. But if you *must* have a wired setup, you can still hide your unsightly networking cables by routing them through a length of cable protector. Not only will the tough plastic housing hide your cables, but it will also help protect them in high traffic areas.

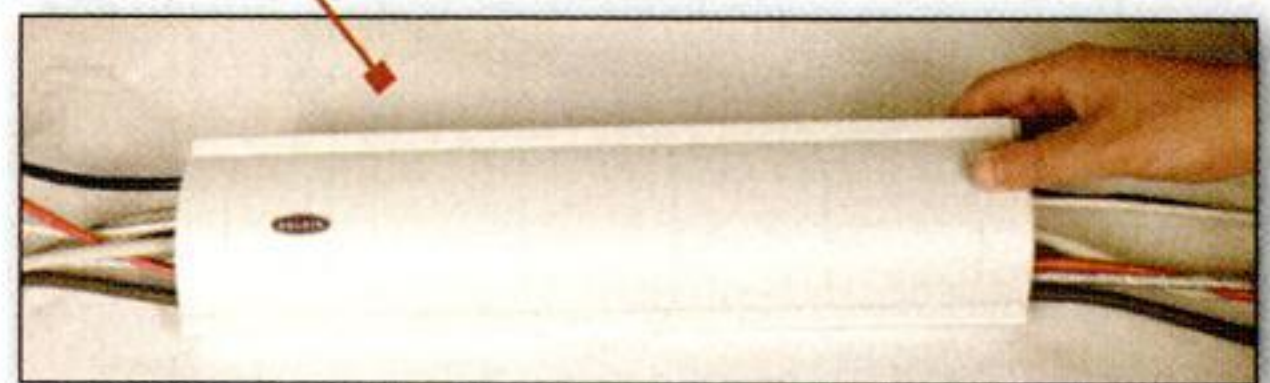
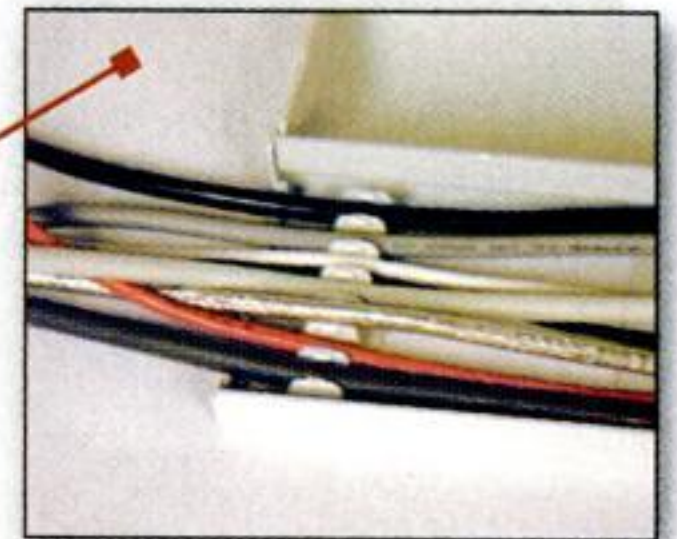
## ▶ Maximize your use of sleeves

Another effective method for bundling your cables together is to fit them into off-the-shelf sleeves or tubes built for this purpose. A recommendation: Use a hot knife to cut sleeving; this will help prevent frayed ends, but if you don't have access to a hot knife, you can use a zip tie or Velcro strap to cover up the exposed ends.



## ▶ Consider an all-in-one solution

If you'd prefer to route all your cables at once, you should look into the Belkin Cable Organizer. It allows you to route up to 14 cables through plastic housing, and can be mounted either underneath your desk or up against a wall.



## ▶ Clamp down on loose cables

Another method for bundling your cables together is the handy-dandy cable clamp. Like the Velcro straps mentioned earlier, clamps are reusable and easily removed; an important consideration if you're constantly changing your system's configuration. You simply slip your cables through and close the clamp around the bundle. How simple is that?

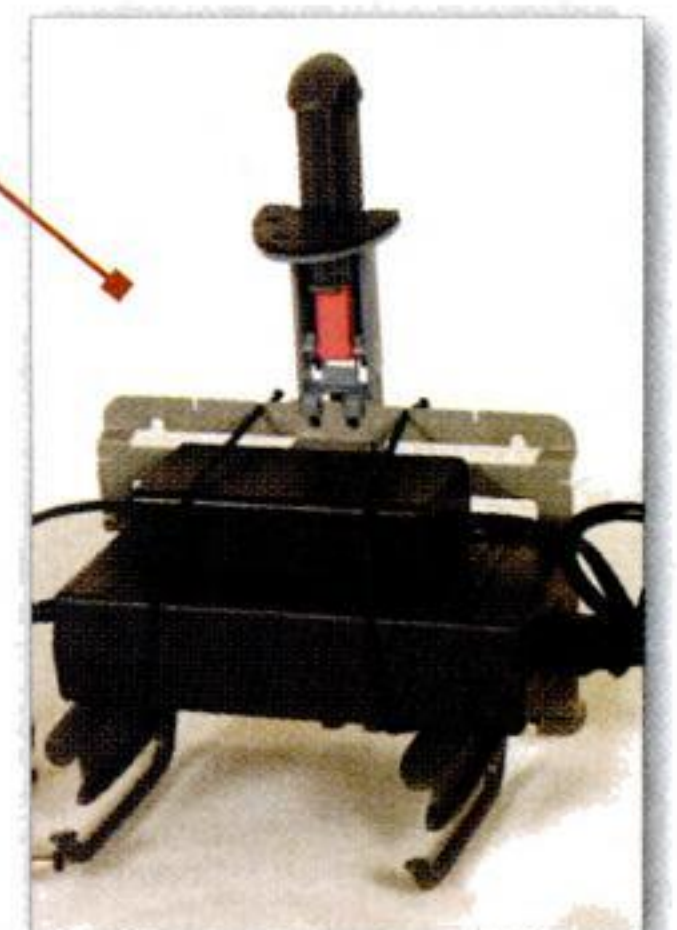


## ▶ Hang 'em high

In certain situations, it may be easier to simply hang your pesky wires out of the way. We used this cable clip and hook from 3M to route a set of wires along the wall behind our workspace. It's decidedly low-tech, but it works, especially if you don't have that many cables to contend with.



The Complete Cable Manager from Cable-Safe takes the all-in-one concept a step further by allowing you to manage all your cables as well as your surge protectors and power bricks. It clamps onto your desk and comes with enough hooks and space to get those bulky power supplies off the floor and out of your way.





## Reclaim your power supply

Everyone knows you shouldn't plug a system directly into an outlet. Power surges and lags can cause damage to sensitive system components, which is why we always use a surge protector or UPS to help keep our PCs from falling victim to electrical mishaps. Unfortunately, these bulky units cause even more cable snarl underneath your desk. This is the chaotic mess we saw every time we looked down at our feet. Here's how we tamed this ferocious entanglement.

We dealt with the surge protector's power cord by first unplugging all of the attached devices and folding the power cord into a loose bundle. We made sure to leave enough all-important slack, then we used a couple of zip ties to cinch the cord.

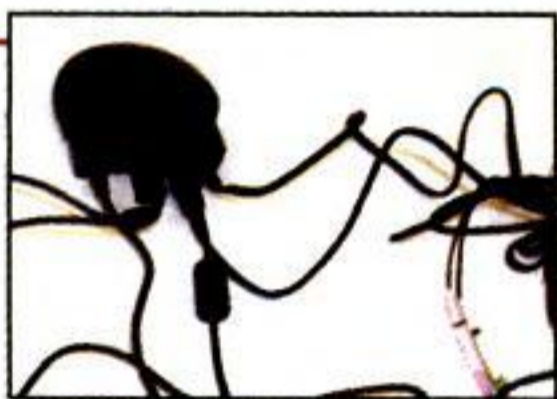
Next, we plugged our devices back into the power strip. We gave a gentle tug on each cord in order to determine how much slack was needed, and then we folded the excess and tied them down.

That's so much better! If you really want to go all out, you can even mount your power strip to the underside of your workspace or to the wall using metal brackets.



## Organize your USB Hub

If you're like us, you love the versatility and plug-and-play nature of USB devices. We keep a speedy USB 2.0 hub on our desk at all times loaded with useful devices like a media reader, game pad, headset, and coffee mug warmer. This can get pretty messy—USB cables can generate some seriously disruptive snarl.



Straightening out this mess is a simple matter of cinching down the cables with some zip ties. We left more excess cable free than we normally would so we could move the attached devices around without disrupting the entire hub.

The optimal placement for a USB hub is in a central location so you have easy access to the ports. If your hub keeps sliding around, attach a piece of adhesive backing to its underside and stick it to your desk or to the top or side of your computer case.



## Clean up your surround sound system

Multi-speaker surround sound systems are all the rage these days and have become so affordable that it's almost a crime not to have one. But one of the biggest obstacles to enjoying a 5.1 or 7.1 setup is managing the mass of speaker wire that ends up running all over your office—or house. Here are a few tips to help get those wires under control.



When running wire to satellite speakers, route the wire along the floor and along doorways. To make them as inconspicuous as possible, secure the wire with plastic wire holders, which are available from any hardware store. Make sure you perform an initial "dry run" with tape to avoid mistakes.

If you have wall to wall carpeting, you can route your wires along the edges of the carpeting using a flathead screwdriver.

Tie together the wires behind your main subwoofer and/or audio component to create a sense of order. First we fold the power cord and tie it down. Then we group the input cables together using some flexible plastic wire loom. Finally, we run the wires out to the individual satellites from there. ■

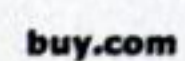
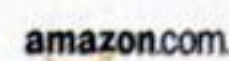
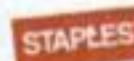






When you gotta game, you gotta game. Wherever. Whenever. So dump that tired old rig and pick up our portable **Super LANBOY** or state-of-the-art **P160**. You'll find a drool-inducing array of features concealed beneath their anodized aluminum bodies. Like ten drive bays, a swiveling control panel, and a removable motherboard tray on the P160. Or nine drive bays, a clear side window, and a free carrying strap on the Super LANBOY. Truth is, these beauties have everything you need for gaming on the go. Except an air freshener. To view our full line of products, visit [www.antec-inc.com](http://www.antec-inc.com).

**Antec**  
The Power of You





# In the Lab

A behind-the-scenes look at Maximum PC testing

## How We Test: Videocards

Learn how the experts in the Maximum PC Lab assess a 3D card's performance

Testing a videocard is as simple as installing the card and running a few games, right? Wrong! Not only do you need to measure every aspect of a card's performance, but you also need to consider other important factors like image quality and stability. To test every aspect of a card's performance, we use a combination of commercial benchmark programs, games with built-in benchmarks, and homegrown benchmarks using *Fraps* or another frame-counter program. We also perform extensive play testing with each card using a library of at least 10 titles, ranging from new releases to the classic games that thousands of people still play. Finally, we look at a few scenes we're intimately familiar with to qualitatively measure anti-aliasing quality, anisotropic filtering quality, and overall image quality. To assign a verdict to a product, we factor in benchmark performance scores, stability, and image quality.

Here's a look at the benchmarks we run.

### Unreal Tournament 2003

*Unreal Tournament 2003's* flyby benchmark has been a staple in our testing suite since the game came out. Unlike the botmatch mode—which is limited by CPU performance—the flyby is an excellent indicator of basic videocard performance. We run the flyby at 1600x1200 at the default settings.

### What makes a good videocard benchmark?

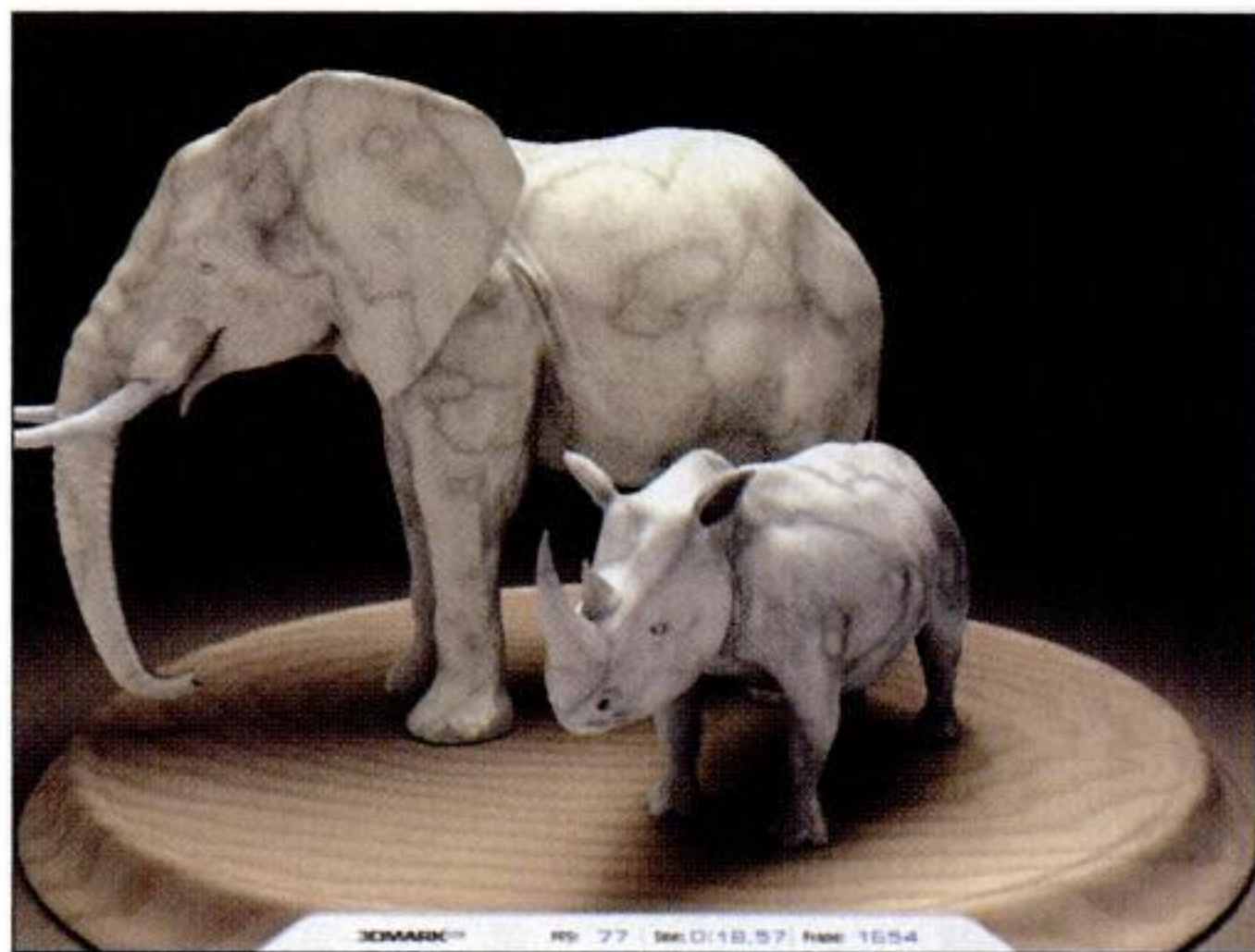
For a game or benchmark to be a solid and accurate measure of a videocard's performance, it needs to be limited by some aspect of the videocard, not by the CPU speed or bandwidth between the CPU and memory. To determine which games are videocard-dependant, we test them using top-of-the-line unlocked CPUs—both

*Far Cry* is the first game we've tested that stresses programmable pixel and vertex shader performance. To hammer the shaders we set everything to Very High in the Advanced Graphics control panel, then we crank the water quality to Ultra High, which enables more complex, fully reflective water. Because *Far Cry's* integrated demo mode doesn't actually record enemy movement, we use *Fraps*—a third-party frame rate counting utility—to measure the frame rate. To ensure we get identical results, we load a specific save-game, and measure the frame rate with *Fraps* for 35 seconds while we walk straight ahead in the game. We test *Far Cry* at 1280x1024.

### 3DMark 2003 version 340

We report several numbers from *3DMark 2003*, including the overall composite score using default settings, the Game 2 and Game 4 results at 1600x1200, and the Pixel Shader 2.0 test at 1600x1200. Game 4 is a great indicator of overall pixel and vertex shader performance, while Game 2 uses volume shadows—the same technique that *Doom 3* uses to render realistic shadows. The *3DMark 2003* results we report give an indication of programmable shader performance.

AMD and Intel—and then vary the CPUs' speed as well as the videocard's core and memory clocks in different test runs. By comparing the drop in the benchmark results with the amount we decreased the components' clock speeds, we can determine the primary limiting factor for each benchmark.



Until more games that fully utilize programmable shader technology are available, *3DMark* is really just a proxy benchmark.



Despite the sometimes boring single-player game, *Halo* still makes a great PC benchmark. Its heavy use of Pixel Shader 2.0 stresses even the mightiest cards.

### Halo 1.02

*Halo* was one of the first games on the market that stressed programmable shader performance, and it includes a benchmark to boot! We run *Halo* at 1600x1200, and force Pixel Shader 2.0 mode by using a command line switch.

### Aquamark 3

*Aquamark 3* is another synthetic test that measures a combination of your videocard's available memory bandwidth and the prowess of your card's programmable shaders. We test *Aquamark 3* using the default settings.

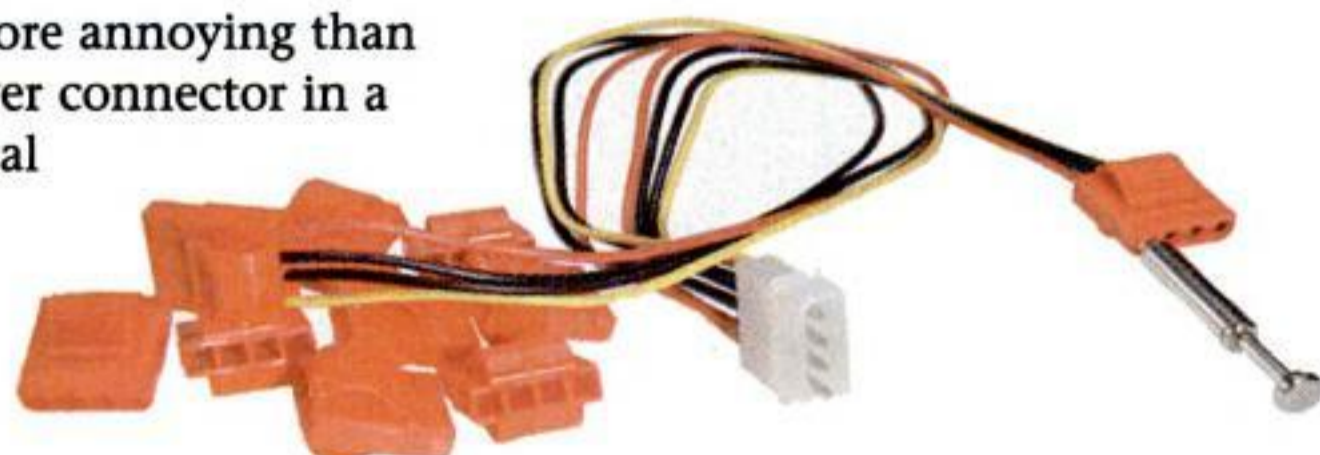


# Vantec EX-Grip Molex Connector Kit



Say goodbye to numb fingers and broken nails

There's nothing more annoying than a stuck Molex power connector in a hard drive or optical drive. You have to pull on it, yank on it, and squeeze until your fingers feel like they've been slammed in a car door. Vantec's EZ-Grip Molex Connectors provide the ideal solution for every cramped hand.



This innovative kit comes with 10 connectors that release easily when squeezed. Each kit also comes with a nifty extractor that will allow you to quickly remove standard Molex connectors before you switch to these new, improved doodads. The \$10 connector kit comes in various colors, including UV reactive shades.

Of course, it goes without saying that you should change only one lead at a time. If you fail to heed this warning and you wire your power connector incorrectly, you can plan on kissing your drive and maybe your power supply goodbye. [www.vantecusa.com](http://www.vantecusa.com)

## Best of the Best

As of July, 2004

The big news this month is that we're giving ATI the nod for its Radeon X800 XT Platinum Edition (see page 20 for all the details). In other news, while we haven't formally reviewed Abit's IC7-MAX3, we've used it in enough projects in and around the office to know it's the best, so we're declaring it our favorite 875P motherboard. Canon's i9900 printer also replaces its little brother, the i9100, as the fastest large format ink jet printer in town. You'll also notice that we're continuing to recommend Sony's discontinued F520 CRT display. This month we review two high-end CRTs, and we'll analyze another two next month. When all is said and done, we'll pronounce a new winner. Finally, if you've missed the news elsewhere in this magazine: AMD has formally released its Socket 939 for Athlon 64 and 64 FX. That makes AMD Socket 940 boards obsolete.

