

**HP+VOODOO=LOVE CHILD!**  
Will this sexy Blackbird sing  
a song of benchmarks?

**FIRST FLASH HARD DRIVES!**  
32GB of speedy, indestructible  
solid-state mobile storage

**THINNEST NOTEBOOK EVER!**  
How this ultraportable  
Toshiba won our hearts!

# MAXIMUM PC

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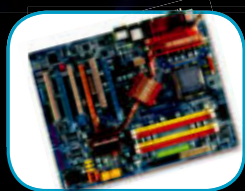
**2008**

# TECH PREVIEW

**INTEL PENRYN  
AMD PHENOM  
NVIDIA G92  
WINDOWS HOME  
SERVER  
*and more!***



*Next-gen optical  
drives unveiled*



*Motherboard and  
chipset secrets*



*The race to two-  
terabyte hard drives*



*The search for smart  
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*The scoop on Vista  
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Ed Word



# Do Not Chase Waterfalls

Please send feedback and purple pears to [will@maximumpc.com](mailto:will@maximumpc.com).

Every few years, the stars align and magic happens. No, I'm not talking about some sort of holiday miracle. I'm talking about those years when all the big hardware development cycles sync up, and we get major releases from a whole bunch of hardware vendors at the same time. That's why I'm particularly excited about this year's tech preview!

Starting on page 20 we've got the inside scoop on all the gear you're going to be lusting after in '08. With new kit just around the corner from Nvidia, Intel, and AMD, it's an awesome time to be a power user. You can rest assured that the fastest gear you can buy today will not be the fastest gear you can buy six weeks from now. At the time of this writing, I don't know who's going to end up shipping the fastest videocard or CPU, and I won't know until the hardware hits the Lab. The *Maximum PC* staff can make educated guesses based on architectural design and speeds and feeds, but we really won't know how hardware dominance will shake out until the metal meets the road.

The inevitable question is, Should I upgrade now or wait for the new gear?

That's what everyone wants to know—and the answer is always the same: It doesn't matter what

hardware is coming, what's out now, or even what brand of hardware you prefer, the time to upgrade is the moment your rig is no longer fast enough for you. When your rig is too slow to play the games you want to play, when your videos take too long to encode, when you're generally unhappy with your rig's performance, that's the right time to upgrade.

Here's the thing: Unless you just bought top-of-the-line hardware two weeks ago, you can always use a little more juice under the hood. If you're running an 18- or even 36-month-old rig, even midrange hardware in stores today will be faster than what's running in your rig. And there are big benefits to upgrading just before next-gen gear goes to market. You pay less for "current-gen" parts, and this hardware will typically overclock a helluva lot better than earlier parts off the same production lines.

The moral of this story is simple: It's fun to read about what's coming next, but don't get hung up waiting for it. There's always something bigger, better, and faster around the corner. If you always wait for the next big thing, you'll just keep running the same old, same old.

Will Smith

MAXIMUM PC Holiday/07

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# 20 2008 Tech

Next year's tech innovations will make your rig work harder, better, faster, stronger!

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# ATI Opens Up (Its Drivers)

Is Linux finally getting decent 3D graphics support?

For all but the most dedicated Linux geeks, graphics-intensive gaming remains a painfully elusive fantasy. The few games that can run on Linux (using a Windows API emulator) typically demand that you throttle down the graphics to embarrassingly low settings, even if you've got a pixel-shredding new GPU in your rig. Why? It's the drivers.

Of the two leading GPU vendors, ATI has taken the worst beating from Linux users—and for good reason. For years, the company has basically ignored Linux, with sporadic development leaving its proprietary driver stagnant and underpowered and no open-source driver for the community to improve upon. “All of the things people take for granted in the consumer Linux world? We weren't doing any of that,” says ATI principal technical staffer John Bridgman. Meanwhile, Nvidia has at least managed to put out decent closed-source, proprietary drivers for Linux, making it the first choice for 3D graphics in the open-source world.

Now ATI is fighting back with a plan to overclock its reputation with Linux users.

ATI's new Linux initiative is two-fold. First, the company is bringing its Linux Radeon driver development cycle in sync with its Windows development cycle, making it easier for the company to port the latest code to Linux. Second, ATI is releasing an open-source version of its drivers—stripped of DRM-related IP—to the public, allowing open-source Linux distributions such as Ubuntu and OpenSUSE to update drivers as part of their own development cycles.

“The open-source library will reduce the turnaround time for the support of newer GPUs. This bodes well for the long-term growth of its surrounding commu-



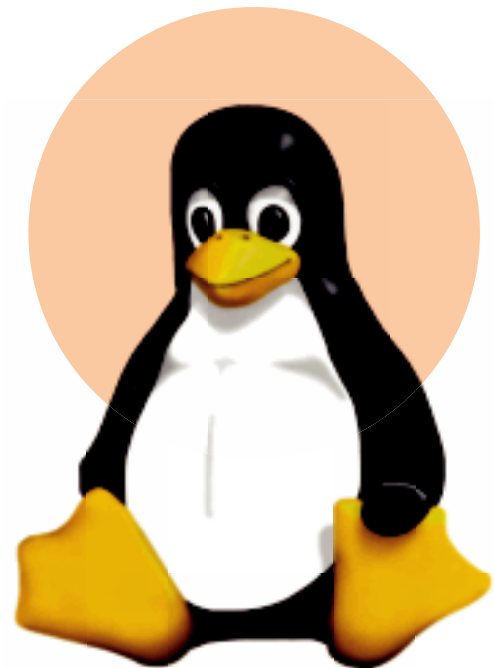
Linux users have been clamoring for a decent driver for their Radeon cards. Now they'll be able to pick between an open-source version and ATI's updated proprietary driver.

nity,” says Alex Fletcher, principal analyst at Entiva Group. But, says Fletcher, “there is a fair amount of skepticism about ATI's plans based on a lackluster record of Linux support.”

At the heart of ATI's new interest in Linux is a little bit of prodding from AMD, which acquired the company in 2006. The decision to release open-source graphics drivers is a reflection of AMD's own policy of supporting the open-source community.

Analyst Alex Fletcher credits the demand for 3D performance improvements to Linux's gathering momentum among desktop users but says the issue extends beyond gaming. “There are far more potential beneficiaries for 3D performance acceleration on Linux than just games,” he says. But it does seem that gaming graphics are a key component of ATI's decision. John Bridgman of ATI explains, “We don't know exactly where gaming on Linux is going to go. But if it doesn't happen, we'd rather it not be our fault.”

The open source ATI Radeon HD driver is available now at <http://tinyurl.com/2ccdK3>.



With the new open-source driver, every Linux distribution will be able to bundle custom-tailored ATI Radeon support that's free from licensing restrictions.

## Microsoft Bends, Slightly, to Google's Demands

With Vista SP1, third-party apps can replace desktop search



Starting with Service Pack 1, Vista users will be able to set a third-party desktop search engine, such as Google's Desktop Search, as their Windows default, replacing the OS's integrated search.

Microsoft released documentation in September detailing the syntax and other commands that will let third-party apps use the search functions in the Start Menu and Explorer windows and enable users to set them as their default search applications.

The change was prompted by Google's accusations earlier this year that Microsoft's search was too tightly integrated into Vista. Google saw this as a violation of the 2002 antitrust settlement in which Microsoft agreed to make it easier for customers to choose third-party software in Windows. SP1 does not, however, allow users to disable Vista's indexing service, another one of Google's gripes.



TOM  
HALFHILL

## Is AMD Running Out of Gas?

AMD has enjoyed great success against Intel in the last few years, but trouble is looming. If the costly acquisition of ATI doesn't pay off soon, AMD could be permanently crippled. And a crippled AMD is bad for everyone who benefits from lively competition in x86 processors—including Intel.

Historically, Intel commands 70 to 90 percent of the x86 microprocessor market, depending on the particular market segment and point in time. AMD can live with that, but just barely. When Intel screws up, billions of dollars may be lost, but the juggernaut survives. When AMD screws up, it's life threatening. AMD is always under pressure to devise near-perfect strategies and execute those strategies nearly perfectly.

Two things are going wrong now. First, Intel has largely recovered from its mistakes with the x86. Intel's Core 2 microarchitecture is a big improvement over the NetBurst microarchitecture and its phallic hyperpipelining. Intel has embraced the 64-bit x86 extensions that AMD pioneered and is introducing competitive multicore chips. Intel's low-power notebook processors look good, too. And Intel has a new alternative to AMD's HyperTransport that promises greater integration in future Intel chips.

The second thing going wrong for AMD is indigestion. Major acquisitions like ATI are hard to swallow, financially and logistically. AMD recently had to raise \$2.2 billion, not a good sign.

Some AMD fanboys pray for deliverance in the form of legal lightning. Actions alleging that Intel engaged in unfair business practices are pending in multiple countries. However, pinning hope on litigation instead of innovation is often the death knell for a company.

Much attention is being heaped on AMD's new Quad-Core Opteron (Barcelona). But to fully recover, AMD must prove that acquiring ATI wasn't an expensive goof. Future AMD processors that integrate the GPU with the CPU will be great for most people who aren't high-end gamers. However, AMD might have accomplished the same thing by licensing the graphics technology from ATI instead of spending \$5.4 billion to buy the whole company.

No doubt Intel enjoys AMD's problems. Nevertheless, Intel is at its best when challenged by competitors like AMD. Lately, Intel has even been slashing prices. Sure, it's an obvious tactic to put more pressure on AMD. But it's good for users, too.

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

### Preview

## LaCie Lays a Golden Enclosure

When your data deserves a storage device that's equally precious

If you're the kind of PC enthusiast who frags while wearing Manolo Blahniks or totes computer tools in a Prada bag—aside your iPhone, of course—then ready yourself for your next favorite accessory. LaCie's soon-to-be-released Golden Disk enclosure combines haute and hard drive.

Shipping in late October, the \$190 external drive, which was created by French design studio Ora-ïto, is covered in a fancy gold finish—containing actual flecks of the real stuff—and adorned with a distinct wave pattern. The insides aren't bad either: The 7,200rpm drive can hold 500GB of data, although the fanless device connects to your computer only via USB. If only there were an eSATA-friendly diamond-encrusted version!



GAME THEORY



THOMAS  
MCDONALD

The Adventure  
of the Tentacled  
Cosmic Spawn

A sinister cult is trying to awaken the Great Old One Cthulhu from his watery slumber, and only Sherlock Holmes and Dr. Watson can stop it from happening!

No, it's not a description of my high school fan fiction (well, actually, it is, but let's not talk about that); it's the premise behind Frogware's latest Holmes game: Sherlock Holmes—The Awakened. Recruiting Holmes into the Cthulhu mythos of H.P. Lovecraft is a popular geek pastime that sometimes actually works.

With *The Awakened*, the exercise gets a solid 3D presentation and narrative that reminds us of the more sedate pleasures of the puzzle-adventure game. Adventure gaming never quite dies but continues to dwell in a shadow realm, on the fringe of the mainstream. Each time I play a new example of this genre, it reminds me of a time when the puzzle-adventure was the dominate PC genre, in the golden days of Sierra and LucasArts. The ascendancy of 3D action gaming signaled the decline of the narrative adventure, and it has never—and likely will never—recover its position.

Yet these games still reward the person who adjusts to their slower pacing. As always, I only really understood that when seeing such a game through the eyes of another. My son sat by my side for about an hour as I played through *The Awakened*. Since the environments are in 3D, he assumed it was another action game. When we'd approach a character, he'd say, "Can you shoot him?" "No, I have to talk to him," I explained. When he saw that Holmes carried a knife, he asked, "Can you use that as a weapon?" "No, but I can use it to cut this rope in order to open the trap door," I said.

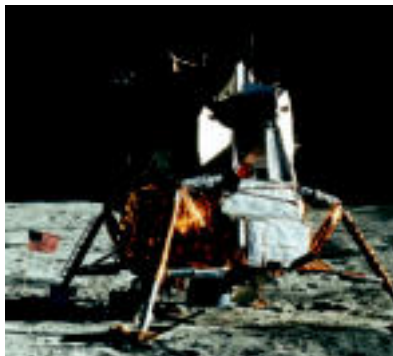
At that, he began to get it. He began suggesting places to search, items to combine, ways to test and examine objects back at 221B. And slowly, he got caught up in the story, the puzzles, the process. He adjusted his expectations and took the game on its own terms. Sometimes, we need to step away from the latest 3D adrenaline rush, slow down, light a pipe, pick up a magnifying glass, and let pure story take us where it will.