### High-end videocard:

ATI Radeon X800 XT Platinum Edition

### Budget videocard:

ATI Radeon 9800

### Do-everything videocard:

All-in-Wonder Radeon 9800 Pro

### Soundcard:

Sound Blaster Audigy 2 ZS Platinum

### Serial ATA hard drive:

Western Digital 740GD/ IBM 7K250

### Parallel ATA hard drive:

Hitachi 7K400

### CD-RW drive:

Plexor PlexWriter Premium

### DVD burner:

Plexor PX-708A

### LCD monitor:

Dell 2001FP

### High-end CRT monitor:

Sony F520

### Budget CRT monitor:

Cornerstone P1750

### P4 motherboard:

Abit IC7-MAX3

### Athlon XP motherboard:

Asus A7N8X Deluxe Rev 2

### Athlon FX motherboard:

Asus SK8V

### Portable MP3 player:

Apple iPod 40GB

### Photo printer:

Canon i9900

### Pocket PC PDA:

HP iPaq 5555

### Palm OS PDA:

Palm Tungsten C

### 7.1 speakers:

Creative Labs 7.1 Gigaworks S750

### 5.1 speakers:

Logitech Z-680

### 4.1 speakers:

Logitech Z-560

### 2.1 speakers:

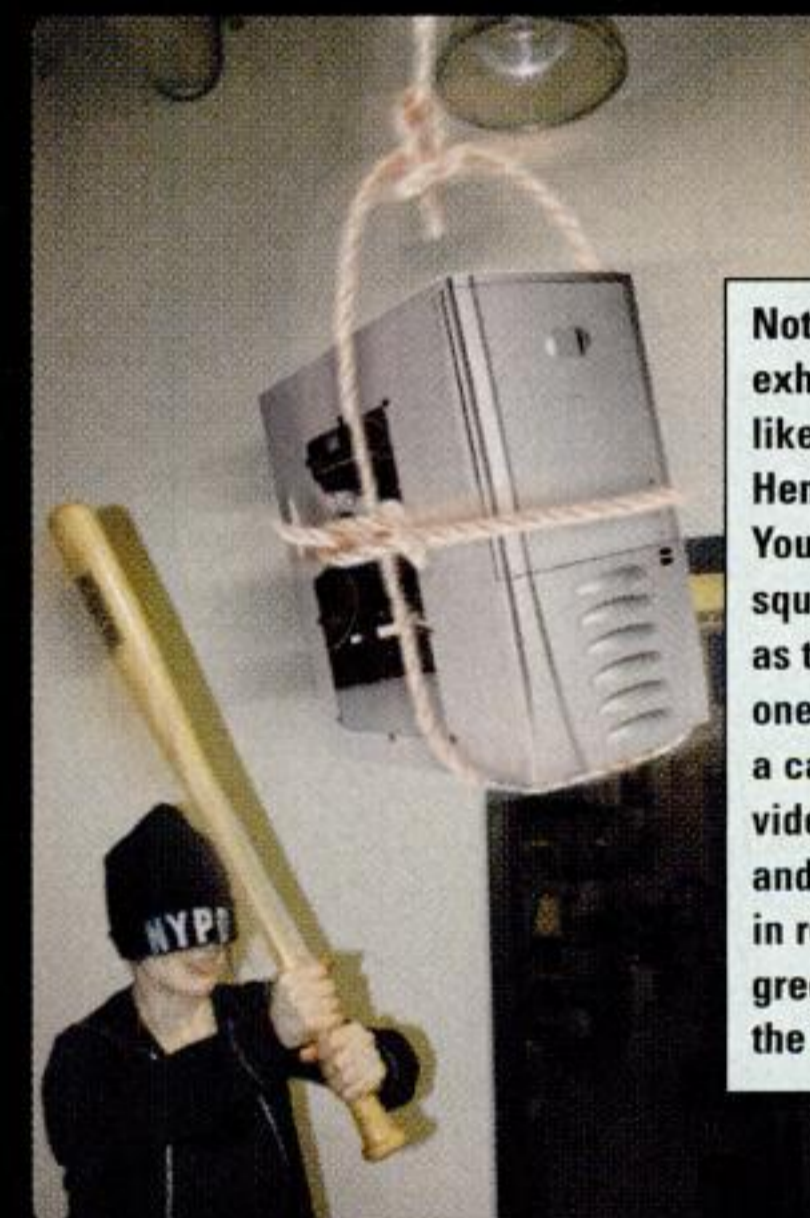
Logitech Z-2200

## LAN Party aNiMaLZ!

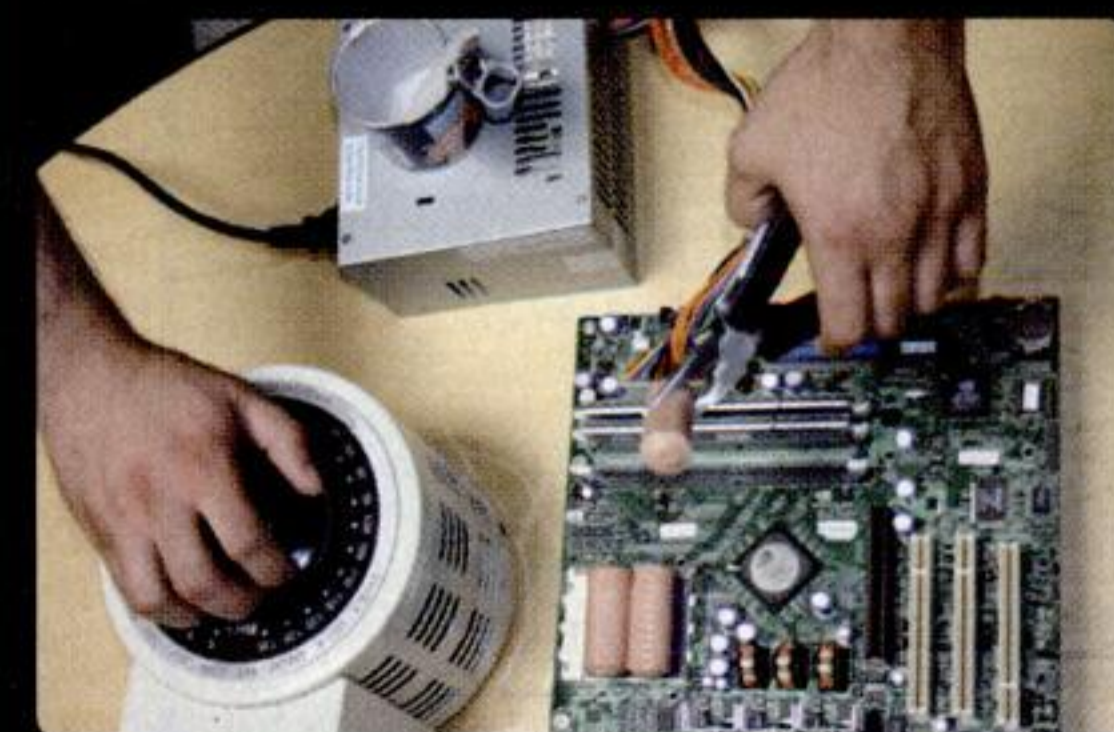
It's not all work and no play here at *Maximum PC*. In fact, no one knows how to have a wild time like we do. Here are a few things we've learned over the years that are guaranteed to liven up any LAN party, no matter how dull your friends are.



There's no beer can big enough to last a whole LAN party. That's the motivation behind the Beer Kewl-er, a high-tech mini-keg that uses the reservoir from a Zalman Reserator to refresh gamers without taking them out of the game.



Nothing wakes up exhausted gamers like free hardware. Hence, the PC-ñata. Your guests will squeal with delight as they vie to be the one who busts open a case filled with videocards, CPUs, and sticks of RAM in red, white, and green—the colors of the Mexican flag!



Cheese puffs and nachos? Dullsville. But what about tasty Vienna Sausages grilled up right at the game table? In-tense! The PC-B-Q, shown here with the optional Over-Cooker dial, uses the scorching heat of your CPU to make hot 'n' healthy treats your guests will be talking about long after the last shot's been fired.

Our current gaming favorites: *Painkiller, City of Heroes, Splinter Cell: Pandora Tomorrow, Far Cry, Planetside*



# Monarch Hornet Pro 64

Next-gen small formfactor PC packs power—and a slew of next-generation components



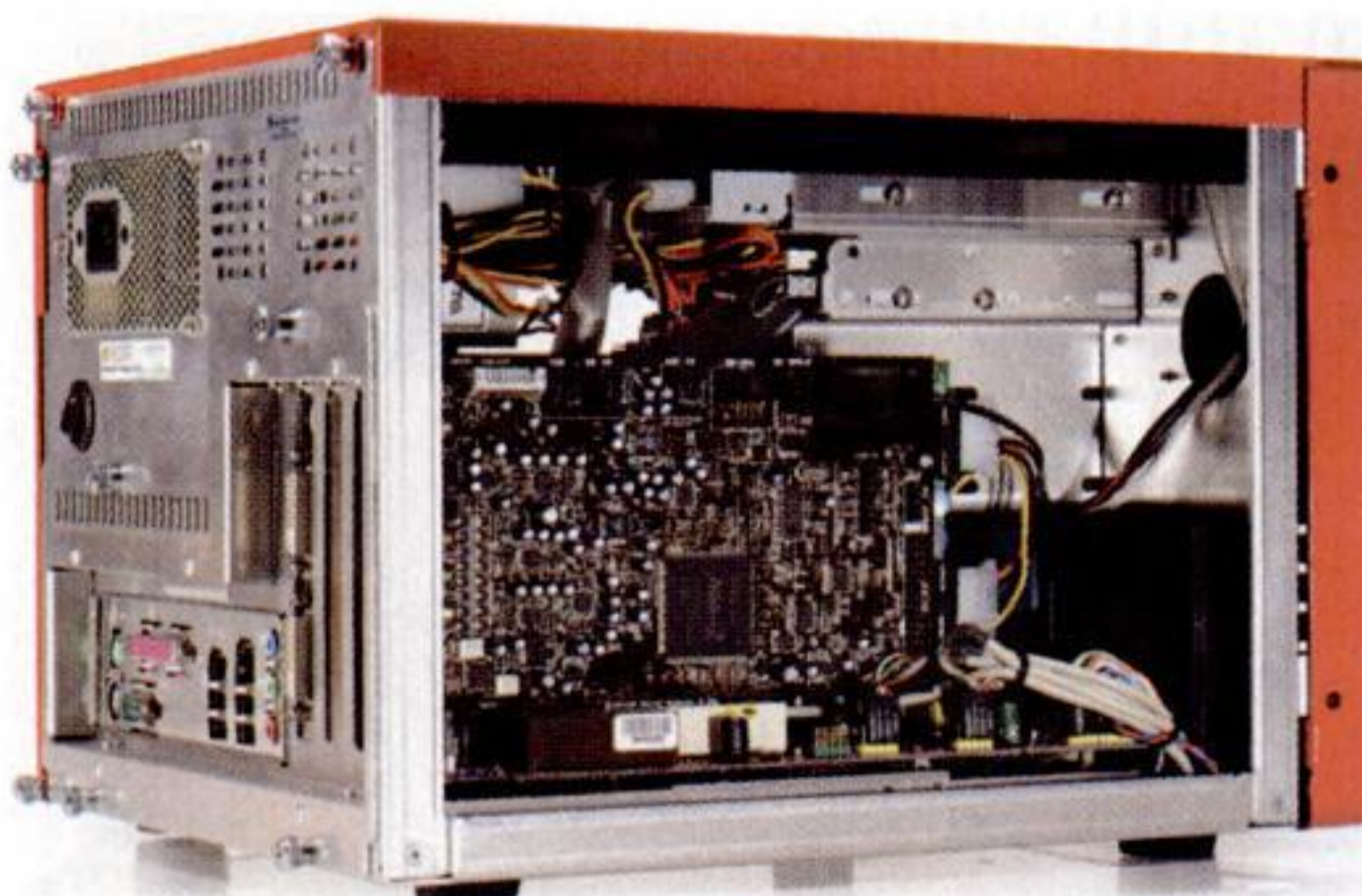
If you like small formfactor boxes and you're partial towards high-end videocards with the GeForce moniker, you probably already know the two don't mix. Few SFF boxes can accommodate these cards' two-slot design. And we don't know of any SFF machines with the *cojones* to match the merciless power requirements of nVidia's new GeForce 6800 Ultra.



But somehow, Monarch has managed to not only stuff a GeForce 6800 Ultra into its Hornet Pro 64, it has also integrated a bunch of other high-end components. All without melting the entire box into a puddle of aluminum and silicon goo.

The GeForce 6800 Ultra is paired with AMD's brand-new Athlon 64

3700+ in a VIA K8T800-based motherboard. This equates to a smooth 2.4GHz of computing that's damn-near as fast as a FX-53 CPU in most tests. A pair of Corsair Micro DDR400 Pro modules light up to indicate memory access activity, while a pair of RAID 0 Western Digital



The Hornet Pro packs a fistful of power, with 10K RAID and nVidia's latest and greatest GeForce 6800 videocard.

Raptor 74GB 10K drives handle storage. Also new to the mix: Plextor's PX-a712A, a recent upgrade to our favorite multiformat burner—the Plextor PX-708A. As its name implies, the newest Plexy burns at 12x to DVD+R discs. (If you can't find 12x-certified media, it will burn at 12x to some 8x media.) Rounding out the hardware configuration is a Sound Blaster Audigy 2 ZS card. Oddly, the machine doesn't include Gigabit Ethernet, which we consider standard these days.

The case itself sports a Ferrari red custom paint job that looks impressive overall but is slightly marred by a cheap-looking black paint job on the Plextor's bezel. However, we assume this flaw is limited to our review system, and will cease once Monarch gets its hands on a black-bezel version of the PX-708A.

The Hornet Pro 64 ran quietly during low-impact computing, but sounded obnoxiously loud when we fired up more intensive tests. As an example, when we finished our basic testing, we ran *3DMark 2003* in a continuous loop to see if the videocard or power supply would fail. Neither did, but the noise increased

significantly. We suppose this is to be expected from this kind of power.

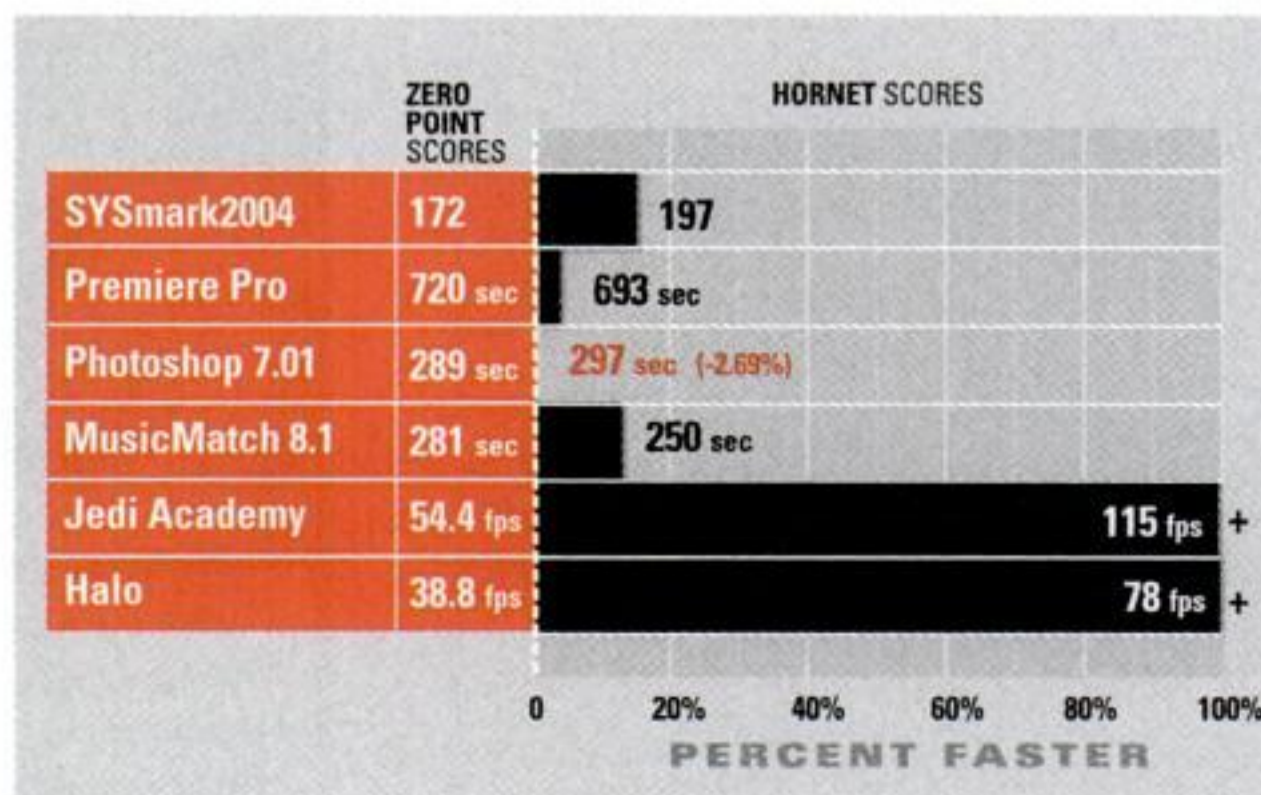
None of this matters to gamers so much as cold, hard performance results. This is a category where the Hornet Pro 64 doesn't disappoint. In our *Jedi Academy* OpenGL test, the Hornet Pro 64 gave us a Lab record 115fps. In *Halo*, it coughed up an amazing 78fps, more than double our zero-point reference system. While it's not part of our official suite, we also ran *3DMark 2003* and recorded a speedy 12,034. In *3DMark 2001 SE*, it threw down a 24,747.

In application testing, the Hornet performed well, but the 200MHz speed advantage of its Athlon 64 3700+ was nullified by the dual-channel capabilities of our zero-point Athlon 64 FX-51. With this said, Monarch's little red box posted 12 percent faster scores in our *MusicMatch* test, which measures a PC's ability to encode MP3s. While our software tests consistently demonstrate the power of Intel's architecture with regards to software performance—the Hornet ran behind our P4EE-equipped system—the Pentium 4 is considerably more expensive. In our mind, these savings justify Monarch's decision to go with an Athlon-based CPU.

But the real story here isn't just record-setting game benchmarks, it's that Monarch built a hot-rod system with next-generation parts that you can easily lug to a LAN party.

## UNDER THE HOOD

THE BRAINS	
<b>CPU</b>	AMD Athlon 64 3700+ (2.4GHz)
<b>Mobo</b>	MSI K8TM-ILSR (VIA K8T800 chipset)
<b>RAM</b>	One gig Corsair PC3200 Pro-series RAM with lights (2 512MB DIMMs) operating in single channel mode.
<b>I/O ports</b>	Six USB 2.0, parallel, Serial, two FireWire, mic, headphone, three line-in, three analog out
<b>LAN</b>	VIA Fast Ethernet
DISPLAY	
<b>Videocard</b>	nVidia GeForce 6800 Ultra (400MHz/1.1GHz)
STORAGE	
<b>Hard drives</b>	Two 74GB Western Digital Raptors (10K RPM, SATA) Raid 0
<b>Optical</b>	Plextor PX-712A (12x DVD+R, 8x DVD-R, 48x CD-R, 24x CD-RW)
<b>Other</b>	1.44MB Mitsumi floppy with built-in media reader
AUDIO	
<b>Soundcard</b>	Creative Sound Blaster Audigy 2 ZS
FINE DETAILS	
<b>Case</b>	Monarch PC custom
<b>Power supply</b>	Enermax EG285SX 270 watt power supply
<b>Fans/extras</b>	One red cold cathode fan
BUNDLE	
Windows XP Pro	
<b>BOOT: 79 sec.</b>	<b>DOWN: 8 sec.</b>



Our zero-point system includes: a 2.2GHz Athlon 64 FX-51, an Asus SK8N motherboard, 1GB of Corsair Registered TwinX DDR400 RAM, an ATI Radeon 9800 XT, a 250GB Western Digital WD2500JB hard drive, Plextor PX-708A DVD burner and a PC Power and Cooling TurboCool 510 Deluxe power supply.

## MAXIMUM PC VERDICT 9

**MOHAMMAD ALI**  
A GeForce 6800 Ultra in a small formfactor box!

**ALI G**  
Athlon 64 trails P4 in application tests.

\$3,277, [www.monarchcomputer.com](http://www.monarchcomputer.com)



# iBuypower Battalion-101

Mean, green, and lean, this laptop combines high-speed parts with a ridiculously low price

Someone at iBuypower must be a Mopar fan, because the Battalion-101 SL-series laptop has to be, just *has* to be, an homage to Plymouth's muscle cars of the late 1960s and early 1970s, which sported the same hi-glow Limelight green paint jobs.

But the Battalion-101 has more than color in common with those big-block, hemispherical box cars of yore. Namely, speed. Powered by an Athlon 64 3400+ and Mobility Radeon 9600, this laptop had no problem chopping up our zero-point laptop's benchmark scores, which are based on a 1.7GHz P4M core. It's really no surprise how superior the A64/Battalion-101 is, but it does demonstrate how far the notebook market has come in a mere year and a half.