Thomas L. McDonald has been covering games for 17 years. He is Editor-at-Large of *Games Magazine*.

Fly Me to the Moon!

Google drops big bucks to spur a new space race

Google is hoping to inspire private space exploration by ponying up \$30 million to fund the X Prize Foundation's latest challenge, the Google Lunar X Prize, which tasks entrants with building and launching an unmanned lunar rover. Google will give \$20 million to the first group to land a craft on the moon that can roam 500 meters and transmit a video back to Earth. It will kick in another \$5 million if the team completes additional tasks such as photographing man-made objects or discovering water or ice. If your team is slow to launch, don't worry. The second-place finisher will pocket \$5 million, but you'd best get to work; the grand prize drops to \$15 million after December 31, 2012 and the competition ends on December 31, 2014.



Spy vs. Spy—  
Cyber Style

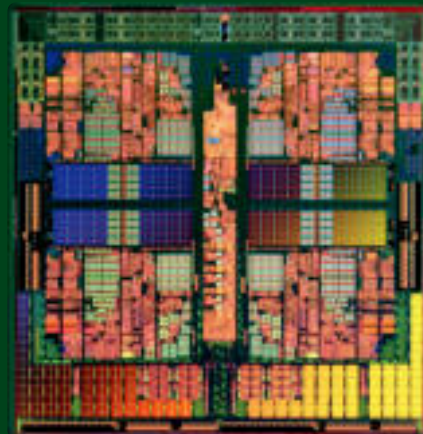
A diplomatic brouhaha has coincided with a recent spate of cyber warfare, with representatives from a number of governments claiming their nations are the victims of coordinated attacks on their computer infrastructure. Systems in England, France, Germany, New Zealand, and the United States have all been attacked in recent months, and while governments in those countries have not directly accused the Chinese government of coordinating the attacks, intelligence agencies have noted that the attacks do seem to be originating from China.

The Chinese government, however, denies any involvement in the incidents, and, in fact, says it has been the victim of cyber-sleuthing from Western governments. Lou Qinjian, vice minister of Information Industry, stated that 80 percent of the recent attacks have come from computers based in the United States, although he did not directly state that the U.S. government was coordinating the intrusions.

AMD to Try Tri-Core

Competitive edge or a sign of trouble?

Are there folks who want something better than dual core but less extreme than a quad solution? That's what AMD is hoping as it prepares to release a tri-core Phenom in 2008. AMD is positioning the three-core chip as something that will help differentiate PCs that use it from their dual-core brethren. But Intel's further slashing of its quad-core prices—already at the \$200 mark—could lessen a tri-core's appeal. More troubling is how AMD is producing these chips. The tri-core is likely to be based on the same quad-core die as Phenom, so is AMD disabling one core or is it trying to find a market for its defective quad-core chips?



With quads getting downright cheap, the need for a tri-core category is questionable.

## Fight for Your Rights

The Computer and Communications Industry Association (CCIA) is fighting back against major media distributors, which it claims are bullying consumers with exaggerated copyright notices. In an effort to thwart the increasingly aggressive tactics being used by Hollywood studios, music publishers, et al., the CCIA has filed a complaint with the Federal Trade Commission defending consumers' right to fair use. To add your voice to the organization's petition, visit [www.defendfairuse.org](http://www.defendfairuse.org).

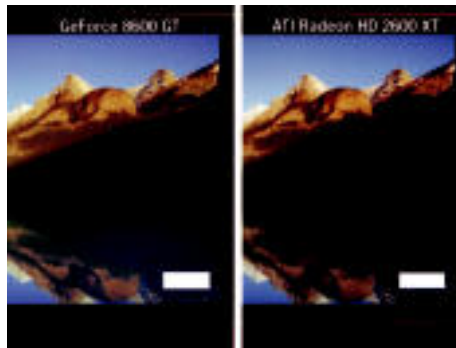


## AMD Alleges Benchmark Cheating by Nvidia

Video quality benchmark scores are source of conflict

AMD and Nvidia have been engaged in a veritable pissing match over the HQV HD video benchmark, with AMD accusing its rival of cooking its Forceware drivers in order to achieve higher scores than its product deserves. Nvidia, in turn, has accused AMD of engaging in a disinformation campaign.

The issue stems from beta Vista drivers (Forceware 163.11) that Nvidia provided to reviewers testing HD-video performance with videocards based on its GeForce 8600 GTS graphics processor. AMD's Aboubakeur Nacef ran the benchmark and took photographs that he says reveal ghosting caused by overly aggressive use of noise-reduction in Nvidia's PureVideo HD decoder. "My feeling,"



Nacef told *Maximum PC*, "is that Nvidia was in panic mode and needed to release something quickly."

Nvidia's Rick Allen, countered that Nacef was "using an older driver and overly aggressive driver settings to cause the problem." Nacef responded that Forceware 163.44 had the same problem but that he hadn't tested version 163.69, the latest version available at press time.

### FUNSIZE NEWS

#### MS ANTITRUST RULING STANDS

After an appeals process that lasted more than three years, an EU court has upheld the European Commission's original antitrust ruling against Microsoft. In 2004, the Commission found Microsoft's practice of tying its media player to its OS and its unwillingness to disclose specifications for its network protocols to be an abuse of the company's market dominance. With Microsoft's appeal now overturned, the company will be forced to pay \$688 million in fines.

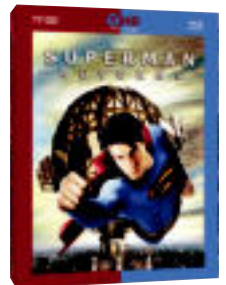


#### COMING SOON: CABLE STREAMING

The cable industry's firm grip on its content looks to be loosening with the recent approval of DTCP-IP (Digital Transmission Copy Protection). The streaming protocol will allow cable subscribers to move content—including HD and video-on-demand—across their home networks for viewing on devices that aren't connected to their cable boxes. Programming flags will protect specified content from being copied.

#### TOTAL HD ON HOLD

Warner Bros.' plan to develop optical discs that support Blu-ray on one side and HD DVD on the other is being shelved indefinitely. Dubbed Total HD, the dual-format media was seen as a way to curb costs for studios that support both formats and save shelf space in retail outlets. But with more studios now choosing sides and consumers remaining unenthused about either format, Warner is discontinuing its efforts with Total HD for the time being.



#### EMUSIC FOR BIBLIOPHILES

The second-largest music download service in the United States is adding audiobooks to its offerings. Subscribers to eMusic will now be able to purchase books from major publishers in the form of 64kb/s MP3 files for \$10 a pop.



## Comcast Bans Broadband Hogs

But you might not know you've overindulged until it's too late

Recently, a number of Comcast subscribers have had their service terminated due to what the broadband provider terms "excessive use." The problem, however, is that Comcast provides no clear guidelines concerning what it views as excessive. Charlie Douglas, the company's director of corporate communications, explained that giving such information to consumers is simply unnecessary because "only .01 percent of Comcast customers have been affected." Douglas went on to say that bandwidth limits were equivalent to a consumer downloading 30,000 songs each month and were consistent across all markets. While such usage does seem excessive, we encourage ISPs to provide clear limits and tools to measure bandwidth usage (which Comcast also finds unnecessary), which would make it much easier for consumers to avoid service termination.

DISPLAYS

# LCD Monitor vs. LCD TV

For power users, a big screen is a necessity. It not only enhances your computing experience, but its commanding presence makes a statement about your commitment to extreme hardware. Right now, the biggest desktop monitors are 30-inch LCDs. There's a lot to like about these 2560x1600 native-res beauties, but they're not perfect—and they're costly. This has led many a reader to wonder whether it wouldn't be wiser to purchase an LCD TV of comparable size, which can be had for a lower price and includes the

added value of TV functionality.

To answer this question, we compared Samsung's SyncMaster 305T 30-inch LCD monitor (reviewed May 2007)—our favorite of the currently available 30-inch offerings—to Samsung's LN-T3253H 32-inch LCD TV. Each is a fair representation of its category's strengths and weaknesses and thus capable of helping us determine the better big-screen solution for a power user's desktop.

BY KATHERINE STEVENSON



**LCD TV**  
Samsung LN-T3253H  
\$1,300, [www.samsung.com](http://www.samsung.com)

## round 1 SCREEN REAL ESTATE

While the TV screen is two inches larger on the diagonal, the monitor offers far more screen real estate. Its 2560x1600 resolution far exceeds the TV's 1366x768, delivering four times as many pixels (four million to one million), so you can consequently fit far more content on the screen at once—shoot, you can fit more content on a 24-inch monitor. **WINNER: MONITOR**

## round 2 VERSATILITY

The 30-inch monitors on the market right now rely strictly on Dual-Link DVI, so provided your graphics card supports it (most current cards do), you can use this screen with your PC—and that's it. A TV, on the other hand, will provide accommodations for a variety of devices. This LN-T3253H, for example, offers TV, AV (2), S-video (2), component (2), VGA, and HDMI (3) inputs—we connected our PC using a DVI-to-HDMI cable. Plus, you get a bunch of audio ins and outs for feeding sound from this surfeit of sources into the TV's built-in speaker or to an external sound system. A remote control makes it easy to switch among your TV, PC, console, DVD player—what have you—whether you're viewing the screen up close or comfortably reclining at a distance. **WINNER: TV**



## round 3

### DESKTOP USABILITY

It's great to have so many open windows exposed on the monitor's ultra-high-res screen, but things can be pretty darned small, especially if you're inclined to sit a little further back when using such a large display. Be that as it may, the TV is unquestionably inferior to the monitor for desktop work. We certainly don't need everything to look that big. And even from a couple feet away you'll be bothered by the "screen door" effect of the TV's spacious pixel grid and nearly blinded by the increased brightness of a screen that's meant to be viewed from a greater distance.

**WINNER: MONITOR**

## round 4 GAMING

But enough about work—an even more compelling use for a screen of this size is playing games. If your rig sports anything less than the fastest graphics cards—GeForce 8800 GTXes—your frame rate is going to suffer if you try to play games on the 30-inch monitor at its native res. But, when the resolution is at, say, 1360x768, gaming is perfectly acceptable and free of motion artifacts with a single midrange card.

Gaming on the TV was also ghost-free at that screen's 1360x768 native res, but we did notice a lot of banding and contouring throughout the graphically rich content, which is most likely due to that screen's inferior grayscale performance. In general, the panels used in desktop monitors—especially high-end models—tend to be of a better quality than TV panels.

**WINNER: MONITOR**

## round 5

### MOVIES

Resolution-scaling issues with today's 30-inch monitors and restricted HDCP support in the majority of videocards (see the May 2007 issue for details), means you'll likely be forced to watch your commercial high-def discs at 1280x800 res on these desktop LCDs. That's far from ideal.

But so is the 1366x768 32-inch LCD—we want something that gives us full 1080i output. At least with the monitor, you can turn to AnyDVD as a means of bypassing the HDCP issues and reaching a higher res—with the TV, you're forever limited.

Plus, as with games, we could see evidence of the TV poorly rendering grayscale in our sample high-def content.

**WINNER: MONITOR**



**LCD MONITOR**  
Samsung SyncMaster 305T  
\$1,800, [www.samsung.com](http://www.samsung.com)

## And the Winner Is...

A 32-inch LCD TV might be somewhat cheaper and serve a wider range of uses, but it really can't compare to a 30-inch LCD monitor if what you're after is a desktop display. Screen real-estate alone makes the latter a better fit for PC power users—as does superior screen performance with demanding content. Be that as

it may, we still don't recommend you buy one of today's 30-inch LCD monitors, as they have issues that must still be improved upon. We'd rather wait for an ultra-high-res screen that offers more input options, a more modern interface—such as DisplayPort or HDMI—and internal scaling before we plunk down that kind of dough. **MPC**

*Our consumer advocate investigates...*

- ✓ Defining HD
- ✓ DriveCleaner Drive-bys
- ✓ NAS Drive Recall



Daisy, watchdog of the month

**IT DEPENDS ON WHAT YOUR DEFINITION OF "HD" IS**

*My problems began when I decided to replace my 20-inch Sceptre X20 monitor with a ViewSonic VX2245wm 22-inch HD Widescreen LCD. I used to run the Sceptre with my PC plugged into the analog port and my HDTV set-top cable box plugged into the DVI port. The Sceptre worked fine even though it maxed out at 1680x1050.*