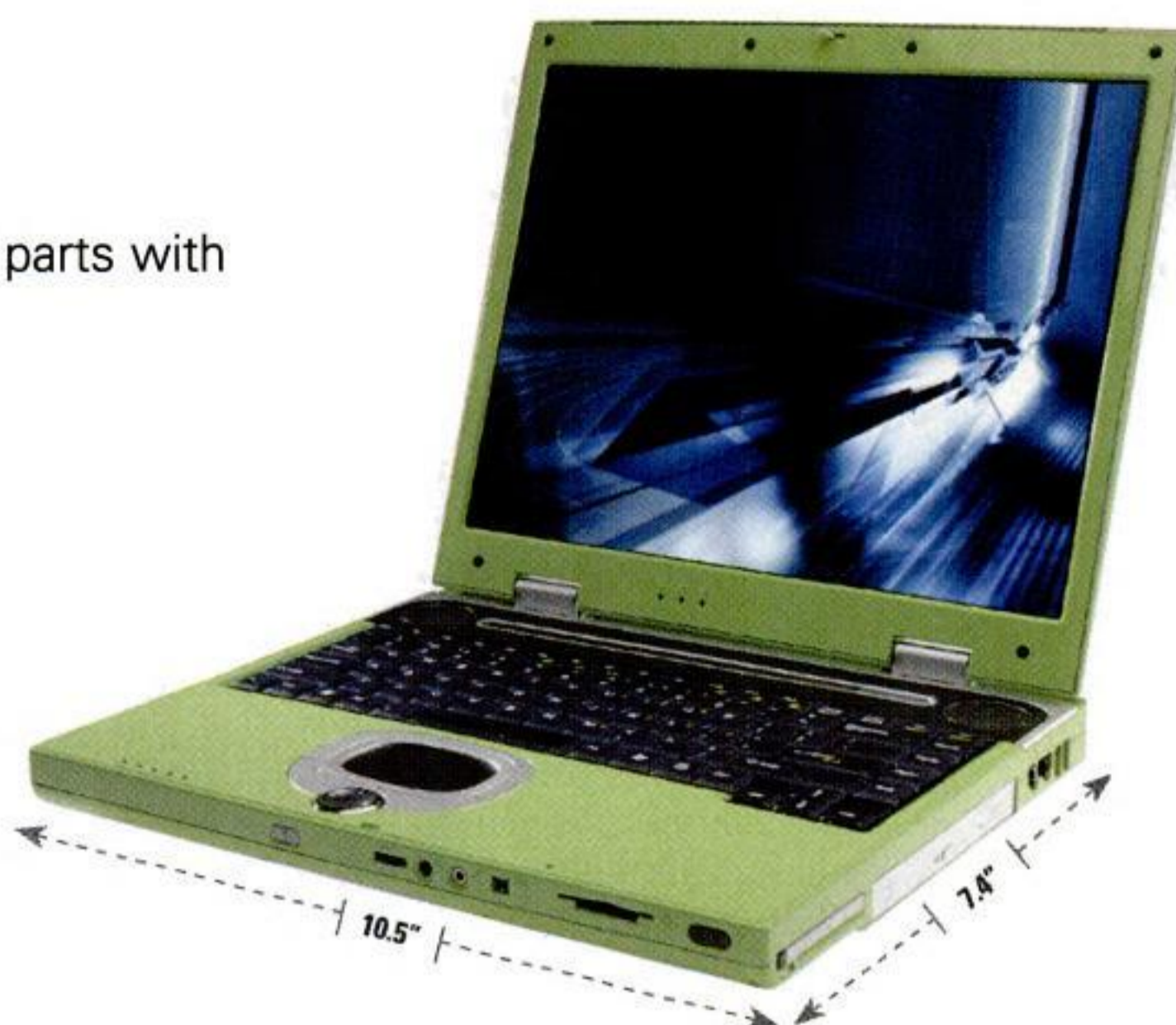
In *SYSmark2002*, which tests how fast a PC can perform certain tasks

in popular applications, the Athlon 64 is about 83 percent faster than our zero-point. In Adobe *Premiere 6.0*, the Battalion-101 is 159 percent faster, and in our *Photoshop* tests, it's 194 percent faster. As Howard Dean would say, "Wee-haw!" That's some kind of speed, son.

But before you light a cigarette and call it a night, remember that our benchmarks are a bit dated. (We'll be revising them soon.) Compared with a notebook from 18-months ago, the Battalion-101 is a pedal-to-the-metal beast. But how does it hold up against the six blazing-fast notebooks we reviewed in our April issue? The Battalion-101 places mid-pack amidst this elite crowd, coming in just behind the Voodoo PC Envy M:855, which has a slight edge thanks to its faster DDR400 RAM and the slightly faster clock speed of its graphics card.

Unfortunately, like the Voodoo Envy M:855, the iBuypower Battalion-101 exhibits piss-poor sound. The sound from the onboard speakers is so poor, in fact, our 1970s' muscle car analogy holds up yet again: We're talking AM radio versus DVD-Audio. Ugh.

The Battalion-101 does offer excellent battery life. In our run-down test, we play a DVD until a unit's batteries run out. The Battalion-101 gave us just less than



The Battalion-101 is like a 1970s' muscle car: garish in color and ostentatious in power.

three hours of battery life, which is enough to watch most DVD movies from beginning to end. While this isn't Centrino-caliber extended battery life, it's phenomenal nonetheless when you consider how much power the Athlon 64 sucks up.

The Battalion-101 packs Wi-Fi in G and B flavors, Fast Ethernet, and a card reader for SD and Smart Media. There's also FireWire A, an Infrared port, and a 7,200rpm hard drive.

At the end of our analysis, however, neither garish color nor astounding speed made us blush as much as the insanely low pricing. To wit, Voodoo's Envy M:855, which costs \$3,400 in April 2004 dollars, is virtually the same as the Battalion-101 save the RAM and DVD burner. The Battalion-101 costs \$2,195.

We were prepared to ding the hell out of the Battalion for its sub-par sound performance and the, umm, unusual aesthetic, but at

this price, the notebook is an incredible steal.

—GORDON MAH UNG

## UNDER THE HOOD

### THE BRAINS

CPU	2.2GHz Athlon 64 3400+ (1MB L2)
RAM	1GB DDR333
I/O ports	CardBUS slot, parallel, S-video, VGA port, four USB 2.0
Modem	V.92
LAN	VIA 10/100 Ethernet 802.11 B/G

### DISPLAY

Video	ATI Mobility Radeon 9600 Pro (128MB)
Display	15-inch (1400x1050)

### STORAGE

Hard drive	Hitachi 7K60
CD-RW/DVD-ROM	QSI CDRW/DVD SBW-242 (24x CD-R, 4x CD-RW, 8x DVD-RW)

### AUDIO

Audio chip	C-Media AC-97
------------	---------------

### OTHER

IrDA, FireWire A, SD/MMC/SM reader

### TIPPING THE SCALES

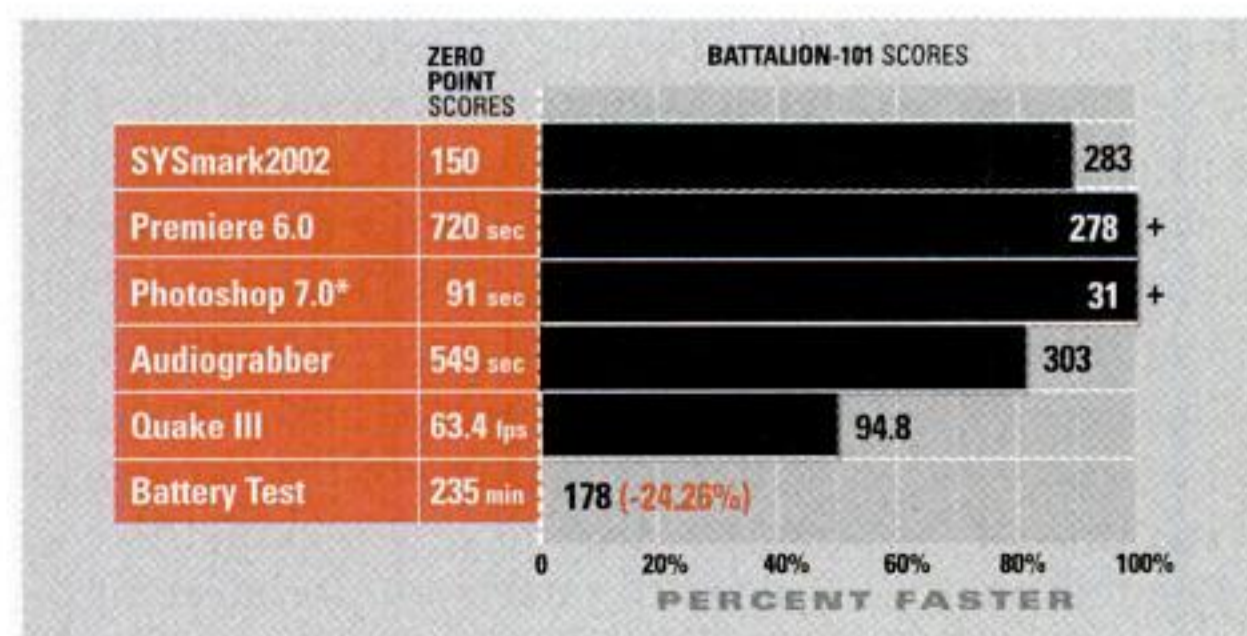
Lap weight:	8.5 lbs.
Carry weight:	9.8 lbs.

### BUNDLE

Microsoft Windows XP Home, Cyberlink PowerDVD XP, BHA B's Clip

BOOT: 30 sec.

DOWN: 10 sec.



Our zero-point notebook is a Dell Dimension 8200, and includes a 1.7GHz P-4M CPU, 256MB DDR266, a 64MB 128-bit DDR GeForce4 Go graphics chipset, and a 5400rpm IBM Travelstar 60H hard drive. \*Our notebook Photoshop 7.0 test differs from our new desktop Photoshop test.

**MAXIMUM PC VERDICT** **8**

**+ HEMI BARRACUDA**  
Great performance, good battery life, and crazy-low pricing.

**- PACER**  
Awful onboard speakers and mushy scroll pad.

\$2,195, [www.ibuypower.com](http://www.ibuypower.com)



# Lyra RD2780 Audio Video Jukebox

Seeing is disbelieving

Portable video players based on Microsoft's Portable Media Center OS are receiving their final teeth-whitening treatments before their big fall rollout, but our enthusiasm remains in check until we know more about the integrated digital rights management in these devices. This is also why we're more interested than ever in the crop of portable video players available on shelves today. We've already seen one winner in Archos' expensive-but-hella-fun AV320; now we've got a loser to even the scales in RCA's Lyra RD2780.

Well, at least the looks are there. The RD2780 looks sleeker

and is slightly lighter than Archos' AV320. The black border makes the 320x240 screen appear to be much bigger than it is; at 3.5 inches diagonally, it's actually a little smaller than that of the AV320 (which is 3.8 inches diagonally).

But screen size doesn't matter if your files won't play, which was often our experience with the RD2780. We were able to play only *one*

of our five downloaded DivX and Xvid test videos, which are recorded at different bit rates. Conversely, every one of them played fine on the AV320.

It gets worse, as we learned when evaluating the handful of movies that came preloaded on our review unit. The image quality wasn't bad—at least, until we saw nighttime scenes, or any scene with dark colors in it, for

that matter.

Regardless of the bit rate of the video, the Lyra displays terrible, blocky pixilation when it comes to flat black shades. We plugged the unit into a TV via the included composite-out cable and the blocky images made our guests flee for the kitchen. We hoped that upgrading the firmware on the player would solve both problems. It didn't.

The videos we encoded ourselves using *VirtualDub* played back without any problems (except for, of course, the aforementioned pixilation); unfortunately, RCA doesn't include this freeware app, or any video compression software at all, leaving you completely on your own to transport commercial titles to the player. What the Lyra will do, however, is record a signal from your television or VCR and automatically compress it. Unfortunately, most commercial VHS tapes and DVDs are copy protected with Macrovision, which degrades the signal and prevents you from taking your movies on the go. But, hey, you can still record the network premiere of *Kill Bill* with all the blood and bad language taken out.

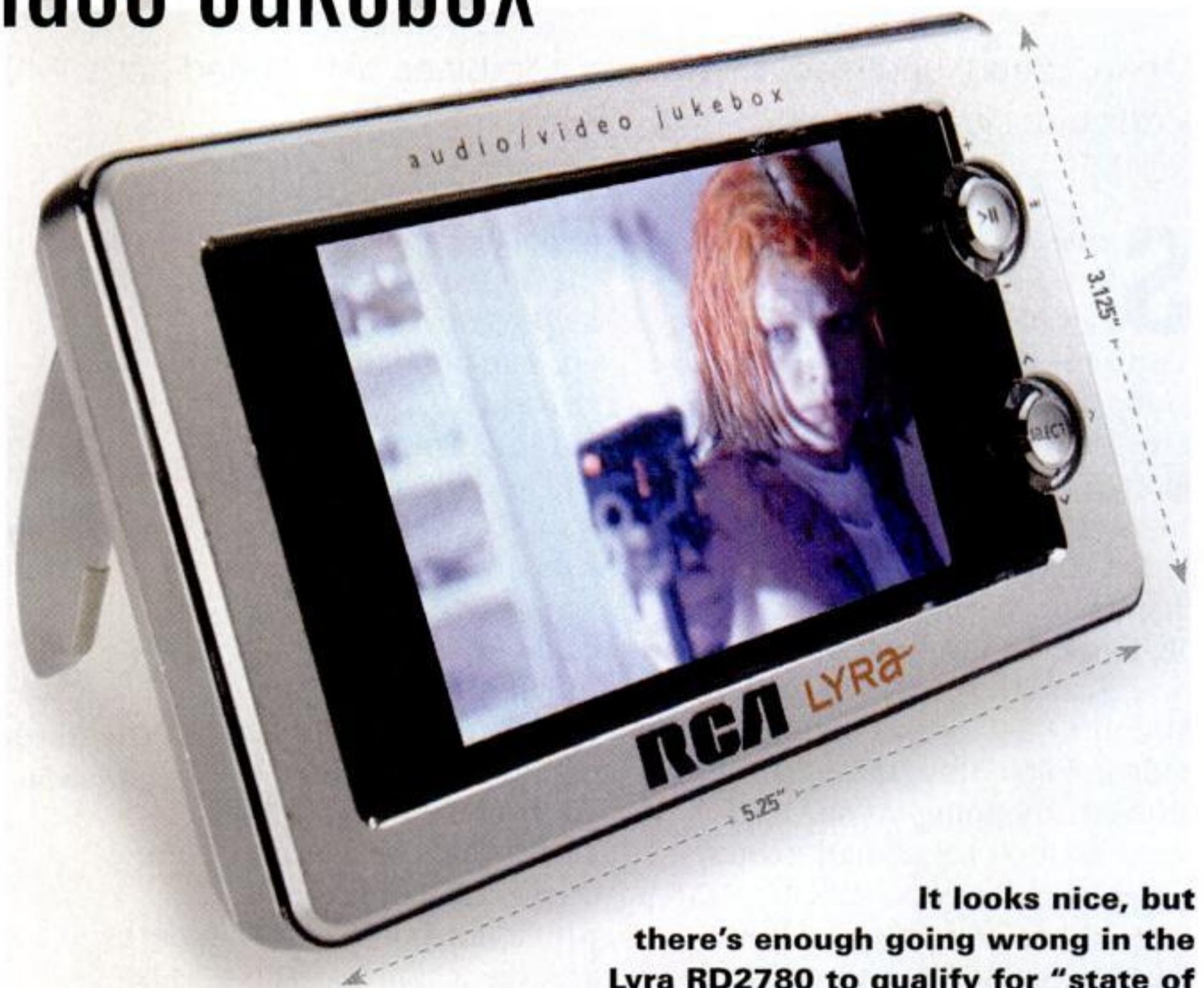
Rounding out the Lyra's woes, the internal, nonremovable lithium-

ion battery pooped out after 2:25 (hours:minutes), about 45 minutes sooner than the Archos AV320.

The RD2780 can also play MP3s, and can even record directly to MP3 through the line-in jack, but only up to 192Kbps and with no internal control over the volume level. Sadly, the interface doesn't take advantage of the large screen display—you can see only the first 11 characters of folders and track names! Finally, you can use the RD2780 to view your pictures as well.

Although significantly more expensive, Archos' media player doesn't choke on DivX files, and gives you the option of extending the device with options such as radio and camera attachments. Our recommendation: Buy the AV320 instead of the Lyra RD2780.

—LOGAN DECKER



It looks nice, but there's enough going wrong in the Lyra RD2780 to qualify for "state of emergency" federal aid.

## WHAT'S MACROVISION?

So how do you allow an analog signal to show up on your TV, but prevent it from being recorded? You use Macrovision, a process patented in 1986 by the company of the same name. Macrovision adds dummy data to the video signal in the vertical blanking interval. Your TV needs this interval so that its electron gun can go from the bottom of the screen back to the top. But your VCR or other recording device is fooled by this dummy data and faithfully records the signal as is, and sends the resulting mistimed signal back to your display.

MAXIMUMPC VERDICT

3

+ CAN-CAN

Retailers often allow up to 30 days for returns.

- PAN 'N SCAN

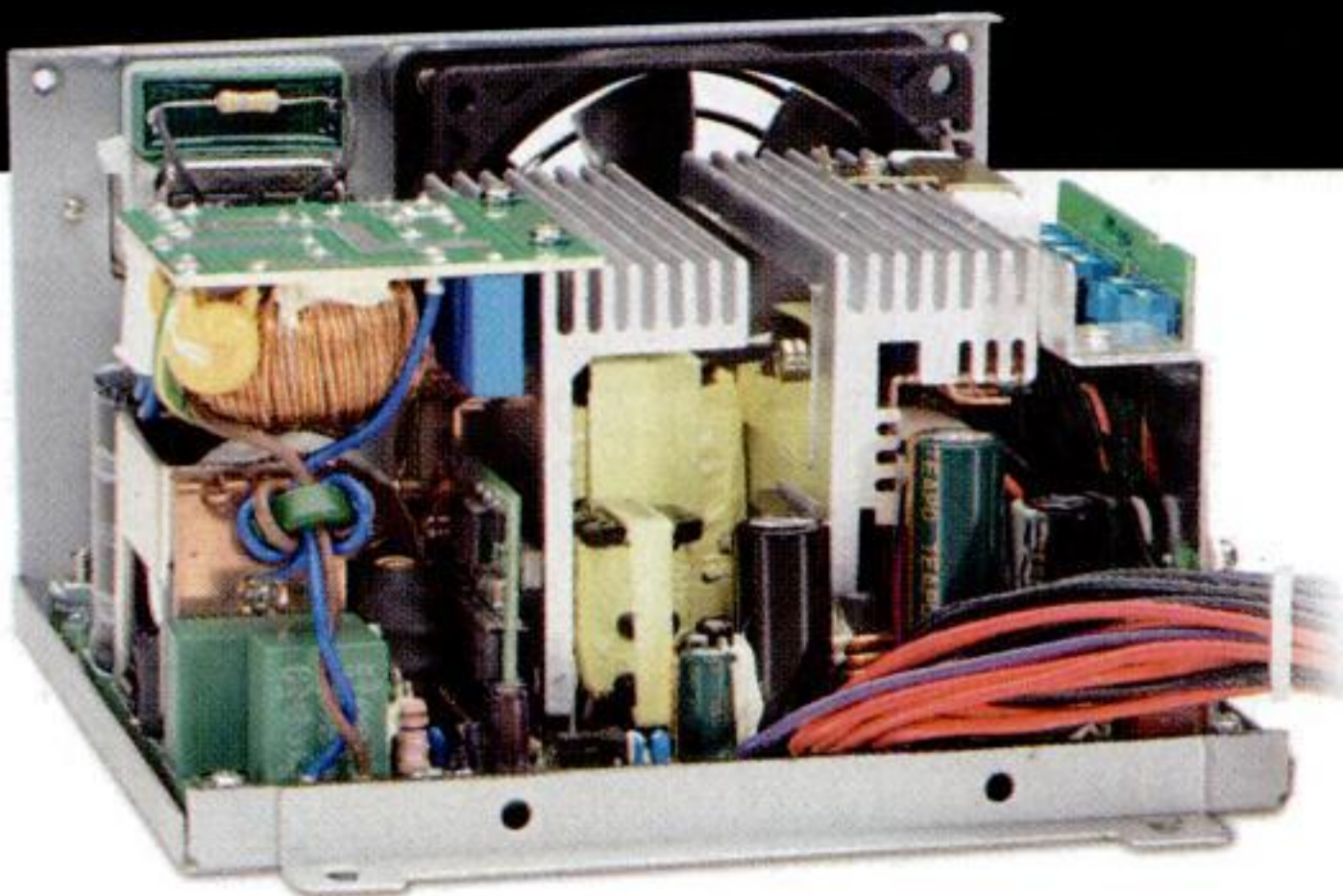
Some don't.