*When I tried to hook the ViewSonic up to my set-top box via DVI, the cable box posted a message explaining there was no HDCP support, so the video was disabled.*

*I emailed ViewSonic to find out if the VX2245wm supported HDCP or not. ViewSonic responded that none of its monitors supported HDCP. A quick search on its website proved this incorrect.*

*So, I decided to call customer service. The gentleman who answered the phone confirmed that the VX2245wm did not support HDCP and was not capable of displaying HD content. I responded that "22-inch HD Widescreen" is printed on the box. His said that that does not mean HDTV. I went on to explain that the VX2245wm includes a feature called ClearMotiv, which ViewSonic claims allows for fast 5ms video response and enables digital HD-broadcast-quality video. He said that meant "the VX2245wm could display HD television resolution if it was capable of displaying the HDTV signal." I told him that did not make sense and he apologized. His supervisor later told me that I could use it for HDTV using the analog input.*

*I have heard rumors that VX2245wm LCD monitors manufactured after a certain date do support HDCP even though ViewSonic tells me otherwise.*

*I expected more from ViewSonic. The VX2245wm is advertised as a 22-inch HD widescreen LCD with a fast response time that "enables digital, HD-broadcast-quality video." It is also listed as being "Certified for Windows Vista," which I believe means it must support HDCP. Any way you slice it, the description of this product is misleading at best.*

—Richard T. Warren, Jr.

Richard isn't the first person to be confused by this subject. To find out just what the HD on a monitor box means, the Dog queried ViewSonic. A representative explained that "HD refers to the capability of displaying 720p, 1080i, or 1080p HD resolutions. The VX2245wm was released prior to Microsoft's release of Windows Vista but has subsequently been certified for the Basic Vista logo, which does not include a requirement for HDCP."

The spokesperson went on to say that the customer service department misspoke and has since been updated on which ViewSonic monitors support HDCP. A number do, but not Richard's VX2245wm. The spokesperson explained, "The VX2245wm was designed as a desktop PC display. It can display HD content, provided that HD content resides on and is played on the PC specific to normal monitor use. The VX2245 was not designed as a TV display and as such we did not include HDCP support. It was never tested to work directly with HD set-top boxes or other HD digital video devices. The VX2245wm does meet the requirements for Microsoft Vista Basic Certification." She also said rumors of HDCP being added to newer revisions of the monitor are false.

"Moving forward," she explained, "our plan is to continue supporting HDCP and the Windows Vista Premium Certification on all of our new widescreen models with DVI or HDMI. All other widescreen (including the VX1945wm and VX2245wm) and 4:3 models will be Vista Basic Certified and will not support HDCP"

For those who don't know, HDCP (high-bandwidth digital content protection) is a system



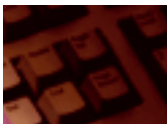
Despite the HD label, some ViewSonic monitors are unable to display protected digital content.

that "protects" digital content, and its rollout has been mangled. As Richard is discovering, despite touting HD features, many PC monitors and even TVs cannot display protected content from a TV source or Blu-ray or HD DVD device.

The VX2245wm isn't the only ViewSonic monitor that has used the term HD without including HDCP. The ViewSonic VG2230WM, which *Maximum PC* reviewed in June, claimed HD support but did not, in fact, support HDCP; ViewSonic has said it plans to add HDCP support in the future. *Maximum PC* also noted that Hanns.G's HW223DPB (reviewed in August) lacked HDCP support, despite being labeled HD ready. Hanns.G said HD capability was available through the VGA analog port.

The Dog feels Microsoft hasn't helped the situation either. As ViewSonic points out, monitors that are Windows Vista Premium Certified must have HDCP support, but Windows Vista Basic Certified models do not need to include it. Since most consumers (and even many tech-heads) have no idea what the hell the difference between the two is, it's likely to create confusion rather than dispel it.

Tom Mainelli, an analyst who covers displays for market research firm IDC, agrees that the situation is a mess. "I think it's the responsibility of



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 answer as many letters as possible, but only has four paws to work with.

the [monitor] industry to address this," Mainelli said. "They're going to be the one the consumer blames when it doesn't work."

Mainelli said the informal line on what gets HDCP and what doesn't seems to hinge on size and aspect ratio. New monitor designs in the 24-inch range and up usually include HDCP, but with smaller monitors it's a toss-up. Most business-class monitors with standard aspect ratios don't include it while widescreens may. So why not just create an HDCP logo? Mainelli said one problem may be consumer education. While *Maximum PC* readers are likely sensitive to it, the vast majority of consumers have no freaking idea what HDCP means, so one more logo on a box isn't going to help the situation.

What's the Dog's opinion? ViewSonic and other display manufacturers are clearly walking a thin line. The Dog thinks that a person shopping for a new monitor is looking not to display his or her Microsoft Word document at HD resolutions but to watch movies. To expect anything else is disingenuous at best.

Until the monitor industry can get its act together and begin labeling monitors appropriately, the only way to avoid getting burned is to look for the Vista Premium Logo and do your due diligence *before* you make a purchase.

## CLEAN DRIVECLEANER

*Recently, I found a program called DriveCleaner that was supposed to speed up my system. I downloaded it and purchased a license for \$50. I promptly received a login name and password along with confirmation of payment. It worked for about two days and everything was great. It seemed like it really had sped up my system. Then everything started acting funny.*

*I called DriveCleaner's tech-support center and was told how to uninstall the program and reinstall it. After I uninstalled, I found that I could not get to DriveCleaner's website anymore. And because of this*

*I can't reinstall the software. I uninstalled the program through Add/Remove Programs and then went and deleted everything pertaining to DriveCleaner. I visited some websites that gave instructions on how to fully uninstall the software. During this time I noticed that it seemed this software was a scam. Nobody talked very nicely about it.*

*Could you please help me find out what the deal is with this company?*

—Lavon Smith

Bad news, Lavon; your suspicions, albeit late, are correct. Most people who report problems with DriveCleaner say it's due to "drive-by" installs via browser exploits. The program itself doesn't enhance your rig's performance; rather, it helps cover your tracks after you've been surfing porn sites. But, according to several antivirus/anti-malware sites, the application (at least the "demo" that gets installed on drive-bys) just creates pop-ups and false positives. The program's recommended fix? That you buy the full version of course.

Although the connection isn't clear, the folks behind DriveCleaner also seem to be responsible for the infamous WinFixer and WinAntivirus programs, which the Dog wrote about in July. Both WinFixer and WinAntivirus were also accused of using similar tactics: drive-by installs and false positives that induced people to pay for the apps. A California woman is trying to take WinFixer to court to recoup the money she paid to repair her PC after installing the program.

The Dog couldn't reach DriveCleaner.com for comment, but you should probably count yourself lucky that you were able to uninstall it, as it's not clear that it actually does anything. You can probably kiss your \$50 goodbye, but you can count the experience as a life lesson: Do some research on an application before you buy it. Woof. **MPC**

## Recall Alert

■ I-O Data is recalling several hundred network attached storage (NAS) devices that may over-heat and pose a burn hazard. I-O Data says it has received three reports of the AC adapters included with the units overheating, deforming, and melting.

No injuries have been reported. The adapters were manufactured in Japan and sold with the UHDL-160U and UHDL-300U Network Hard Disk Drives between December 2004 and February 2007 in the United States. If you have either of the models listed above, examine the AC adapter and look for part number IO-ACADP1510UL. If your adapter has that part number, it may be one of the defective units. I-O Data is asking consumers to immediately stop using it and contact the company for a free replacement. More information is available at 877-878-2926 or by visiting: <http://www.iodata.com/usa/>.



Some power bricks sold with I-O Data NAS drives may over-heat and melt.

2008

# TECH PRE- VIEW

WELCOME TO THE NEW REVOLUTION! YOU CAN EXPECT A HOST OF SAUCY NEW INNOVATIONS TO BRING CHANGE TO EVERY COMPONENT IN YOUR PC **BY THE MAXIMUM PC STAFF**

It might be called “personal” computing, but it’s actually best you not get too attached to your PC hardware. Because no sooner have you snuggled up to that 8800 GTX or taken to calling your Core 2 Duo “soul mate” than new and better parts come along that make you question the foundation of those

relationships. Before you know it, the money you should be saving for the next best gear is going toward therapy.

To make it as a power user, you must say no to sentiment—stuff all those warm, fuzzy feelings you have for today’s parts and instead embrace the inevitability of technological progress.





Today's cutting-edge components are bound to be tomorrow's cast-offs—and that's just fine by us!

As history proves, there's always more power to be had, more features to be explored, more applications to push the very limits of our computing capabilities. And if

even half the predictions we make in the following pages come true, there will be no shortage of improvements in the year ahead. From your CPU, to your motherboard, to your memory, and even your cooling apparatus, you may as well start saying your goodbyes now.

# QUAD-CORE CPUs

It's been a long time coming, but the quad-core war between AMD and Intel should be in full swing by early next year—and we can't wait!

The year 2007 was all about Intel. Intel's Core 2—both the dual- and quad-core versions—dominated AMD's aged offerings. What's more, Intel's prized chips feature 64-bit computing, something AMD once proudly laid claim to via the "64" in its Athlon series; the tag has since been dropped now that the distinction is moot.

## HERE'S INTEL'S STORY

In the coming year, Intel intends to turn the screws on AMD with a die-shrink/performance-enhanced CPU code-named Penryn. Penryn uses Intel's new 45nm process, which includes high-k metal gate silicon technology, touted by Intel as "the biggest breakthrough in 40 years." In non-PR terms, high-k basically decreases power leakage, offers greater energy efficiency, and has the potential to increase transistor switching speed. So expect faster, cooler, and less-power-hungry CPUs. Penryn-class CPUs will follow the same dynamic as Conroe (Core 2

Each Wolfdale will feature 6MB of L2 cache and 410 million transistors. Yorkfield doubles those numbers. Penryn isn't just a die-shrink, though; Intel has also tinkered with the core to greatly increase division math, pump up virtualization performance, and include a new SSE4 instruction set aimed at video encoding. And the chip is well underway. We drove Penryn for our July issue, and it was fast. Of course, we will reserve official judgment until we test shipping parts, but we expect Penryn to be anywhere from 10 to 100 percent faster than the current quad cores.

The first Penryn for consumers will be the Core 2 Extreme QX9650 and will run at 3GHz on a 1,333MHz front-side bus. The chip should just become available as you read this, with volume shipments of mainstream speeds early next year.

## AMD'S PLAN UNVEILED

Not much has changed for AMD since we wrote last year's tech preview, except the company has dubbed its still-upcoming quad core Phenom (pronounced *fee-nom*).

Phenom will be based on the company's 65nm process and be "native quad core," which is AMD-speak for one single, contiguous piece of silicon containing all four cores. The advantage of this design

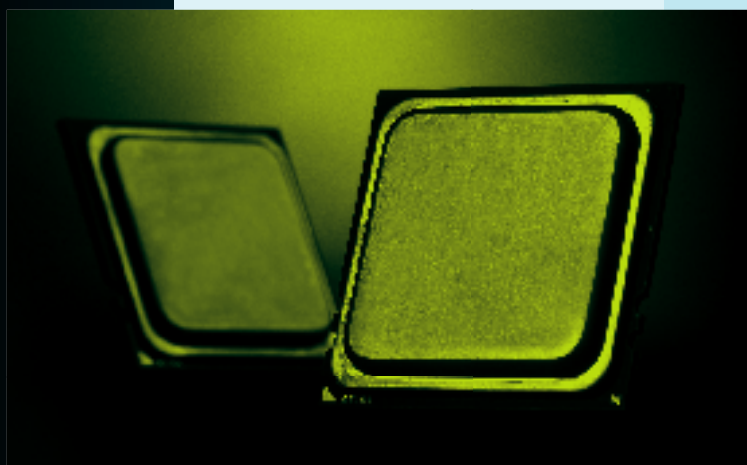
is that each CPU core can communicate with the others at much higher speeds than Intel's cores. In Intel's design, communication between the discrete pieces of silicon is limited to the speed of the 1,333MHz front-side



bus. AMD's design, however, should really pay off in multi-CPU configurations, such as its upcoming FASN8. A sequel to the company's Quad FX platform, FASN8 will populate two quad-core Phenom FX processors in a single machine for super-multi-threading performance.