\$450, www.rca.com



# GETS DOWN

# LETS YOU DOWN

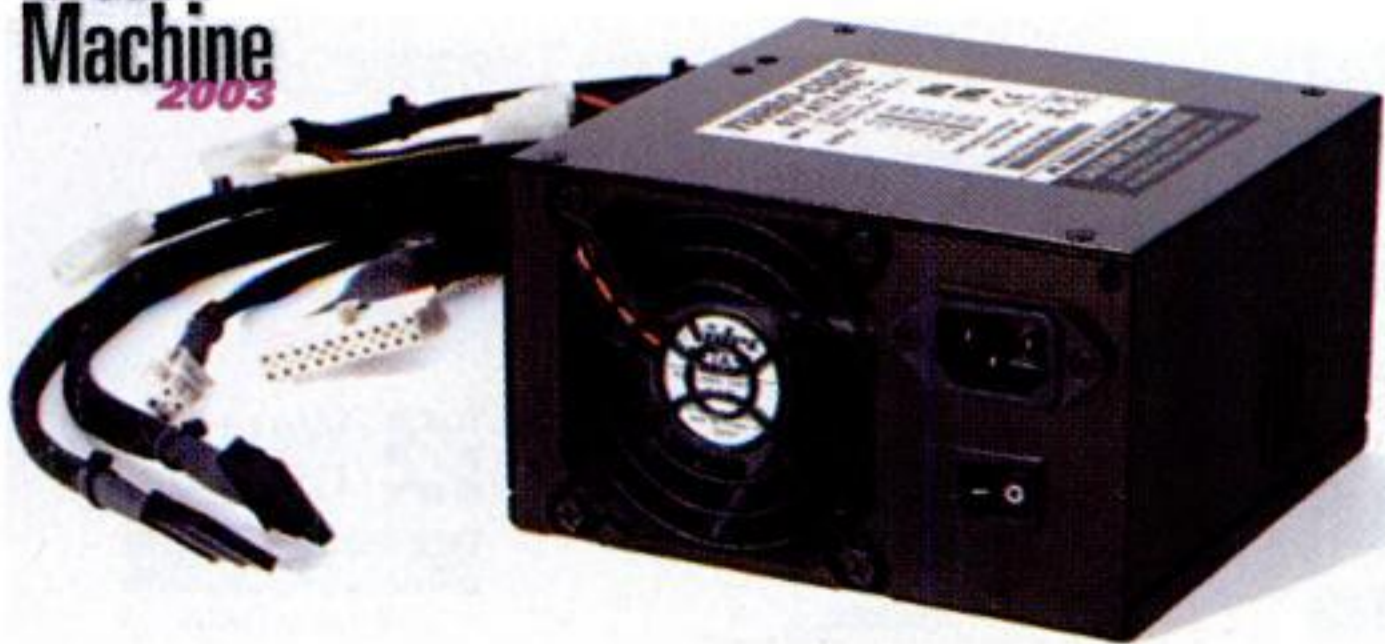


## Turbo-Cool® 510 Power Supply

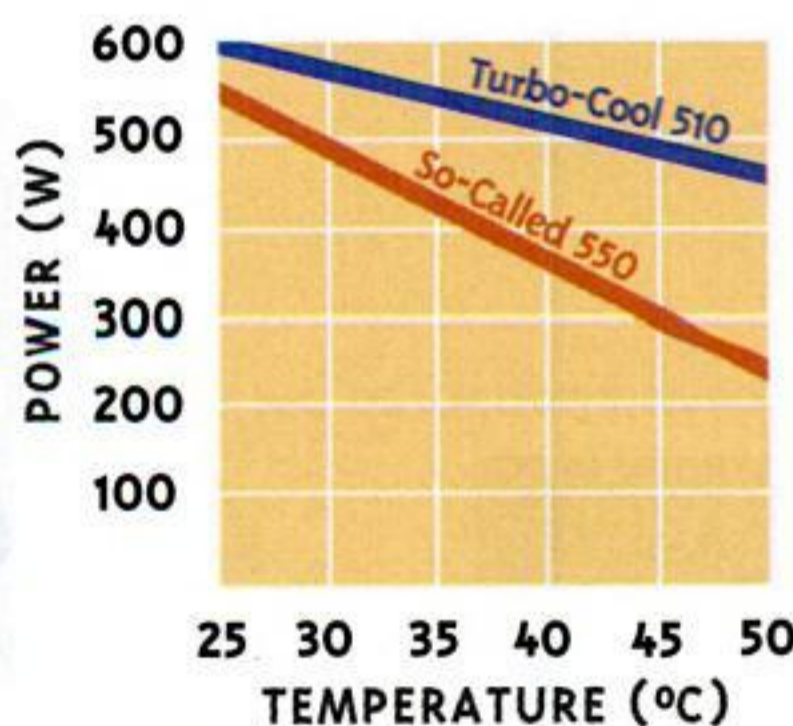
## So-Called "550" Power Supply

Power @ 25°C:	600W	550W	Rating requires room temp. < 60°F
Power @ 40°C:	510W	366W	True rating (40°C is typical P.S. temp)
Power @ 50°C:	460W	244W	50°C is the spec for an industrial PC
+12V Output:	34A*	24A	*38A peak. Powers CPUs and drives
Regulation:	1%	5%	Turbo-Cool's voltages are 5X tighter
Ripple:	10mv	50mv	Turbo-Cool's outputs are 5X cleaner
Max. Cooling:	44 cfm	40 cfm	Tests show "550's" 2nd fan is ineffective
Active PFC:	Yes	No	Continuous range line conditioning
Voltage Pots:	Yes	No	Adjustments for system fine tuning
Intel Listed:	Yes	No	Turbo-Cool 510 tops Intel's ATX12V list
Warranty:	5-Years	1-Year	Reliability and longevity indicator

**Hardware  
Dream  
Machine  
2003**



## Don't be Misled by Wattage Claims!



Even though the ambient temp. in a power supply is at least 40°C (104°F), most manufacturers unrealistically assume 25°C (77°F) in order to exaggerate their wattage claims. Since the proper full-load rating is 15°C higher, these power supplies produce **33% less power than their advertised ratings** as shown on the derating chart.

- Check Our Website for *Ten* 510 Reviews!
- See Our New Silencer® 410W for Only \$85!

*Turbo-Cool 510 derating spec: full load @ 40°C, decrease to 90% load @ 50°C.  
So-Called 550 manufacturer's spec: full load @ 25°C, decrease to no load @ 70°C.*

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Catch the

# 2004 Dream Machine TOUR

LIVE

All work and no play makes for a very dull computer.

DEMO THE LATEST VIDEO GAMES FROM YOUR FAVORITE GAME PUBLISHERS!

EXPERIENCE THE THRILL OF THE BEST COMPUTER MONEY CAN BUILD!

ENTER TO WIN ONE OF 4 DREAM MACHINES TO BE GIVEN AWAY IN AUGUST!



## Look for the Dream Machine Tour at:

**South By Southwest**  
Austin, TX, Interactive Tradeshow,  
March 14-16, 2004

**Comic-Con International**  
San Diego, CA, July 22-25, 2004



## As well as the following concerts in Summer 2004:

**Sound Advice Amphitheatre - Blink 182/Cypress Hill**  
West Palm Beach, FL - May 9, 2004

**Germain Amphitheatre - Blink 182/Cypress Hill**  
Columbus, OH - May 14, 2004

**White River Amphitheatre - Blink 182/No Doubt**  
Auburn, WA - June 16, 2004

**Shoreline Amphitheatre - Blink 182/No Doubt**  
Mountain View, CA - June 19, 2004

**Tommy Hilfiger at Jones Beach Theater - Rush**  
Wantagh, NY - August 11, 2004

The Dream Machine Tour has been sponsored by:

CREATIVE



Look for more information at [www.maximumpc.com](http://www.maximumpc.com)

# MAXIMUM PC



## Canon i9900

Superior-quality prints and blazing-fast speed?  
You've got to be kidding

If you print a lot of images with your ink jet printer, you know every phase of the process by heart. There's the *ker-chunk* of loading, the *whir, whir, whir* of printing, and finally, after an eternity, the *ker-plunk* sound of the emerging print. Ahh, welcome to the age of digital photography... and slow, slow printing.

Fortunately, Canon's i9900 doesn't subscribe to the practice of slow-pokiness. Essentially a revamp of the i9100, Canon's new bundle of joy is super fast and offers even better print quality than its predecessor.

In addition to a new body that can be closed to keep out dust and debris, the i9900 sports several new and long overdue interfaces. While the parallel port remains absent, Canon has added high-speed USB 2.0 and FireWire A ports to the mix, along with USB 1.1 (why there's a separate USB 1.1 port we don't know). The printer's instructions seem to indicate that FireWire only works on a Macintosh, but we had no problems using it to print to the i9900 from our PC. The USB 1.1 port on the front lets you print directly from a digital camera that supports the PictBridge format—unfortunately, that's the only thing the port can be used for.

Internally, Canon has augmented the six-color range of the i9100 printer with the addition of red and green ink tanks. Besides giving photographs more vibrant reds and greens, the new colors also greatly improve black and white output. Finally, Canon spec'd the printer with double the resolution (4800x2400), a smaller ink droplet (2 picoliters), and an astonishing 6,144 nozzles.

Canon says prints from the i9900 will last for many decades, but that still doesn't match the longevity of Epson's 2200, which is rated for



**When not in use, the i9900's paper trays can be folded up for a more compact profile and protection against dust.**

75 years thanks to its pigment inks (Canon uses a dye ink). But while the Epson's longer-lasting prints are nice, we really appreciate the i9900's speed. The relatively large number of nozzles allows it to crank out a 13x19 borderless print in less than three minutes versus the 20 minutes or more it takes other brands.

—GORDON MAH UNG

### MAXIMUM PC VERDICT 9

#### + TRI-X

Improved green output and incredible speed.

#### - T-MAX

Front USB port should support devices other than digicams.

\$500, [www.canonusa.com](http://www.canonusa.com)

## BenQ x120 Internet Keyboard

A decent basic keyboard that's stylish  
and functional

We don't often review basic keyboards these days. After all, they usually cost less than \$20 and are readily available to try at major retailers like Best Buy and CompUSA. But we made an exception for the BenQ x120 keyboard; its features are unique enough to earn it a spot in our review section. Its small size and slim profile make it ideal for LAN-party totage, and you certainly won't be ashamed of its spiffy silver and grey stylings.

Our main consideration when reviewing a keyboard is its layout. Keyboards must use the standard layout that touch typists—from expert to novice—are accustomed to. That means all the number, letter, punctuation, modifier, and command keys need to be exactly where your fingers expect to find them. If they aren't, you'll quickly become frustrated when you try to type. Fortunately, the x120's keys sit exactly where we expect them to be.

We also love to see at least a few nonstandard programmable keys. We've seen so many fancy, newfangled keyboards lately that it's difficult to imagine one without volume controls and a mute key. While the x120 doesn't include multimedia keys, it does have a few programmable "Internet" keys at the top of the keyboard. Sadly, they can't be reprogrammed to handle even basic multimedia functions.

The x120 offers gratifying tactile feedback, making each press of the key obvious to the touch, which helps prevent missed key presses, double taps, and other annoyances. And while it includes the new F-keys that have been the scourge of our recent keyboarding experiences, it's not implemented as awkwardly as we've come to expect. On newer Microsoft and Logitech keyboards, the F-keys are automatically remapped to com-



**Available in either silver and grey or standard PC beige, the BenQ x120 keyboard is awesome, whether you're a touch typist or a hunt-'n'-pecker.**

mon tasks like Undo and Save. The catch is that when you need to enter your BIOS, you have to scramble to press the F-lock key to revert to the F-keys' original functions, and then press the F1 key. It's an unnecessary nuisance and we appreciate BenQ's approach: The F-keys all operate at their original capacities until you press the F-lock key to implement the remapped features.

—WILL SMITH

### MAXIMUM PC VERDICT 8

#### + HOME

Slim keyboard design performs perfectly. F-keys perform as they should.

#### - END

The low profile of the keys may feel awkward to some typists.

\$25, [www.benq.com](http://www.benq.com)



# FIC Condor

Finally—a small formfactor case that won't have you cursing like a sailor



**T**he gashed knuckle. The charley-horsed hand. The loose screw rattling around on the motherboard. These are the typical frustrations of anyone building his or her first small formfactor PC.

FIC's new Condor breaks this torturous tradition with a well-engineered SFF case enclosure that doesn't haze your buttocks bright red. To open the Condor, you simply slide a button on top of the unit and flip the case wide open like you would an Apple G3 tower. The bays for the hard drive and optical drive are screwless and easy to access, making for effortless building and upgrading. We had our Condor up and running in just 10 minutes.

The Condor is slightly taller than the average SFF and consequently offers more space to the tune of an extra PCI and AGP slot; most SFF boxes offer

just one of each. While there's just enough room to run a two-slot graphics card, we don't recommend that you mount nVidia's GeForce 6800 Ultra. This über-card requires a minimum of 480 watts from the power supply, while the Condor comes with a meager 200-watt PSU. The Condor's taller case size allows you to mount the optical drive vertically, hiding it behind a spring-loaded door.

Unfortunately, FIC made a minor mistake by leaving FireWire out of the Condor. FireWire certainly isn't as prevalent as USB 2.0, but these days, it's a standard feature we consider indispensable. The Condor uses Intel's rock-solid 865G chipset—our review unit featured an Intel-branded

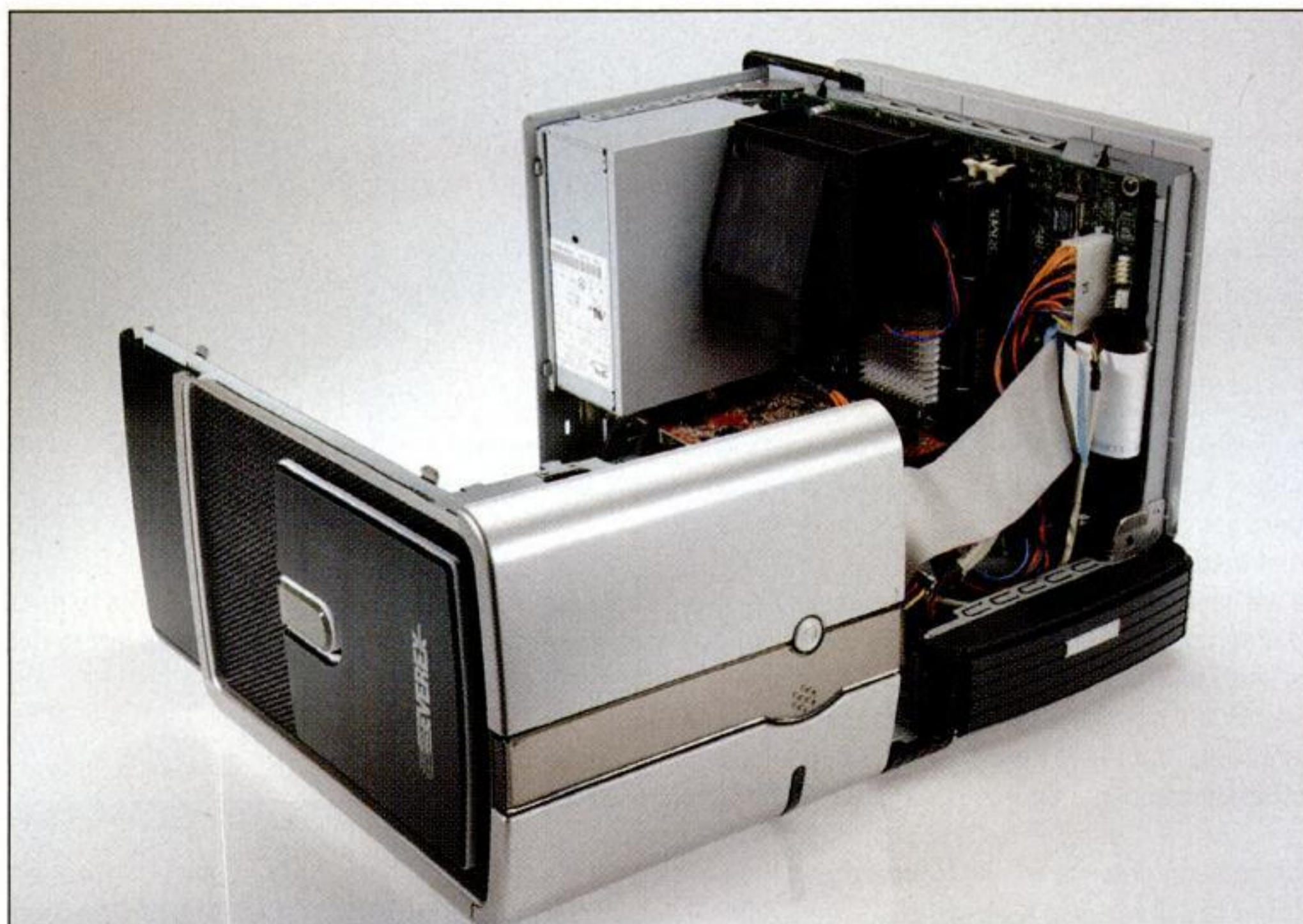


**FIC's quiet, attractive-looking Condor has the power of a PC and the stylishness of a Mac.**

motherboard as well. FIC says the board supports 3.6GHz Prescott Pentium 4 chips and up. We also appreciate the presence of two SATA ports as well as a pair of DIMM slots for full dual-channel capability. Like the optical drive, a 3.5-inch bay and front-mounted USB, headphone, and optical SPDIF ports are also hidden. If you decide to ditch the floppy drive, you can even mount a second hard drive.

Overall, this is an impressive design. Our only complaint is the absence of FireWire as well as bonus features like Wi-Fi or Gigabit Ethernet. (FIC tells us it will soon release a version that's dressed to the nines.) Still, in a category that's full of copycats, FIC's Condor is a breath of fresh air, and an excellent platform for your next SFF system.

—GORDON MAH UNG



**Need to access your RAM or hard drive jumpers? The Condor's flip-open design makes performing maintenance and upgrades easy.**

## MAXIMUM PC VERDICT 9

### + THREE DAYS OF THE CONDOR

Extremely quiet and easy to work in.

### - CONDOR DROPPINGS

The slick external finish scratches easily.

\$280, [www.fic.com.tw](http://www.fic.com.tw)



## Deja View Camwear

Attached to your glasses or the brim of a cap, the camera and microphone built into Deja View's Camwear continuously records everything it sees and hears in a 30-second buffer. With the press of a single button, the contents

of the buffer are transferred to removable flash memory in the form of MPEG-4 video. The Camwear comes with a 64MB SD card that holds about 18 video clips, but you can use your own higher-capacity card if you're trigger happy. The clips can be played back on your PC via USB or a media card reader, or on your TV with a direct connection to the Camwear device. This concludes the good news.

The plastic belt-clipped unit that houses the SD card feels ridiculously large and has the look and feel of something produced by prison labor. The actual camera isn't too bad, but the heavy cord it's attached to wasn't designed to be worn and is guaranteed to drive you crazy no matter how it's positioned. While the image and sound quality were better than we anticipated, we can't imagine anyone who'd be willing to put up with this dorky, uncomfortable design disaster, even if it means missing that shot of the sasquatch salvaging cigarette butts along Highway 101.

—LOGAN DECKER

**+** **CAM:** It does, in fact, record the last 30 seconds of your life, as advertised.

**-** **SCAM:** It's awkward, uncomfortable, and unbelievably expensive.

**MAXIMUM PC VERDICT: 3**

\$400, [www.mydejaview.com](http://www.mydejaview.com)



## Logitech QuickCam Orbit

Logitech's QuickCam has evolved from yesterday's goofy beige pinhole camera into a sleek, motorized device with software that allows it to keep your face in the camera's frame.

We were pleased that the camera didn't twitch nervously when we leaned over or sneezed, and we marveled that it didn't freak out when we wandered off altogether, but it would have been nice if we could have manually tweaked the tracking speed and sensitivity. Using the software's interface to manually position the camera was a slow and tedious process, and the auto-zoom function felt practically useless.

Honestly, however, we consider the QuickCam Orbit's internal motor to be a mere nicety among other, more tasty features like 640x480 video capture, image capture up to 1.3 megapixels, and more than adequate tools for fine-tuning image quality. Particularly useful are the built-in hooks to IM services like Yahoo and AIM, which make connecting to business associates, friends, and even extremely friendly strangers a breeze. E-mailing pictures and video clips (don't ask, and we won't tell) is just as simple.

—LOGAN DECKER

**+** **CAM:** Deeply cool-looking design. Effective image-tweaking controls. Integration with many IM services.

**-** **SPAM:** Neither remote control nor remote surveillance paranoia-ware is included

**MAXIMUM PC VERDICT: 8**

\$130, [www.logitech.com](http://www.logitech.com)



HE DOESN'T PLAY FAIR.