Intel's response is that it sees no reason to build a large, chunky die connecting all four cores when performance on its CPUs is good without taking such a path. Intel also points to the manufacturing advantages of its dual-dual core approach. Today, it can use the same silicon for dual or quad cores and vary the pricing based on demand. Intel's approach also yields more working CPUs since the company can manufacture its quad cores using two different pieces of silicon. Intel can manufacture four-leaf clovers by connecting a pair of far more prevalent two-leaf clovers, while AMD has to hunt for the four-leaf variety. OK, hitting on a quad core isn't quite that rare, but managing the larger native quad-core chip has proven to be an issue for AMD.

How will Phenom perform? The company continues to express confidence that Phenom will be competitive with Intel's fastest parts, but insiders are concerned that the late-to-the-party Phenom FX will face off not against Kentsfield, but rather the next-gen Yorkfield part from Intel. Phenom is expected to make its splashdown very late this year and not begin shipping in volume until 2008.



Duo) and Kentsfield (Core 2 Quad): Each die will be a dual-core processor (desktop code-name Wolfdale), with a quad-core comprising two Wolfdales beneath a unified heat spreader (desktop code-name Yorkfield).

## OPTICAL DRIVES

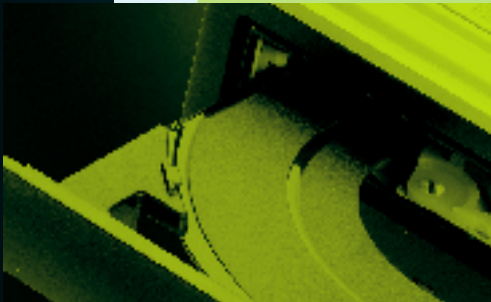
Speeds and prices of high-def drives will become more palatable, but will the masses bite?

In last year's tech preview, we could see that the format war between Blu-ray and HD DVD was only just beginning, and sure enough, 2007 has been all about the two sides trading taunts and boasting of their respective successes. This will undoubtedly continue throughout the next year, and it's still anyone's guess who's going to win.

We had also predicted last year that a stalemate such as this would result in dual-format drives. That's been true to some extent, as the LG GGW-H10NI we reviewed in September 2007 is able to *read* both formats, but it writes to only Blu-ray media. In fact, there hasn't been much HD DVD writing on any front—save for the HD DVD drives built into some Toshiba notebooks and a very limited number of OEM-only offerings from Panasonic. We figure there has to be greater HD DVD burner availability in the coming year. None of the optical drive vendors we spoke with would commit to such plans, but an optical-media insider told us to expect four or five manufacturers to have models next year. Thus, dual-format burners will likely also appear by late 2008.

And expect the cost of both HD DVD and Blu-ray drives to be significantly lower in 2008. For instance, LG's GGW-H20LI, the follow-up to the aforementioned dual-format drive, will cost just \$500—a far cry from the \$1,200 MSRP of the original. That drive also gets a write-speed boost to 6x, from 4x, which is sure to be a trend.

But don't expect to see any dramatic price or speed-rating changes in high-def media. We're told the prices of single- and double-layer media will remain at \$12 to \$15 and \$25 to \$30 apiece, respectively. And while a motor upgrade might make for a relatively simple speed boost on a burner, getting reliable performance from the media at greater speeds is much more challenging. So perhaps we'll see 4x single-layer and 2x double-layer media by the second half of 2008.



## MEMORY

DDR3 is on deck—but at twice the price of DDR2 and with nary a performance benefit, at least for now

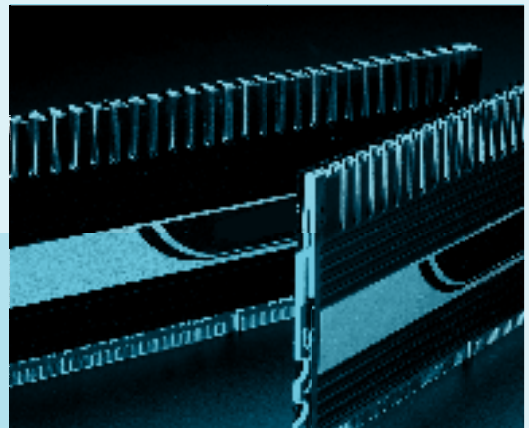
We don't always get it right with our tech preview, but you could call us Techradamus for last year's predictions regarding RAM: We said DDR3 would touch down in 2007—and no one would want it.

DDR3 is so unappealing right now that AMD doesn't have plans to adopt it until late 2008 or 2009 when it releases its new AM3 socket and CPUs that use DDR3 and DDR2 memory controllers.

The new RAM brings a lower voltage (1.5 volts versus DDR2's 1.8 volts), better termination, and the ability to prefetch eight bits of data instead of the four bits that DDR2 is capable of. The DIMMs are 240-pin

but are keyed differently than DDR2.

Our tests have shown that the new RAM features more theoretical bandwidth at the cost of greater latencies. Did we mention that it costs almost twice as much as DDR2? That's caused the expected dog pile, as reviewers have all pounded the new RAM standard as being pretty damned pointless. DDR3 does show promise, though. The new memory is being pushed to higher clock speeds sooner than anyone expected.



It's clear to us that DDR3 (which ranges in data rates from 800MHz to 1,600MHz) isn't a today technology or even a three-months-from-now technology. But give it six or eight months—think next summer or fall—and its clock speeds should finally make it appealing to enthusiasts.

# WINDOWS HOME SERVER

Kiss Windows 2000 goodbye. Microsoft's new Windows Home Server software looks poised to deliver some lust-worthy features for power users

**W**e all do it: Install a giant hard drive or three inside last year's gaming machine, load it with a copy of Linux or Windows 2000, then toss it in a closet to act as a home server. It's a way to recycle old hardware and deliver added value to everyone in our homes by allowing us to share all our data—music, videos, and photos, etc.