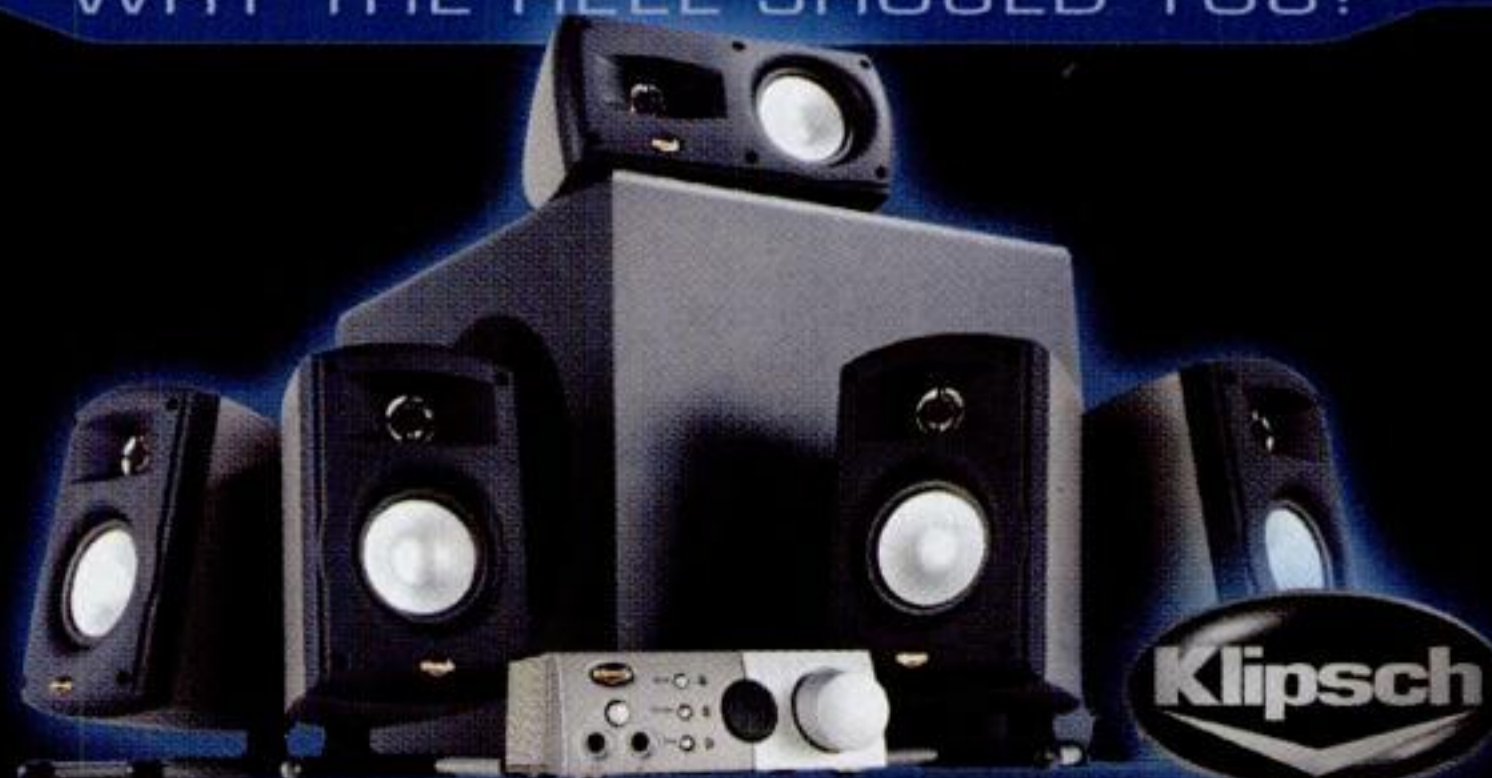


Medal of Honor: Pacific Assault  
not yet rated by the ESRB.

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# Monitor Mano-a-Mano

Longtime rivals Sony and NEC put their best 21-inch CRTs in the ring



**We were so in awe of the FE2111's picture quality, we forgot all about its boring beige cabinet.**

The recent discontinuation of Sony's GDM-F520 CRT monitor not only marks the passing of an era—after all, we've been singing the praises of that 21-inch Kick Ass awardee since September 2001—but it also leaves a gaping CRT-size whole in our Best of the Best list, on which the F520 has been a mainstay. Naturally, we turn to its replacement, Sony's GDM-C520, in our quest for the next best CRT. Find out what's changed besides a single letter. And while we're at it, we check in with the competition. Sony and NEC remain the only two patent holders of consumer aperture-grille technology (known as Trinitron and Diamondtron, respectively), so it seems fitting for the two to meet and wage war on these pages.

—KATHERINE STEVENSON

## Sony GDM-C520

Like its predecessor, the C520 cuts a handsome figure. Its 19.8-inch diagonal viewing area is perfectly flat, anti-reflective, and attractively framed in an elegant cabinet that can be had in one of three shades of gray.



**The C520 comes with a calibrator that mounts on the screen and finely adjusts color for various outputs.**

GDM-C520

**MAXIMUM PC VERDICT** 9

**+ SEEN**

Crisp, clear, and color-accurate image quality.

**- HEARD**

Pricy, and less-than-perfect text reproduction.

\$1,800, [www.sonymstyle.com](http://www.sonymstyle.com)

Also like its predecessor, the C520 is priced for people who are *serious* about CRTs. These days, that usually means graphics professionals (if not hardcore gamers), so the inclusion of an attachable hood to keep out environmental light, as well as a proprietary hardware/software color-calibration system, presumably make this monitor worth a premium.

Performance-wise, the C520 is pretty much on par with NEC's FE2111, which is a good thing. In our standard battery of *DisplayMate* tests

([www.displaymate.com](http://www.displaymate.com)), the C520 proved more than competent at reproducing fine variations in grayscales, maintaining geometric linearity at even the far edges of the screen, preserving color purity and uniformity, and sustaining focus and resolution of intricate patterns.

The C520 also did well with color registration, though the interlocking lines of red, green, and blue in *DisplayMate's* registration test pattern were slightly disjointed at the edges of the screen, but not to any degree that would be noticeable in most circumstances. As for text legibility, Times New Roman (a serif text) was legible at 9-point, and comfortably readable at 10.5-point, but not quite as crisp as it was on the FE2111. The difference was even more pronounced when we switched our res from 1280x1024@75Hz to 1600x1200@85Hz—the resolution recommended by both CRT makers.

One of the F520's claims to fame was its 0.22mm grille-pitch—the finest consumer CRT grille-pitch known to man. So it's curious that Sony went with a 0.24 grille-pitch in its new C520 model; it might also explain why this time around Sony's CRT isn't stomping the competition.

## NEC MultiSync FE2111

If this were a contest between cabinets, the Sony C520 would win—at least compared with the plain-Jane beige FE2111 we received. Luckily, NEC also offers black as an option. But of course, what really matters is what's on the screen, not what's around it. In this respect, the FE2111 excels.

It performed admirably in all the various *DisplayMate* tests without requiring any adjustment of the monitor's controls. When viewing a pattern of white squares atop a black background, there was some faint evidence of halos at the edges of the screen, which is where a CRT's image-quality is most fallible. But we

### THE SPECS

Model	NEC FE2111	Sony GM-C520
Viewable area	20-inch	19.8-inch
Grille pitch	0.24mm	0.24mm
Max refresh@max res	76Hz@1920x1440	85Hz@2048x1536
Max refresh @1280x1024	105Hz	85Hz

didn't notice any such anomalies in other test screens.

In the color registration tests, the FE2111's performance was superb. The interlocking lines of red, blue, and green were virtually seamless across the entire display, demonstrating dead-on convergence of the CRT's primary color beams. As noted earlier, the FE2111's text reproduction was superior to the C520's to various degrees, depending on the resolution.

Mind you, Sony's monitor was outfitted with its special hood throughout our comparisons. Even still, the FE2111's output looked as good, if not better—in *DisplayMate* and in side-by-side viewings of several high-res digital images. And while the FE2111 doesn't come with a fancy calibration system like Sony's, we never really felt the need for one. Of course, graphics professionals may feel otherwise; for them the ability to adjust for prepress specs might be ideal and well worth the price. For us, the NEC FE2111 does the job beautifully and its superior handling of text gives this monitor the edge.

MultiSync FE2111

**MAXIMUM PC VERDICT** 9

**+ VISAGE**

Beautiful image quality and text reproduction.

**- MIRAGE**

Beige cabinet is uninspired.

\$600, [www.necmitsubishi.com](http://www.necmitsubishi.com)





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# Enclosure Exposure

A devilish design challenges a charismatic cooler in this PC case shootout

This month we're proud to showcase two enclosures that push the PC-building envelope in two divergent ways. The Diabolic Minotaur from CasEdge looks downright E-V-I-L, but is it just as wicked on the inside? We also take a look at the Xaser V gaming case from industry stalwart Thermaltake. Both cases are marketed as full-blown gaming rigs, so follow along as we put the cases through their paces.

—JOHN LIRA

## Thermaltake Xaser V Damier V6000A

Pronounced *zaser*, this all-aluminum mid-tower features a lavish two-part front panel, including an outer door that covers four 5.25-inch bays.

Below the gigantic Thermaltake logo

sit three built-in LEDs that can be toggled to light up, flash, or continuously illuminate the logo. Normally we're big fans of case lights, but in this instance, we find the cosmetic enhancement garish—a little too "Vegas" for our tastes.

The Xaser's design emphasizes user control. The top bay of the front panel holds the Hardcano, which

lets you adjust the case's impressive six-fan array. An I/O port at the top of the case puts FireWire, dual USB 2.0, and dual audio jacks at your fingertips.

The side door of the case sports a large X-shaped window that would reveal more of the Xaser's interior if the view weren't obstructed by a swing-out fan holder for the PCI slots. The spacious interior features a screwless design, with plastic tabs holding the PCI cards and drive rails for the three 3.5-inch bays in place. Sadly, there's no motherboard tray.

Overall, the Xaser offers a feast of features and ample cooling. And the acid-flashback lighting effects will certainly appeal to some builders, even if we geezers think it's a tad over the top.

## CasEdge Diabolic Minotaur

Love it or hate it, the Minotaur looks unique. With its glowing red eyes and big, black horns, it's easily the most sinister-looking case we've ever seen.

Behind its devilish faceplate are four 5.25-inch bays, two 3.25-inch floppy drive bays (which will not accommodate hard drives), and an internal four-drive cage that leaves much to be desired (more on that later). While we dig the blood-red facade, we wish it were a door rather than a removable cover; the inclusion of a beige or black optical drive will quickly ruin the enclosure's demonic aesthetic. But hey, at least installation of the optical drives is easy thanks to the handy and convenient single-rail system.

The I/O port is located toward the bottom of the face, behind a set of plastic "teeth," and sports quad USB 2.0 ports, a FireWire port, and dual audio jacks. Quadruple USB is great, but all the ports are unfortunately recessed deep inside the Minotaur's mouth, which means you have to



**We love the Minotaur's demonic exterior, but were baffled by its poorly designed innards.**

memorize the ports' orientation in order to quickly access them. The Minotaur also includes a cold-cathode light, but a PSU is optional.

A small window on the side panel offers a teasing view of the interior. Through it you can see a small shroud that's supposed to reside over the CPU and keep it cool. Unfortunately, the shroud's nonadjustable, one-size-fits-all design is not ideally suited for all CPUs. In fact, a dearth of cooling options is this case's biggest shortcoming—it has mounts for just a single 120mm fan in the rear.

We're also perturbed that the hard drive cage uses rails that require four special screws per drive, and that only eight special screws are provided. While you can use other types of screws, you'll take your chances with them not fitting properly. Shame on CasEdge for not including a sufficient supply of screws. Compounding this problem, the drive cage is way too close to the edge of the case, creating clearance issues with drive cables and the case door itself.

Granted, it's full of character, but the Minotaur has too many flaws for our tastes.



**The Xaser V boasts six case fans that can be individually adjusted via an included bay-mounted fan controller.**

Xaser V Damier V6000A

**MAXIMUM PC VERDICT 9**

**+ LIGHTING**  
Well-made, plenty of cooling, and easy access.

**- SMITING**  
Thermaltake logo plastered all over the case, and lighting is overdone.

\$170, [www.thermaltake.com](http://www.thermaltake.com)

Diabolic Minotaur

**MAXIMUM PC VERDICT 7**

**+ MALIBU RUM**  
Unique look, screwless design, loaded front I/O port.

**- RED RUM**  
Inadequate cooling, poorly designed interior.

\$150, [www.casedge.com](http://www.casedge.com)



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# Toshiba Satellite P15-S479

## THE PORTABLE HOME THEATER

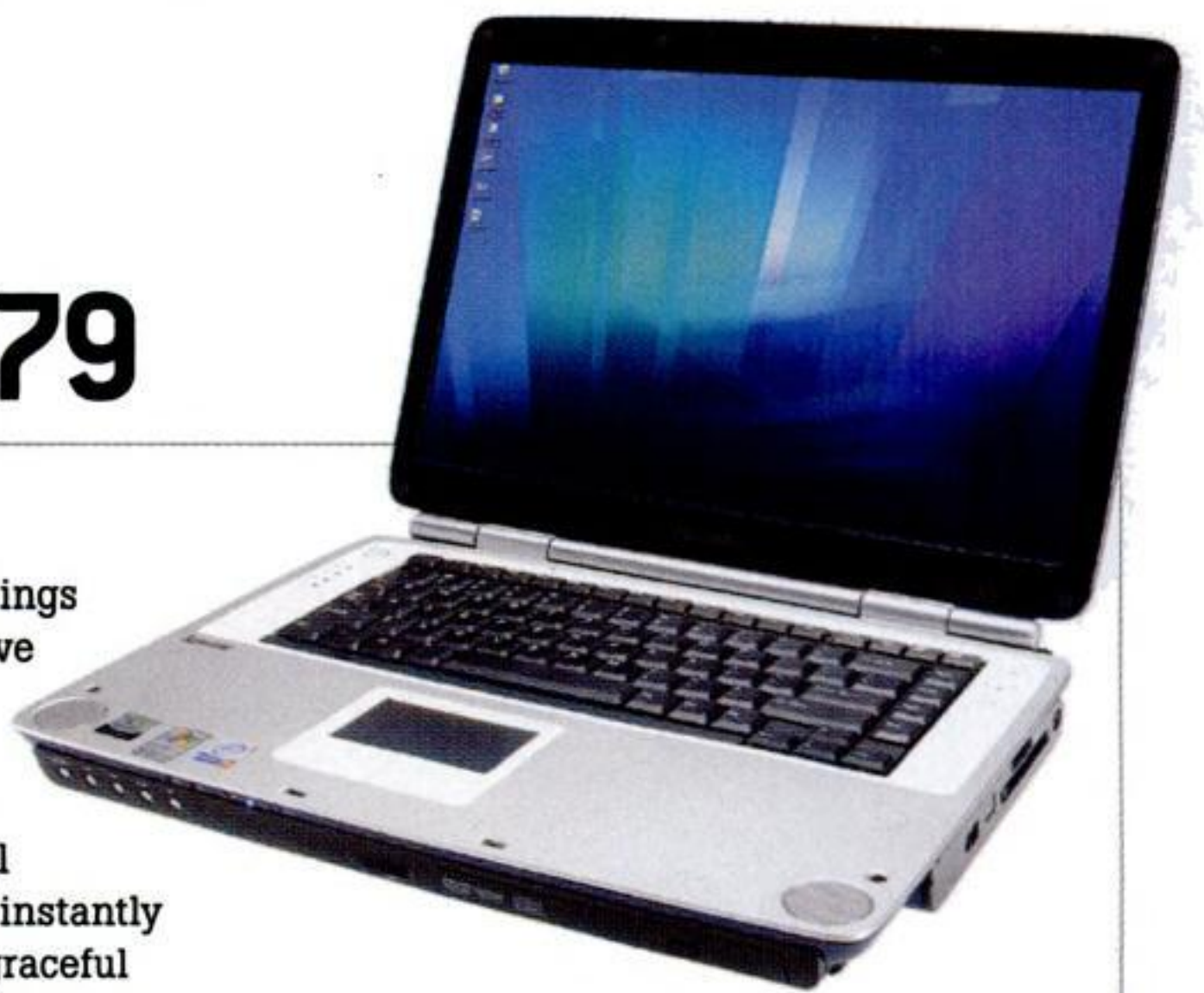
The Toshiba Satellite P15 is a 10-pound hulk of a computer, a 17-inch widescreen that impresses with its thoughtful design, modern styling, and serious under-the-hood specs. Think of the P15 as the junior-varsity version.

Weighing in at 8 pounds on the nose, the P15's only noticeable difference is a slightly smaller screen, at 15.4 inches. The other features of the P25 are there, only less space is wasted on either

side of the keyboard. All things considered, we'd rather have the slightly more compact version, which costs up to \$1,000 less.

The Satellite P15 is a real computing showpiece that instantly gets people talking. More graceful curves have never been seen on a notebook computer, and the P15's booming speakers, gorgeous screen, and impressive keyboard all back up its thoughtful design. Under the hood, the Satellite is no slouch; while gaming performance could stand to be improved, the obvious tradeoff for an older Nvidia graphics card was made to keep the price down (hitting an irresistible \$1,799).

More than just a notebook, the P15 is also a Windows Media Center PC, with a built-in TV tuner and remote control. As with all Media Center machines, this



notebook doubles as a TiVo-style video recorder — and believe us, video looks far better on the Toshiba's screen than it does on most traditional CRTs.

With two hours and 42 minutes of battery life, daredevils might even take a stab at lugging the P15 along on a trip. You may not be comfortable trying to open the notebook in coach, but if nothing else, you're sure to impress the pants off the guy in the seat next to you.

—Christopher Null



### BEST FEATURE

Outstanding audio and video experience

**WORST FEATURE** Gaming performance a little weak

## PERFORMANCE

	WORST		BEST
Sysmark	78	179	218
Unreal	9.6	90.7	211.1
Battery	1:02	2:42	5:21

**Toshiba Satellite P15-S479** \$1,799

**Weight:** 8.0 pounds **Size:** 13 x 10.8 x 1.2 inches

**Specs:** 2.8GHz Pentium 4; 64MB Nvidia GeForce FX Go5200; 512MB of RAM; 15.4-inch TFT; 60GB hard drive; CD-RW/DVD-RW/DVD-RAM drive; SD slot; 802.11g; Windows XP Media Center

[www.toshiba.com](http://www.toshiba.com)

# Motorola i730

## BIG BROTHER'S FAVORITE CELL PHONE

The world has waited years for the development of e911, the location-based emergency service that promises to save lives through the cellular airwaves. And as it turns out, businesses may

get a little boost from the service, too. Offered by Nextel, Motorola's i730 iDEN phone features GPS tracking that may soon allow your company to

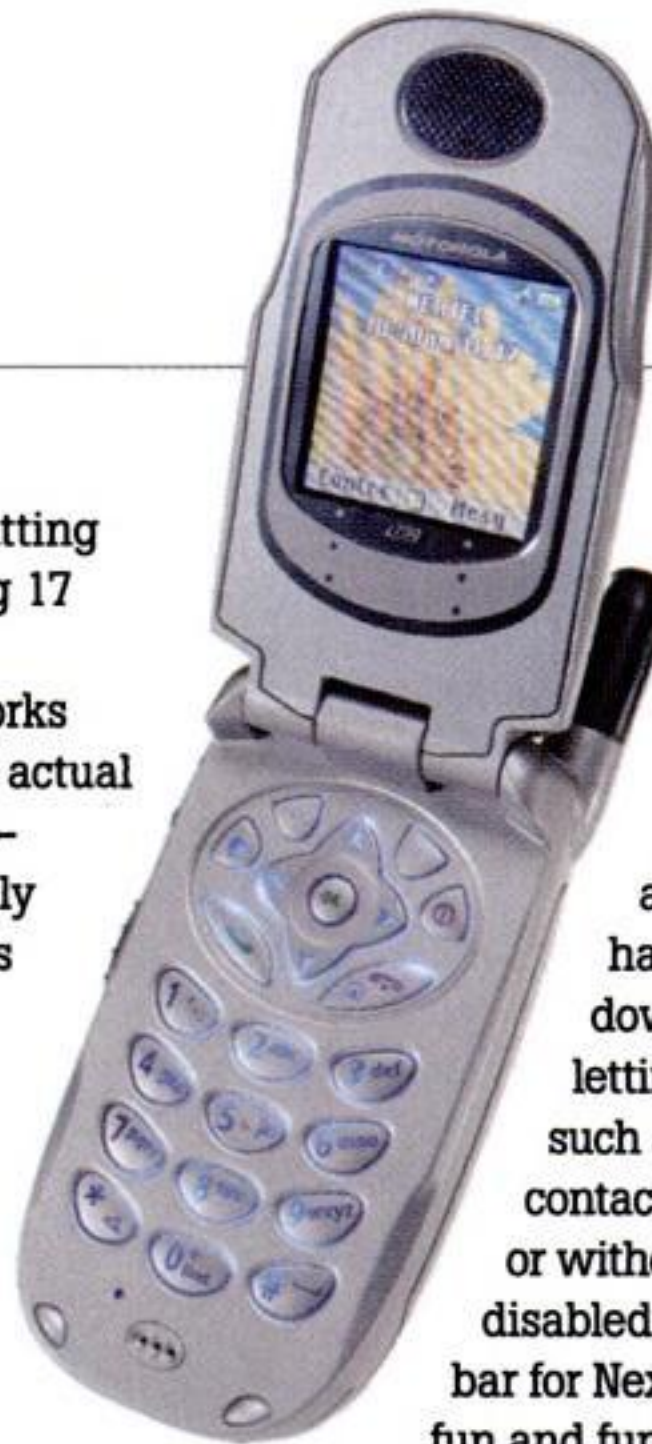
pinpoint your position to within 50 feet.

Nextel has offered walkie-talkie phones for years, and the i730 is the company's most advanced handset yet. With a 1.7-inch, 65,000-color screen and a large keypad, navigating the i730's menus is simpler than on most handsets. This is good, because the interface is more complicated than many conventional phones. Booting takes a

good 20 seconds, and shutting it down takes a dismaying 17 seconds.

Fortunately, the i730 works much more quickly during actual use. Establishing a walkie-talkie connection takes only a few seconds, even across thousands of miles. Data connections through the WAP browser are peppy, and the phone supports AOL mail and AOL Instant Messenger so that you can keep in touch with your buddies on the road.

Being a walkie-talkie phone, the i730 has an excellent speakerphone mode that sounded great — on both sides of the conversation — in our tests. It also supports voice-activated dialing and doubles as a voice recorder for logging short memos or capturing important conversations. But watch out:



with a talk time of 3 hours and 22 minutes, all these extra features may shut you down prematurely.

As difficult as it may be to convince your flight attendants, the i730 features a handy airplane mode that shuts down its wireless features while letting you access important things such as date book entries, memos, contact information, and games. With or without GPS tracking, which can be disabled for privacy, the i730 raises the bar for Nextel handsets and brings all the fun and functionality of an afterhours cell phone to the long-trusted Direct Connect network Nextel made famous.

—Robert Strohmeier



**BEST FEATURE** Zippy push-to-talk service

### WORST FEATURE

Extremely bulky for a flip phone

**Motorola i730** \$299

**Weight:** 5.1 ounces **Size:** 3.6 x 2.0 x 1.1 inches

**Specs:** iDEN; Direct Connect; GPS; WAP; Java; speakerphone; voice dialing

[www.nextel.com](http://www.nextel.com)





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## EZQuest 250GB External Cobra Combo Drive

This backup drive is large and in charge—of your data, that is

**E**ZQuest's new backup drive is named Cobra, possibly because of its flat, wide body, which kind of resembles a cobra's hood—if you've had enough to drink. Or maybe it's so called because when you think of data security, the first thing that pops into your head is the... trustworthy old cobra? Um, right. Even without the wacky name, the Cobra drive is different from your run-of-the-mill backup drive, and we mean this in a good way.

First of all, inside its silver-colored plastic exterior sits a top-of-the-line 7,200rpm Western Digital 2500JB with a 250GB capacity and an 8MB buffer. This is the same drive we use in our zero-point test systems in the Lab, so it has obviously earned our respect. Surrounding the drive is an absolutely massive shell that includes an internal power supply and a fan, which means you don't have to worry about an auxiliary power brick dangling underneath your desk. The downside, of course, is that the drive is quite large and rather heavy. At six pounds, it's not exactly portable. A small part of that weight is the drive's internal Oxford 922 bridge chip that offers both a mini-USB 2.0 port as well as two FireWire 400/800 ports that accept a 9-pin cable. Thankfully, cables for all three ports are included in the package.

A copy of Dantz *Retrospect Express 6.5* is included for backup duties, which makes us happy because it's such an excellent application. We dig it because the process of creating backup scripts is extremely simple, yet the app has enough advanced features to make it good for more than just garden-variety backups. Several applications are also included on the CD for Mac users.



**The EZQuest Cobra is a big boy, but that's only because it has an integrated fan and an internal power supply.**

In the final tally, we're impressed with the Cobra. It's got enormous capacity, has all the connectors we need, runs nice and quiet, and is extremely affordable. At first we were put off by its excessive girth, but after testing it for a few weeks we see that extra weight as just more Cobra to love.

—JOSH NOREM

**MAXIMUM PC VERDICT** **9**

**+** **BACKUP**  
Huge capacity, quiet operation, and good software bundle.

**-** **BARFUP**  
Large size and weight restrict portability.

\$350, [www.ezquest.com](http://www.ezquest.com)

## Simpletech 80GB USB/FireWire External Drive

A whole lot of storage—with a whole lot of issues

**T**he Simpletech 80GB drive is a tasty-looking device, but it's not without drawbacks. In fact, for every cool feature this portable drive packs, there's another feature that sticks in our craw. For example, its 80GB capacity is cavernous and more than enough space to transport most people's primary partition or important documents. But the rub is the drive's woefully slow 4,200rpm rotational velocity. Maybe we're just snobs, but 4,200rpm? *Puh-lease*. Thankfully, a 60GB 7,200rpm model is available—we'd gladly give up 20GB of capacity for this zippier version.

Another we-love-it/we-hate-it scenario involves the bundled *StorageSync* software. We're tickled pink that the Simpletech drive includes an easy-to-use backup and synchronization software package—it's a rarity among these types of drives. But the software behaved unpredictably in testing. Although it performed a rudimentary backup of our 20GB primary partition, it froze on numerous occasions and wouldn't shut down. Even the window that says "this program has stopped responding" stopped responding, effectively locking up our PC tighter than a duck's you-know-what, and forcing us to hold the power button down to reboot. Not good.

Continuing in this vein, the drive features both USB 2.0/1.1 and FireWire interfaces, which is a superb feature that we expect in any portable storage device. But on the flipside, the drive isn't bus-powered, so you must cart around the included AC adapter and find a nearby power outlet to use the drive. We've tested plenty of bus-powered portable storage devices, so we're spoiled by the convenience of running a drive off the PC's power rather than a wall socket's.

Finally, we come to the price tag. At \$430 retail, this drive is way overpriced; models with similar capacities and more features sell for much less.



**Just like male model Derek Zoolander's smoldering "Blue Steel" pose, this drive's sexy blue shell attempts to conceal a lackluster product.**

To wit, a quick search of our favorite hardware sites revealed several drives that have the same capacity, but are bus-powered and 5,400rpm, for \$300. So what gives? The sexy blue outer shell is nice, as is the included software, but these offerings don't justify this model's exorbitant price.

—JOSH NOREM

**MAXIMUM PC VERDICT** **6**

**+** **EXTERNAL**  
Huge capacity, USB, and FireWire interface.

**-** **INFERNAL**  
Buggy software, not bus-powered, overpriced, slow rotational speed.

\$430, [www.simpletech.com](http://www.simpletech.com)



# MSI K8N Neo Platinum Edition

A new nForce3 250Gb-based mobo sports advanced features, but doesn't result in a huge performance increase

Sometimes you have to make sacrifices to be first. Such was the tale of the first Athlon 64 chipset: the nForce3 Pro 150. It lacked native Serial ATA, Gigabit Ethernet, and a high-speed HyperTransport link. Yawn.

MSI's K8N Neo Platinum Edition, which uses nVidia's new nForce3 Pro 250Gb chip, aims to correct these previous blunders. Like the nForce3 Pro 150, the nForce3 250Gb is a single-chip solution (a benefit of having the memory controller for the Athlon 64 series on the CPU itself), which offers improved latency over the standard two-chip design that Intel and VIA use. But unlike its predecessor, the 250Gb's single chip boasts a Gigabit Ethernet core, which is even faster than Intel's speedy CSA port and far superior to any PCI-based card.

Another improvement afforded by the new nForce3/K8N Neo combo is a faster HyperTransport link between the CPU and the chipset. Although we've never been able to prove that the nForce3 150's 600MHz link hurt performance, the 250Gb supports a more confidence-inspiring 800MHz link that can be bumped up to 1GHz.

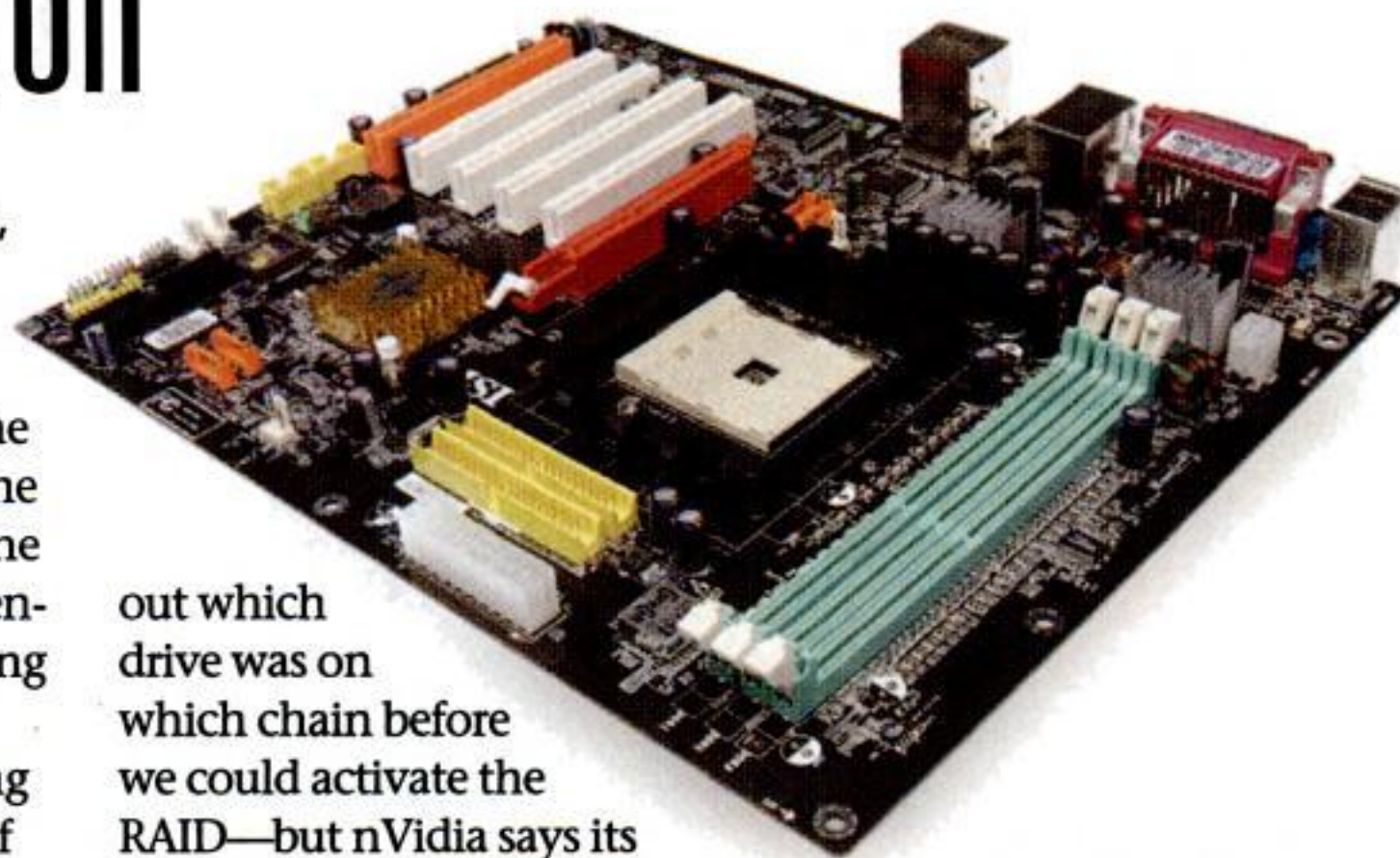
In Lab testing, the K8N Neo ran faster than the Soyo CK8 board we used in last issue's speed trials, but the difference was far from spectacular. In our real-world gaming benchmarks, the K8N Neo also outpaced VIA's K8T800-based Albatron K8X800 Pro II

mobo, but again just barely. That's the nature of the Athlon 64 platform—the memory controller's placement on the CPU has greatly diminished the potential for performance differences among competing chipsets.

This doesn't mean there's nothing to get excited about. The presence of native SATA means you won't need a floppy drive and fast fingers to perform the dreaded "F6" driver combo just to install Windows XP.

And while fans of the nForce2's APU audio system will be disappointed that nVidia didn't include the real-time Dolby Digital encoding capabilities in its new chipset, the nForce3 offers a snazzy built-in hardware firewall as consolation. This is a welcome change for people who connect their PCs directly to a cable or DSL modem, because it creates less of a system performance hit than a software-based firewall. The K8N Neo's firewall uses a web interface for configuration and offers stateless and stateful packet inspection, depending on the protocol.

The K8N Neo also packs two parallel ATA133 ports, four Serial ports, and a rather unique RAID arrangement. You're offered RAID 0, 1, and 0+1 but, unlike conventional implementations, the K8N Neo lets you create a RAID partition across SATA and PATA drives. Using this capability on our evaluation board felt clunky—it took us five minutes just to figure



out which drive was on which chain before we could activate the RAID—but nVidia says its NVRAID 2.0 software will move the work out of the BIOS and into the operating system. Unfortunately, running RAID still requires the use of F6 drivers.

The board's orange PCI slot can accommodate a normal PCI card or a future wireless card that will turn the PC into an access point (this is where the firewall becomes really useful). On the audio front, it's strictly 16-bit AC97 care of the new RealTek ALC850 codec, but it does sport eight channels of audio and an optical SPDIF.

While the K8N Neo offers above-average performance, its new features are what make it a great motherboard. Who can argue with Gigabit Ethernet, a hardware firewall, and an extremely flexible RAID subsystem? The only enhancements that would make the K8N Neo better are 24-bit audio and perhaps a second Ethernet port.

Still, there's one thing that should give you pause before buying the K8N Neo—or any other Athlon 64/FX motherboard, for that matter—the impending switch to Socket 939 that's expected this summer, which will push Socket 754 to secondary status.

—GORDON MAH UNG

**The K8N Neo supports single-channel DDR Athlon 64s in Socket 754 trim.**

## MAXIMUM PC VERDICT

# 9

### FORMFACTOR

Flexible RAID options, native Serial ATA support, and a built-in hardware firewall.

### FEAR FACTOR

Black PCB isn't quite as flashy as the red PCBs MSI normally uses. No APU audio.

\$150, [www.msicomputer.com](http://www.msicomputer.com)

## DARE TO COMPARE: Athlon 64 Motherboards

Mainboard	Soyo CK8	MSI K8N Neo	Albatron K8X800 Pro II
CPU	Athlon 64 3400+	Athlon 64 3400+	Athlon 64 3400+
Clock speed	2.2GHz	2.2GHz	2.2GHz
Chipset	nForce3 150	nForce3 250Gb	K8T800
RAM mode	Single	Single	Single
Quake III "Normal"	450	<b>456</b>	443
Sandra RAM Composite	3,041	3,005	<b>3,044</b>
3DMark 2001 SE	19,990	20,095	<b>20,143</b>
AquaMark 3 CPU	9,638	<b>9,665</b>	9,550
3DMark 2003 CPU	<b>757</b>	<b>757</b>	747
UT2003 Fly-by 6x4	309.3	<b>317</b>	312
SYSmark 2004 Overall	<b>173</b>	168	172

Best scores are bolded.

## SPECS

CPU support	Athlon 64 series
Chipset	nForce3 250Gb
RAM support	Up to 2GB in single-channel mode (DDR400 is limited to two slots)
LAN	Gigabit Ethernet using nForce3 chipset
ATA ports	Two ATA133 PATA, four SATA 1.0
I/O ports	Six High-Speed USB 2.0, three FireWire 400A using VIA VT6306 chip, Serial, PS/2 keyboard and mouse, parallel
Audio	Onboard 8-channel audio with optical SPDIF



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- KAOS Damier Case 420w Power
- Microsoft Windows XP Pro
- Free KAOS Bundle Pak \*

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## LG Super Multi GSA-4082B 8X DVD Burner

No format is turned away from this door

The company that changed its name from Lucky Goldstar to LG so as to avoid being mistaken for a Sanrio character shows it still has a flair for high-fructose names. "Super Multi" might be a little over the top for an optical drive, but LG backs it up with a drive that supports DVD-R/W, DVD+R/W, and DVD-RAM, all in a single unit.

Poor compatibility with set-top players and slow burn speeds have prevented DVD-RAM from catching on with, well, anyone. Nonetheless, DVD-RAM's brawny defect management and tough media cartridges make it a good format for rugged and reliable backups. Unfortunately, the LG's GSA-4082B will only accept DVD-RAM discs once they're removed from their cartridges, thus defeating one of the pitifully few reasons to adopt the format.

The results of our tests weren't spectacular, but they weren't terribly disappointing either. It took 9:10 (min:sec) to burn 4.25GB to DVD+R, and 9:29 to burn the same content to DVD-R. These times fall behind those of most other 8x burners we've tested, from as little as two seconds to as much as a minute. In the rewriteable corner, DVD+RW took 15:04 to burn the disc, and DVD-RW trotted in at 15:41. For some reason, CD burning is stuck at 24x, taking 5:14 to do what should be done in just a few minutes. Burning to 3x DVD-RAM (the top speed for the drive and media) took a lowly 36:32. You'll do it all with the bundled *B's Recorder Gold Basic*, a competent

application with yet another cheerfully ridiculous name.

In spite of its versatility, the drive was picky about media. For example, it would burn happily at 8x to our DVD+R Verbatim media, but not to

### THE BUNDLE

BHA *B's Recorder Gold Basic*, BHA *B's Clip* (packet writing), Cyberlink *Power Producer Gold*, Cyberlink *PowerDVD*



<b>Writes to:</b>	
DVD-RAM	3x
DVD+R	8x
DVD-R	8x
CD-R	24x
<b>Rewrites to:</b>	
DVD-RAM	3x
DVD+RW	4x
DVD-RW	4x
CD-RW	16x
<b>Reads:</b>	
DVD-ROM	12x
CD-ROM	32x

**We're all about choice, but LG's Super Multi drive has us yearning for fewer recordable DVD formats, not more.**

Verbatim's 8x DVD-R; we had to try several different brands before the drive finally agreed to burn 8x to a TDK disc.

It's too bad the Super Multi lacks support for DVD-RAM cartridges (unlike Panasonic's MultiDrive II). The result is a fairly average DVD burner that's saddled with an extra format that, in this incarnation, is even less useful than when we first ignored it.

—LOGAN DECKER

### MAXIMUM PC VERDICT 6

#### + LLAMA

The Super Multi supports all three major DVD formats—like it or not—and does so capably.

#### - TRAUMA

Lack of support for DVD-RAM cartridges is weirder than software called "Gold Basic." Picky about media.

\$180 (street), [www.lgeus.com](http://www.lgeus.com)

## Plexor ConvertX PX-M402U

The perfect way for Dad to archive all those embarrassing home videos

OK, so it's been five months since you promised your old man you'd help him digitize all the home videos he has rotting in the attic, and he won't stop bugging you. You could give in and blow a couple of weekends capturing and editing tapes of your old Little League games—or you could buy Dad a ConvertX and let him do the job himself.

The Plexor ConvertX is a one-stop shop for video capture and editing. Everything you need is included: S-Video and composite cables, a USB cable, DVD decoder software, InterVideo's *WinDVD Creator 2* DVD authoring software, and of course, the ConvertX itself. Beneath the ConvertX's sleek silver exterior lies a hardware encoder capable of outputting video in the MPEG-1, MPEG-2, MPEG-4, and even DivX formats.

The instruction manual is clear and concise, though the ConvertX is so easy to use, you probably won't need it. Simply install the included software, plug the device into your USB 2.0-enabled PC, connect an analog video source (such as a VCR), and fire up *WinDVD Creator* to start capturing video. The process is straightforward enough that you won't have to worry about becoming your dad's personal support technician.

We compared the ConvertX's output with that of other capture devices and were impressed. It delivers excellent-quality captures regardless of the compression format used, and encoding to DivX (which most other video capture devices don't support) yielded visual quality rivaling the MPEG-1 codec with files that were almost half the size.

Our experience wasn't all a bed of roses, though. On several systems, we encountered inexplicable compatibility issues that ranged from an inability to



**This shiny silver box costs a lot more than an entry-level video capture card, but its ease of use and above-average quality make it worth every penny.**

install the device to spontaneous system reboots during video capture. However, the ConvertX worked fine on most of the systems we tested it on, so if you're having problems, we suggest you try updating your chipset drivers.

—OMEED CHANDRA

### MAXIMUM PC VERDICT 9

#### + WILLIAM TELL OVERTURE

Easy to use, and comes with everything you need to make great video captures.

#### - WILLIAM HUNG OVERTURE

Compatibility issues on some systems left us leery.

\$160, [www.plexor.com](http://www.plexor.com)



# Roxio Easy CD Creator 7

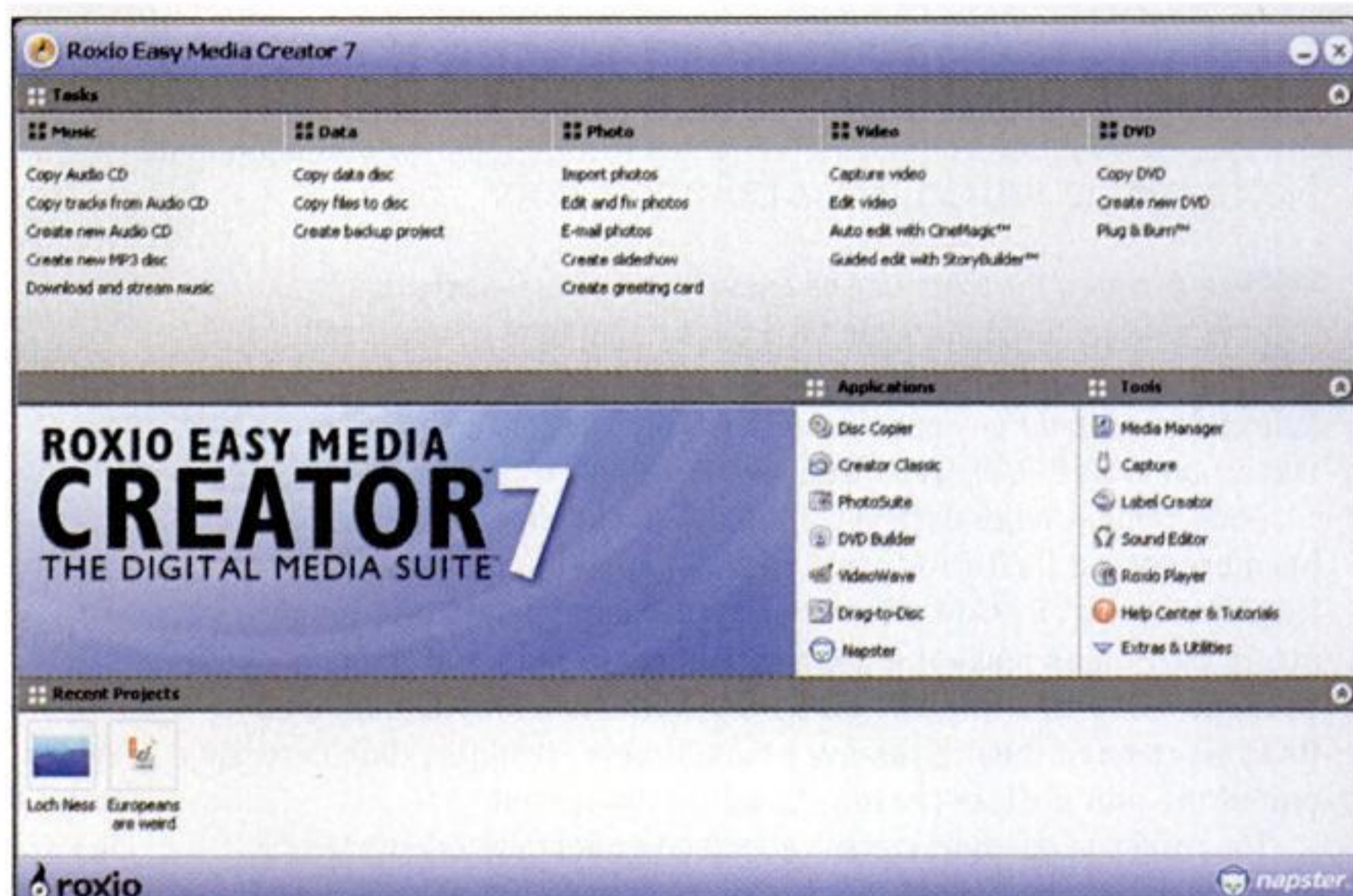
Roxio's newest CD- and DVD-burning software suite boasts shocking power

**W**e used to tolerate Roxio's *Easy CD Creator* as a necessary but crude tool for entry-level folk who just wanted to burn a simple audio CD they could listen to on their way to work. So we were certainly surprised when, in our October 2003 issue, *Easy CD Creator 6* beat Ahead's *Nero 6* in a Head2Head match up. (*Nero 6* was crippled by a shamefully buggy launch, which has since been rectified). And now that we've discovered that *Easy CD Creator 7* absolutely blows away its predecessor—and the competition—in every category, we're completely at a loss for anything smart-assed to say.



Let's start with the software welcome mat—the interface. Typically, the front-ends of burning applications are outfitted with cutesy, meaningless icons, weird sliding drawers, and a minimum of options—as if this is necessary to keep beginners from taking fright and retreating to their cassette tapes. *Easy CD Creator 7*, on the other hand, puts forth a clean, organized interface where it takes just a click of a descriptive text label to perform any of the tasks available in this palatial suite. It's simple, comprehensive, and ties together the apps' diverse and numerous applications.

Basic CD and DVD burning tasks haven't changed much; *Easy CD Creator 6* was already, well, easy to use. But it's even more effortless in this version, despite the addition of advanced features such as support for Plextor's VariRec adjustment, which boosts compatibility with ancient CD players. We're also pleased as punch that Ogg Vorbis support is included not just in *Creator Classic*, but throughout the entire suite, so



***Easy CD Creator's* new front-end interface dispenses with the eye candy and replaces it with a beautifully simple and elegant text-based interface.**

our lovingly encoded OGG tracks can be used as background audio on our DVDs.

Things get even sexier in Roxio's *DVD Builder* app. Amazingly, this DVD authoring and mastering tool is superior to Sonic's extremely popular *MyDVD 5* (which sells for \$10 more than the entire *Easy CD Creator 7* suite). *DVD Builder* allows you to position menu and movie buttons wherever you want (it can also snap them to a grid), and supports animated buttons that loop any portion of video. Most impressively, *DVD Builder* didn't reject a single one of our files—embracing even video downloads encoded at various bit rates with different codecs that brought *MyDVD* to a grinding halt. Video editing is handled in *VideoWave 7 Professional* (again, no skimping in this suite), which rivals Apple's *iMovie* for its ease of use.

We did encounter some relatively minor problems, however. For some reason, DVD-Video previews don't play background audio, although the audio worked fine on our finished discs. And although the "Fit to Disc" feature that compresses your content to fit on whatever size disc you're using is convenient, it often left empty space on our discs that could have been used to accommodate a slightly higher bit rate. Finally, we experienced occasional rare crashes to the desktop when we were making DVD-Video menus, reinforcing the axiom: "Save early, and often."

We've covered the major successes of *Easy CD Creator 7* in this review, but you'll find much more to appreciate in daily use. There's *PhotoSuite* for photo editing (hearty enough to include object alignment, transparency, and type on a curved path), a slide show creator, auto-capture from DV cameras, backup software, and a utility that can copy and compress unencrypted DVD-Video to a single disc.

Aside from the nits we picked with the otherwise superb *DVD Builder* app, we've also noticed that applications launch too slowly, and sometimes feel sluggish while running. But despite the newbie-esque name and a few minor flaws, it's impossible to regard *Easy CD Creator* as an entry-level product anymore. There was little debate in awarding the suite our Kick-Ass emblem—the application lets you quickly and easily perform simple tasks, and at the same time capably caters to the bizarre and decadent proclivities of power users.

—LOGAN DECKER

## MAXIMUM PC VERDICT

# 9

### + WEASELS

Huge, comprehensive suite of excellent products behind an effortless interface.

### - MEASLES

"Fit to Disc" feature is not user-tweakable, and some apps are slow to launch.

\$80, [www.roxio.com](http://www.roxio.com)



## Logitech MX510

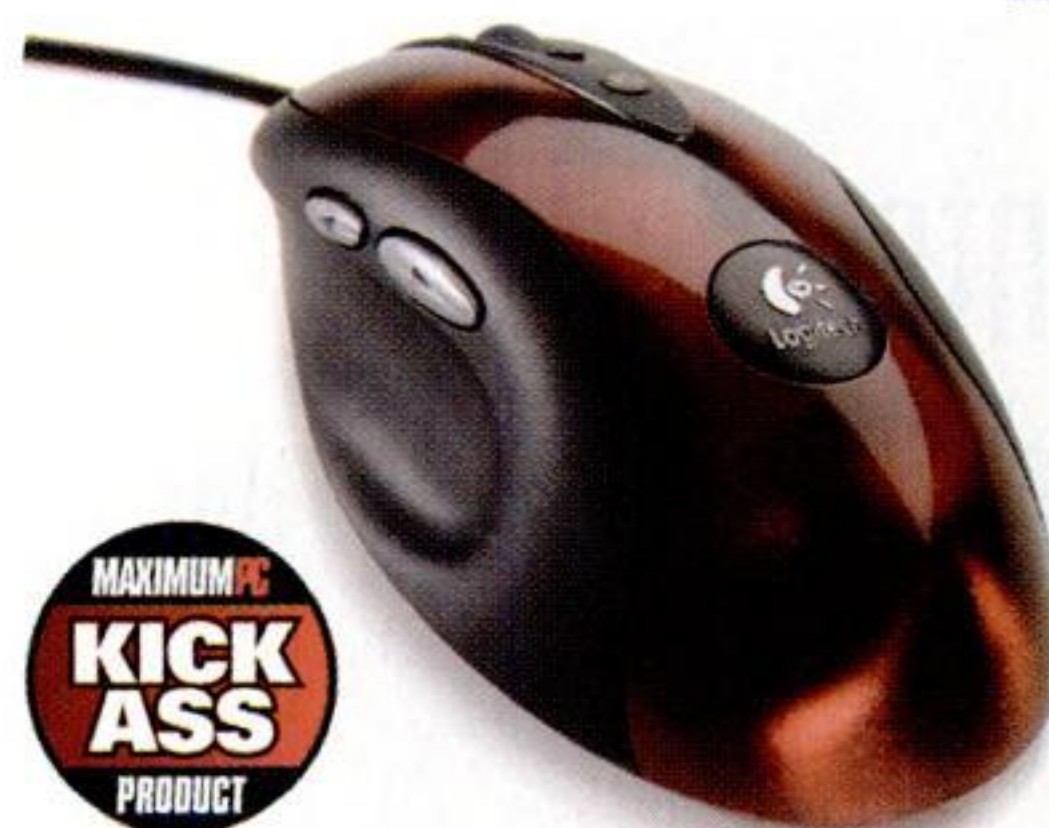
Shiny and perfectly accurate—this mouse has it all

**W**hen it comes to mice, there are good optical mice, and bad optical mice. Good mice are responsive, fast, and accurate—even under the most demanding deathmatch conditions. Bad mice—with inferior optical sensors—just can't keep up under rapid movement. Symptoms of an inferior optical sensor include stuttery movement, poor response, and loss of directional control. The Logitech MX510 definitely fits into the "good mice" category.

The MX510 is an updated version of a *Maximum PC* favorite, the MX500. In addition to the shiny metallic shell, which comes in either blue or red, the MX510 adds a slightly improved optical sensor. The Logitech mouse's 800dpi sensor is arguably more sensitive than 400dpi sensor in the kick-ass Intellimouse 4.0, but there's no difference in functionality. It's difficult to say with certainty, but in our tests the MX510 is every bit as imperturbable as the latest Intellimouse.

The MX510's 800dpi sensor claims an update rate of 5.8 megapixels per second, which lets the sensor move up to 40 inches per second with no skips, blips, or whirs. In testing, we simply could not make the MX510 skip, no matter how quickly we moved it. Plus, the mouse's sensitivity scales well, from detecting minute movements while sniping to lightning-quick evasive maneuvers. With its two main buttons, a clickable scroll wheel, a pair of tiny buttons above and below the scroll wheel, and a pair of thumb buttons, the MX510 is outfitted for even the most demanding mouser.

We do miss the tilting scroll wheel that Microsoft's latest Intellimouse features. While we initially pooh-poohed the idea of a side-to-side scroll wheel, we became hooked on it after a few months and now can't imagine mousing without it. Still, the omission of the side-scroll functionality isn't



**Available in both shiny blue and red colors, the 800dpi optical sensor on the MX510 makes it as deadly as it is attractive.**

enough to deny this otherwise ideal mouse a Kick Ass award, but it is enough to knock it down from a perfect 10.

Left-handed mousers, beware: Although the MX510 looks like it would be comfortable for lefties, it's not.

It's designed exclusively for right-handed mousers. If you use your left hand to mouse, you'll probably be better served by the ambidextrous Logitech MX310, which houses the exact same sensor.

—WILL SMITH

### MAXIMUM PC VERDICT 9

#### + CHEESE

Pixel-perfect accuracy and lightning-quick response in a comfortable package.

#### - D-CON

No side-to-side scroll wheel makes us sad.

\$50, [www.logitech.com](http://www.logitech.com)

## Manhunt

Faster, Pussycash, Kill Kill Kill!

**M***anhunt* begins with death row inmate James Earl Cash being dragged to an appointment with the electric chair. Instead of direct current, however, Cash receives a strong sedative, and wakes up in the streets of decrepit Carcer City. Communicating through an earpiece, a faceless snuff-film peddler named Starkweather tells Cash he's been abducted in order to star in the director's latest production. If you can survive a night of pursuing and killing off the deranged gangs that populate the city, he'll let you go.

*Manhunt's* initial levels dispense devilishly suspenseful and sadistic third-person stealth action. In order to deliver the trademark over-the-top brutality Starkweather demands for his ubiquitous cameras, you have to take your prey by surprise. The longer you stalk your enemies in close proximity, the more vicious your attack can be, whether you're committing murder with a seemingly innocuous plastic bag, a piece of broken glass, or a dual-bladed machete. The payoffs are brief and bloody cutscenes that play out like this: *Whap! Squish-squish. Gurgle. Thud. Or Whump! Urgh! Gurgle. Thwack!* All the while, you're constantly goaded and ridiculed by Starkweather, whose fiendish, sadistically gleeful voiceover is one of the most spectacular performances in PC game history.

Unfortunately, once guns come into play in the later levels, the magic falls apart, degenerating rapidly into monotonous, spastic *Grand Theft Auto 3*-style shootouts that feel like they last forever. Your AI opponents possess the intelligence of the average turnip; the best you can hope for is that they won't rush the door and collapse onto the growing stack of corpses.

The story throws in the requisite twists, but by the time they arrived we were already fatigued by mind-numbing repetition. Play mechanics do become enjoyable again during some of the brutally tough final levels, but by that time even Starkweather himself would be bored into a coma.



**You don't have to be a star, baby, to be in Starkweather's brutal show. Interestingly, Starkweather's voice is performed by Brian Cox, who played the original Hannibal Lecter in the movie *Manhunter*.**

Painfully unambitious in implementation, there's not much in *Manhunt* that will interest stealth fans beyond the over-the-top and often silly Looney Tunes mayhem. In the end, *Manhunt's* notoriety writes a check that Rockstar simply can't cash.

—LOGAN DECKER

### MAXIMUM PC VERDICT 6

#### + MRS. GARRETT

The initial levels are an orgy of suspense and violence.

#### - WIRE GAROTTE

Repetitive play mechanics and subpar AI.

\$50, [www.rockstargames.com](http://www.rockstargames.com)



# Splinter Cell: Pandora Tomorrow

A tale of two games

**H**ere's the scoop, chief: The *Pandora Tomorrow* CDs really contain two separate games—a sneak-and-steal game just like the original and a nail-biting multiplayer game that pits good against evil. To give you the best review possible, we had our resident stealth-game expert Josh Norem review the single-player component, and our multiplayer fanatic Will Smith review the multiplayer game. Then we locked them in a small room filled with venomous spiders and deadly cobras until they agreed on a final verdict.

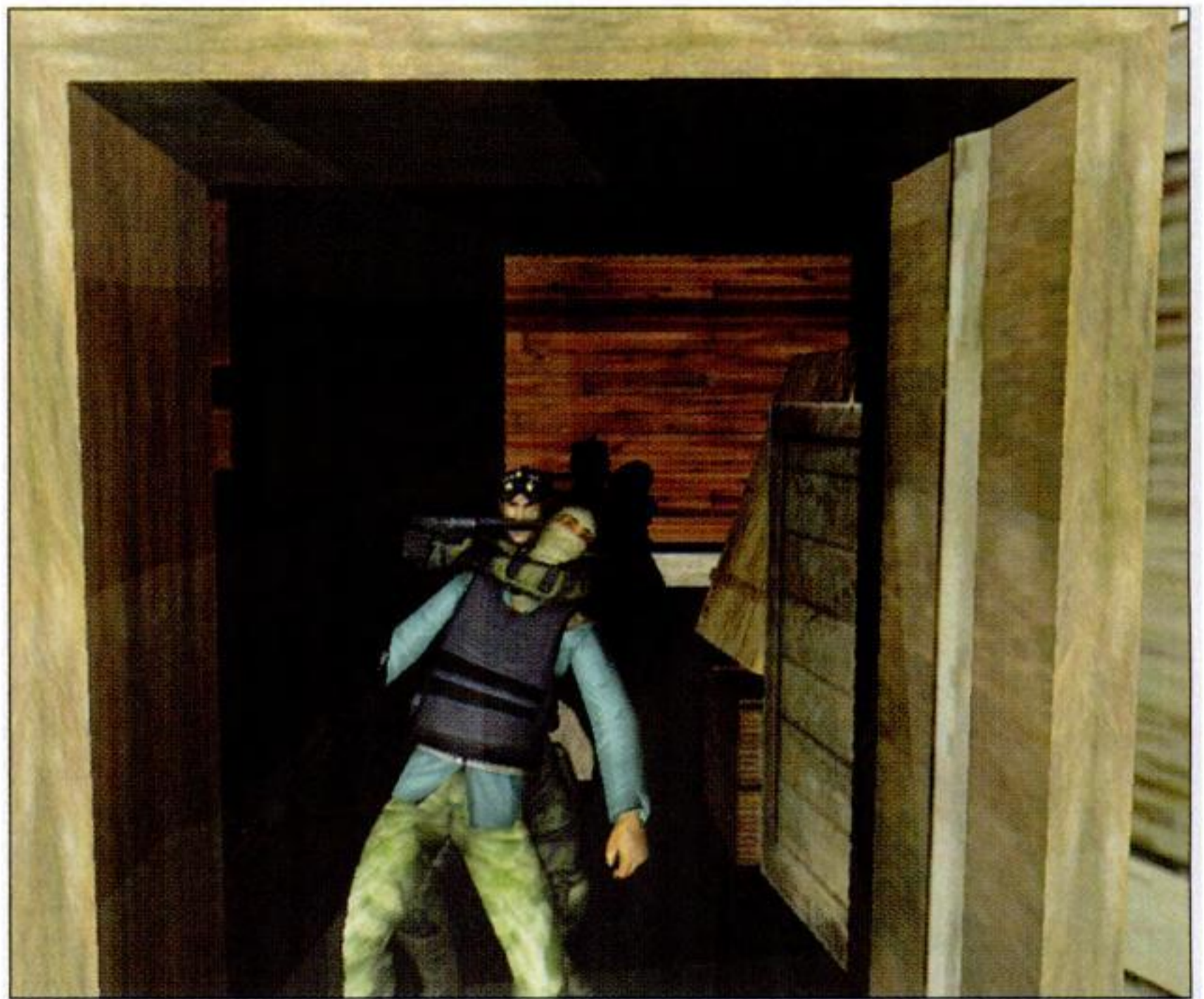
—JOSH NOREM AND WILL SMITH

## Playing with Yourself

We were huge fans of the original *Splinter Cell*, but the sequel—*Pandora Tomorrow*—makes us wonder whether this game is about waging war against terrorism or against bulb-based lighting accessories. You see, Sam Fisher hates light bulbs in the same way that would-be murderer in *The Jerk* hated cans of motor oil.

Here's how it works: Agent Fisher deals in stealth and is usually not allowed to kill people in this game. If anyone were to see a guy running around in an all-black rubber bodysuit with night-vision goggles affixed to his head and a gun strapped across his back, they might get a little suspicious, which leads to the single-player game's central premise—Sam Fisher must not be spotted by anyone. It doesn't matter if he's indoors, outdoors, in Los Angeles, or Indonesia, he *must not be seen* or the mission is over. So every mission is based on shooting out every light source, luring unsuspecting guards into your midst, and whacking them on the head or shooting them, if allowed. Once you get the pattern down, just repeat until terrorism is eradicated or the game ends.

Luckily, this cat-and-mouse game that you play throughout



**Though Agent Fisher spends most of his time lurking in the shadows, he occasionally steps into the spotlight to lay the smack down.**

the single-player campaign can be fun at times, but ultimately it's just way too repetitive. Once you play through the game's first mission, you've pretty much seen it all.

The original *Splinter Cell* blew us away with its slick gameplay and stealth-based action, but from a single-player standpoint this follow-up regurgitates rather than revives the formula to the point of tedium.

## Now, the Rest of the Story

The multiplayer component, on the other hand, is innovative and exciting. Eschewing the popular trend of bigger maps and more players per map, *Pandora Tomorrow* offers intense two-on-two maps, where spies try to reach certain objectives, and mercenaries attempt to keep the spies from completing their objectives.

The spies are similar to Sam Fisher from the single-player game, but most of their lethal weapons are missing. They play from a third-person perspective, and have many of the acrobatic moves you learned in the single-player game. The other team consists of mercenaries. They play from a first-person perspective and have a variety of weaponry.

Each team has a separate pool of gadgets and vision modes to assist them. Spies get tools to help them draw attention away from themselves and escape when they're

caught, and they also have the standard low-light and thermal vision modes to help them keep tabs on the mercs. Mercs get a variety of booby traps—such as mines and tripwires—as well as tasers and grenades to help them kill spies. They also have a few special vision modes: a motion tracker and a mode that detects any active electronic equipment, including any activated spy gear.

The practical upshot here is that nearly every match is a real nail-biter. Good communication is an absolute necessity if you want to win. Playing as a merc means you and your teammate have to be everywhere at once, separating the false alarms from the real incursions and defending as many as six targets. On the other hand, the spies have to avoid roving mercs, motion sensors, cameras, and booby traps while completing their goals. By coordinating and acting decisively, the spies can seem to be everywhere at once—except at the objective they need to hack.

*Splinter Cell: Pandora Tomorrow* is an awesome multiplayer game. In a heated two-on-two match, even the slightest mistake can turn the tide against your team.

**MAXIMUM PC VERDICT** 8

**+ SHOOTING SPIES**  
If you dug the original, you'll love *Pandora*.

**- SHOOTING LIGHT BULBS**  
Single-player is the same as the first game.

\$40, [www.splintercell.com](http://www.splintercell.com)



# Painkiller

This fast-paced shooter is one of the sleeper hits of the year!

**S**cattered bones slither together to form skeletons that rush at you with gaping maws. Flesh-deprived archers realize they're losing a battle and suddenly begin firing upwards, bringing down a ballroom-size chandelier onto your head. A 15-story tall beast shatters a pillar, dropping massive stone ruins into your path as you attempt to flee, squirting urine with every frightful step. This is but a snapshot of the action in *Painkiller*—a grim and relentless crusade that combines the frenzied backwards-shooter action of *Serious Sam* with gorgeous graphics, over-the-top physics, and bowel-loosening thrills.

*Painkiller* casts God as a micro-manager who assigns newly deceased crash victim Daniel Warner the task of assassinating four generals of the underworld in order to prevent a coup by Lucifer himself. Standing in Warner's way are thousands of low-level chumps who aren't about to give up their hellish pension and benefits without a fight. Individually, these grunts aren't terribly bright. Whip out your primary weapon—the eponymous whirling-bladed Painkiller—and you can cut through crowds like a human (well, formerly human, at least) Cuisinart.

The twist is that in *Painkiller*, complacency is quickly punished. As you play, familiar enemies learn new tricks and combine forces to develop new attacks. Some opponents will grab nearby associates and use them as shields and projectiles. Weak enemies in large numbers will cluster around a stronger foe, or spread out to diminish the effect of your weapons.

Although you're limited to five weapons, each is essential and possesses lethal firepower and spectacular alt-fire options. Particularly impressive is the stake gun, which lifts close-range enemies off their feet—or hooves,



Would you like that stake medium or well done? *Painkiller* is relentless.

or whatever—and pins them to the nearest wall. And then there's the freezer/shotgun combo that gradually immobilizes enemies in their tracks until you shatter their frozen bodies into pieces with a shotgun blast, a la the original *Duke Nukem 3D*.

Massive waves of lesser enemies are interspersed with boss battles against Lucifer's generals. Each of these behemoths is an intimidating, sky-scraping abomination in command of fire, earth, air, or water. Unlike the battles with the bulk of your antagonists, defeating these bosses requires as much strategy as firepower. Finding their weaknesses isn't all that difficult, but compensating for your own is.

*Painkiller* offers some strategic depth in addition to the fast-paced action. Destroying coffins and chests yields gold coins that can later be cashed in for character upgrades. And each time you collect 66 souls (which appear above the corpses of your vanquished enemies), you morph into a temporary demonic mode that allows you to plow through enemies like buttah.

*Painkiller* deftly avoids the impression that Hell has just one interior decorator. Textures are unique to each level, and each environment has its own crepuscular charm. You'll go from crumbling ruins to gaseous swamps to claustrophobic cottage interiors to huge military hangars. Hell even sports its own opera house, an indication that, in addition to having a sense of humor, the game's

developers have imbued *Painkiller* with enthusiasm, character, and atmosphere. More evidence of the high-quality design: the frequent appearance of checkpoints and the option to save whenever you'd like.

The only drawback in the single-player mode is that lengthy loading times slow down the otherwise frenetic pace, especially in boss fights where we had to respawn often because we found ourselves routinely ground, crushed, and spiked into the dirt. Unfortunately, multiplayer action is fairly limited, with just six multiplayer maps and five play modes; additionally, our multiplayer killing sprees were occasionally truncated by crashes to the desktop.

But these are minor quibbles with a game that delivers exhilarating, old-fashioned *Quake*-style mayhem upgraded with today's shimmering environments and the gleeful physics of the Havoc 2 physics engine. Darker than *Doom* and more serious than *Serious Sam*, *Painkiller* demonstrates that publisher Dreamcatcher is starting to "get" the first-person shooter.

—LOGAN DECKER



**MAXIMUM PC VERDICT** **9**

**+ LAUGHING GAS**  
Malicious rag-doll physics and luscious textures amplify *Painkiller*'s relentless dosages of action.

**- MUSTARD GAS**  
Simple play mechanics, with bulky load times and multiplayer kinks.

\$40, [www.painkillergame.com](http://www.painkillergame.com)





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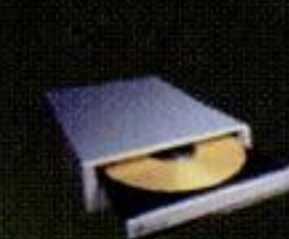
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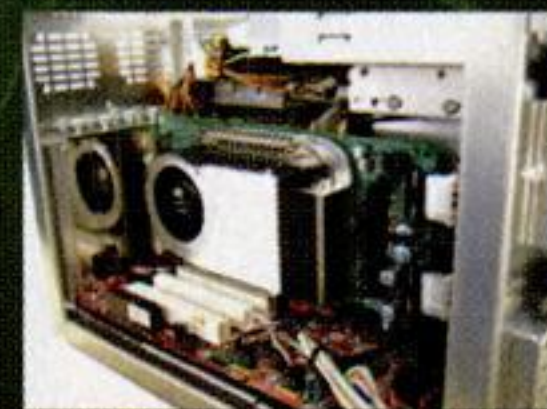
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**MAXIMUM PC**  
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REVIEW VERDICT: **9**



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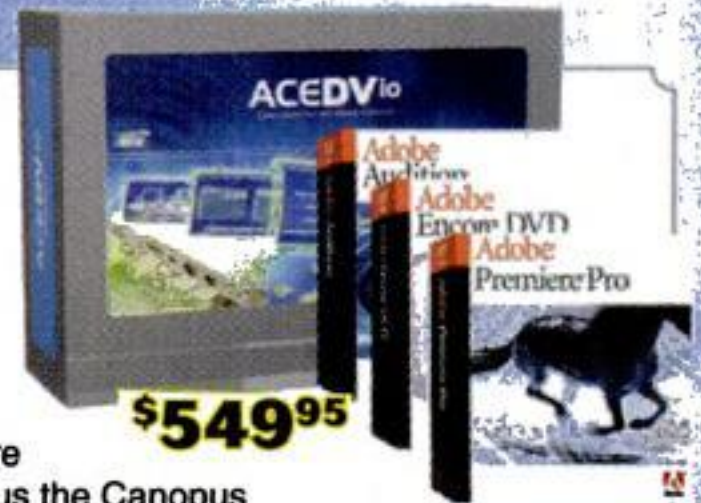
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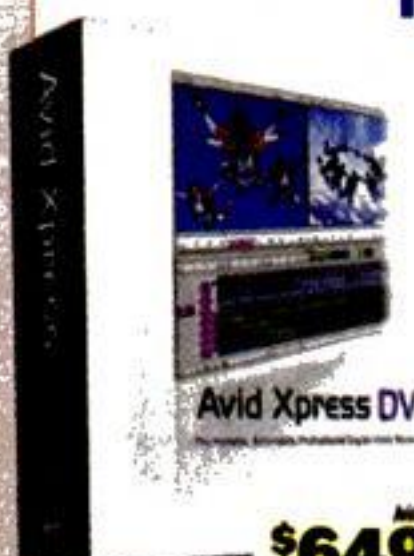
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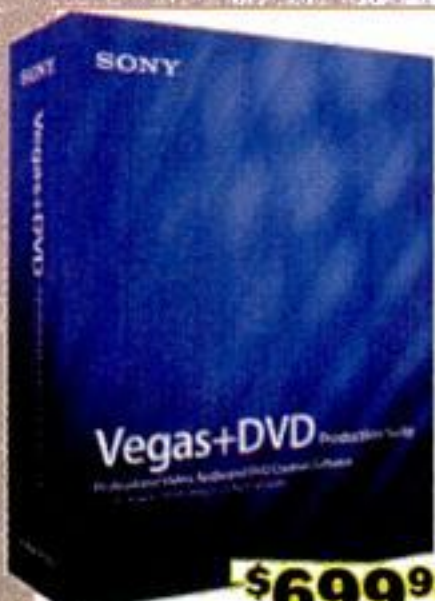
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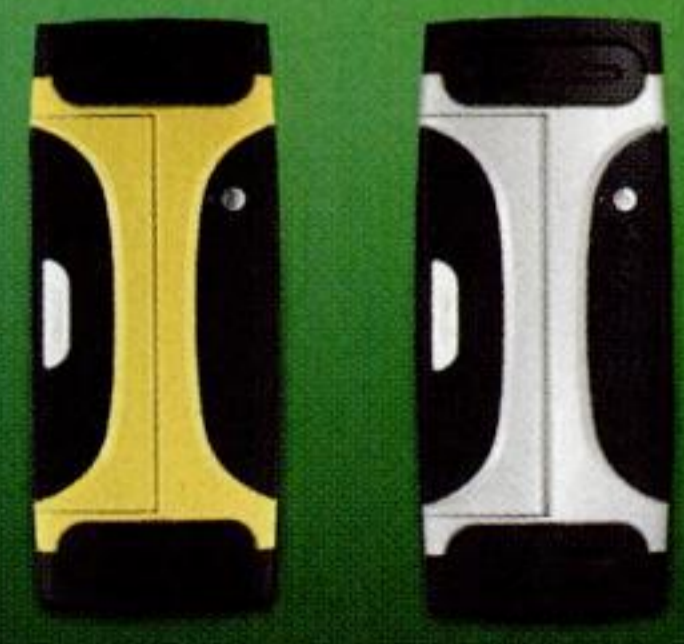
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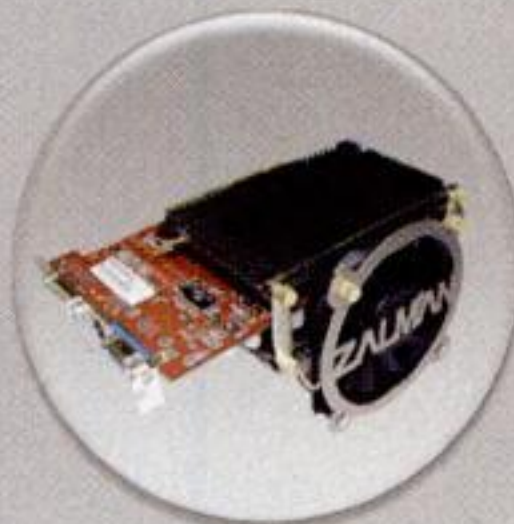
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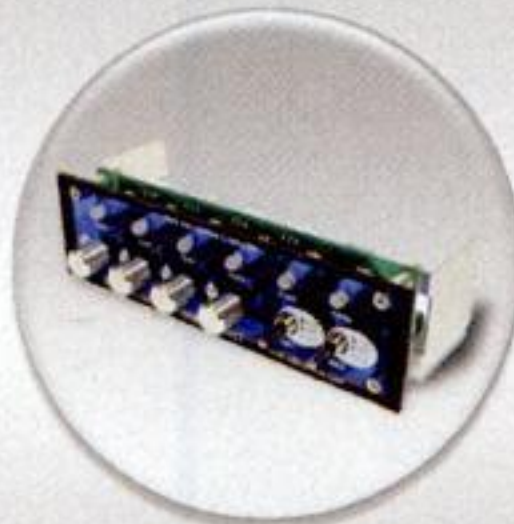
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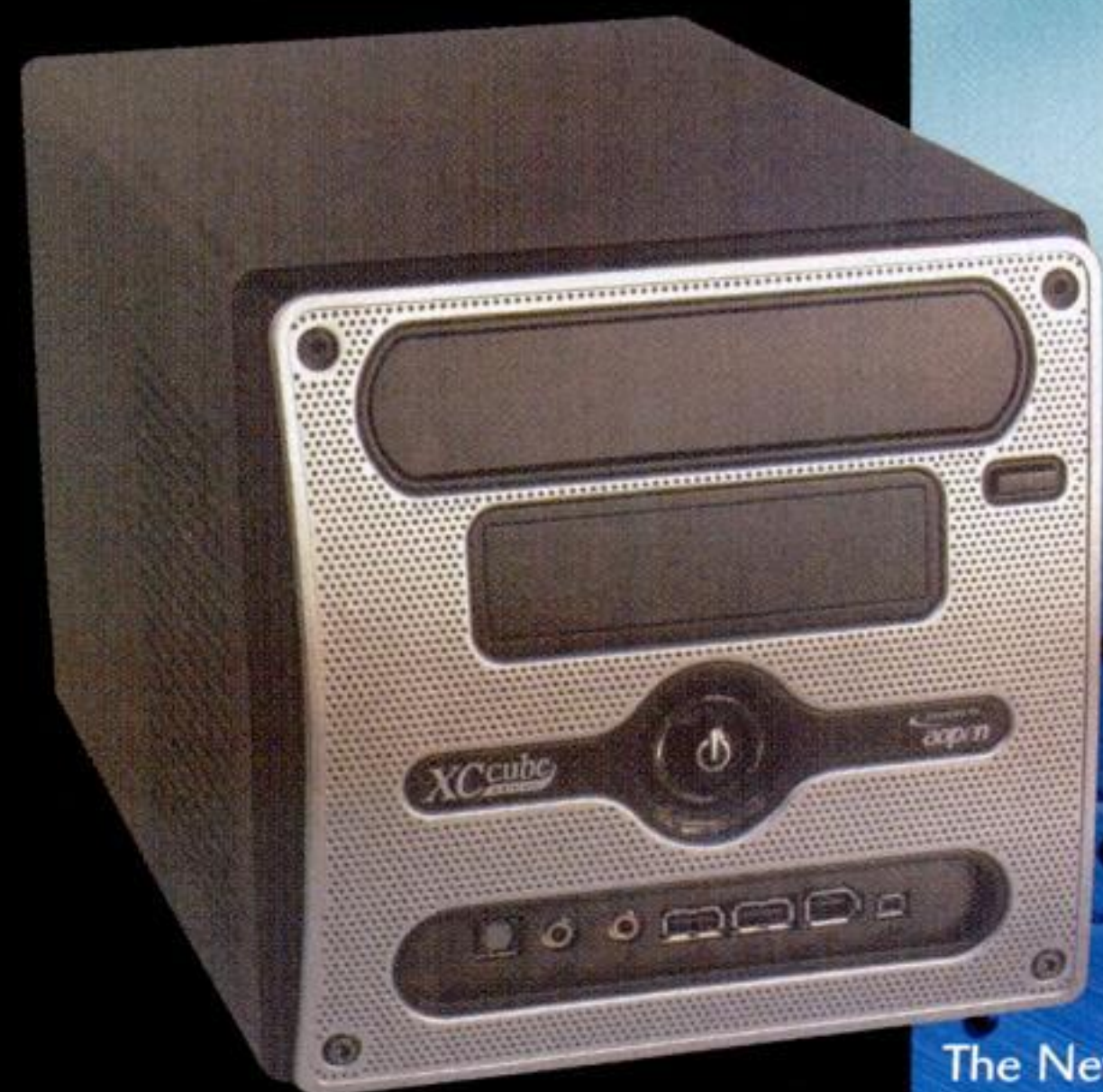


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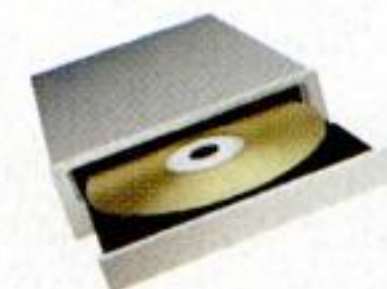
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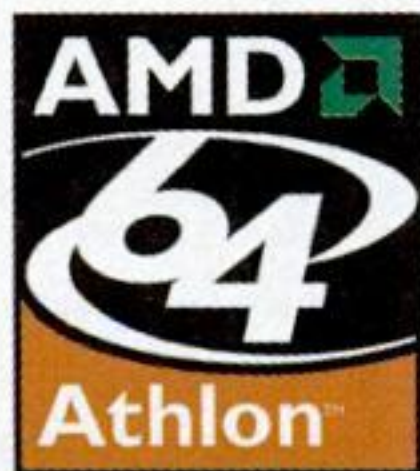
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- Front panel headphone/mic jacks under front panel access
- Power & Reset switch (behind front panel)

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**A**t a time when "case modding" is so often identified with over-the-top and/or in-you-face creations, we're struck by the straightforward elegance and sophistication of Dustin Walker's rig.

Mod isn't even the right word, really, because he built the PC from the ground up. Well, first he gave it a few years of careful thought, which in no small way accounts for his superbly refined design.

The case is made entirely of aluminum—from the welded frame that supports the structure and holds the components in place, to the removable side panels, to the length of 3.5-inch pipe that gives the case its curved corner. Even the 120mm fans that reside behind the front fins and beneath the top vents are aluminum. Sounds cool, huh? It is. According to Walker, "the same hardware setup ran 5 to 10 degrees cooler than it did in a Lian Li PC 60 [enclosure]."

It's quieter than his other case, too. State-of-the-art through and through, Walker rigged up a hard drive suspension cage that keeps the high-speed parts from contacting any metal, thereby eliminating

## THIS MONTH: Dustin Walker's Homage to Frank Lloyd Wright



You get the feeling this might be the only thing left standing after an 8.0 earthquake. We're talking 40lbs. of heavy-gauge aluminum.

When Walker was done building, he had the case anodized—in other words, completely submerged in a solution that chemically etched its surface. The result is a protective finish that nonetheless exposes the metal's natural grain.



the drives' characteristic clicking sounds. We asked a hard drive manufacturer about the integrity of this unorthodox setup and received no compelling evidence against it. In fact, the manufacturer cited only vibration as a concern. For the record, Walker hasn't experienced any problems whatsoever.



Up, up, and away: A retractable door on the front panel offers unfettered access to the drive bays. The bays were created with a hand-held plasma cutter—"a time-consuming process that took patience and a steady hand," says Walker.



Repeating curves, cold-cathode backlighting, a Crystalfontz LCD, and Bulgin Vandal buttons come together in a perfect blend of Art Deco concepts and modern style.



For his winning entry Dustin Walker wins **\$1,000** and a 12-pack of BAWLS to fuel his late nights of modding.



So ends BAWLS' year-long sponsorship of winning rigs. But make no mistake, Rig of the Month lives on—just without any prizes (unless you count the rewards of a job well done).

To submit a Rig, send at least three high-res images and a 300-word description of your project to [rig@maximumpc.com](mailto:rig@maximumpc.com).



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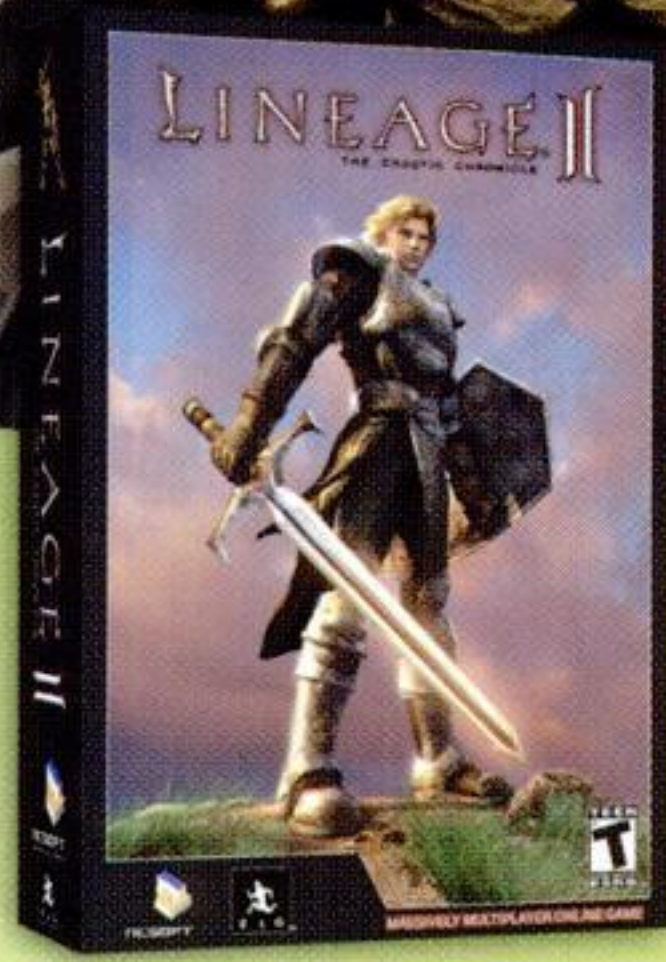
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