Microsoft's new Windows Home Server will do everything a plain-old PC with some file shares on it will, but also a whole lot more by adding roaming profile support for all your Windows PCs, sharing your media files across all the machines on your network, and

even providing an automatic backup service for the client machines on your network. By spinning enterprise-type features into a more home-friendly package, we think Microsoft might have built a real winner with WHS.

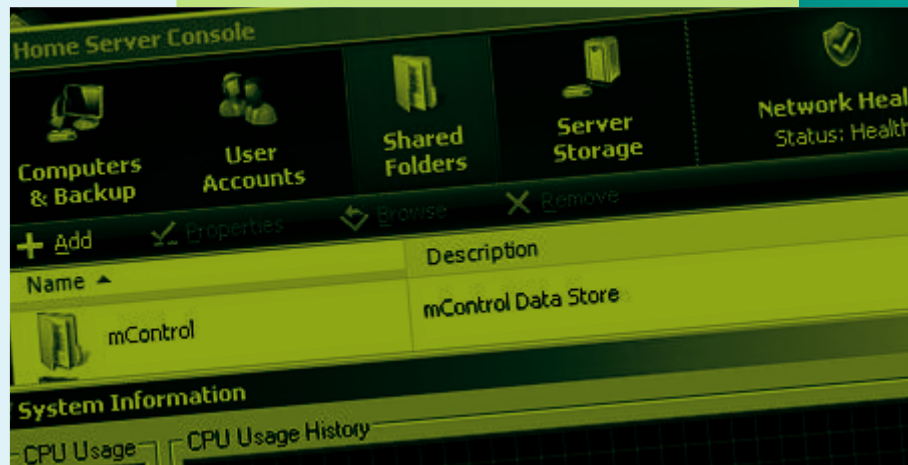
Stand-alone pricing hasn't been announced yet, but Home Server will be available in OEM-type packaging from whitebox retailers, as well

as on preconfigured machines from manufacturers such as HP.

Here's a closer look at its highlights.

## SHARED FOLDERS

The biggest benefit Windows Home Server offers hardcore mediaphiles is simplified sharing, which seems to bypass the artificial restrictions Microsoft added to Windows Media Player and Media Center that limited your ability to copy or stream even unprotected media within your home.



It's a little unclear how the server will play with DRM'd files—like legally downloaded music or videos recorded by Windows Media Center machines. But having one unified music and photo library will be a major convenience for folks with large collections.

## THE STORAGE CLOUD

The Windows Home Server Storage app lets you configure your drives in a much more flexible manner than any version of Windows has to date. Unlike traditional Windows configs, in which each drive is a stand-alone data bucket, Home Server lets you add multiple drives to your server to create one large volume. While this feature has been present in Windows's enterprise products, it hasn't been available to the home set and certainly not in such an easy to use package.

It works like this: You create file shares (or use the default ones for music, photos, videos, and software) and assign permissions for them. Then, when you start running low on space, simply add a new drive (internal or external) to Server Storage, and Windows will automatically distribute your data across both drives. If your server has multiple hard drives, you

can enable redundancy on a per-folder basis. And when it's time to replace a smaller drive with something bigger, you can run a simple wizard that will migrate your data off the old drive and onto the other drives in the volume. It's an extremely slick setup that should make data migration very easy.

## BACKUP

No one likes backing up a machine. It's a big hassle, and it takes a long time. But WHS promises to replace your backup drive with automatic backups of your client PCs. The backups are smart, too; the software will only back up files that haven't been backed up before. So if you have the same 2GB movie file on multiple machines, Home Server will only make a single backup copy of that file, conserving your disk space for other uses.

Of course, backing up is just half the story. You can browse backups to restore individual files or boot from the recovery CD and pull the latest nightly backup from the server if you want to restore the entire machine.

All you have to do to enable automatic daily backups for all the rigs in your home is install the Home Server Connector software on each machine. Voila!



### ZOOM H2 HANDY RECORDER

If you grew up wishing you were *Star Wars* sound designer Ben Burtt, you need Zoom's ass-kicking yet affordable surround sound digital field recorder. Capable of recording WAV files with resolution up to 24-bit/96KHz (MP3 is also supported), the H2 uses four condenser microphone capsules to record surround sound or stereo. With SDHC support, this is the ultimate portable recording device. \$200, [www.samsontech.com](http://www.samsontech.com)



### COLORWARE CUSTOM PAINT JOBS

By now, there's nothing new or wondrous about the iPhone in and of itself, but the fine folks at Colorware are more than happy to customize your shiny toy into a device that's totally unique to you. Mix and match from a palette of 29 different colors to create your own crazy color scheme. Instant popularity, check! \$150 and up, [www.colorwarepc.com](http://www.colorwarepc.com)

### LINE 6 POCKET POD

You. Your guitar. The Pocket POD. More than 300 preset sounds, plus 32 amp models. Plug in headphones, and it's a practice amp. A USB connection allows you to use bundled software to create custom effects on your PC. All for a street price of \$130? *Aw, hells yeah.* [www.line6.com](http://www.line6.com), \$180



MAXIMUM PC'S

# GIFTS *for* GEEKS

Forget the fruitcake. Nix the necktie. This year, get the tech-lover in your life what he or she *really* wants!

#### CELESTRON SKYSCOUT

For a gift that's truly out of this world, look no further than this celestial GPS. Point the lens of this camcorder-size device at any star or planet and you'll get a mini astronomy lesson—its name, significance, mythology, relation to other heavenly bodies, etc.—via text on the SkyScout's well-lit LCD screen or through its audio output. The Scout will also point you to the evening's highlights.

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

The holidays can be difficult for the tech savvy. After gleeful friends and family members open up their new rigs, video cameras, and media players, guess who is tasked with getting all these devices up and running? Be sure to reward the geek in your life with what he or she really wants. Forget about

the clip-on tie and choose from the following items—all of which are geek tested and approved!

BY THE MAXIMUM PC  
STAFF



### PAC-MAN SHOT GLASS SET

When you've consumed the last of your yuletide nog and are ready to move on to something stronger, keep the mood festive by imbibing from these Pac-Man shot glasses. Each of the six vessels has undergone rigorous benchmark testing in the Maximum PC Lab and is capable of safely transporting 1.5 ounces of fluid from bottle to mouth repeatedly without the need to reboot. \$30, [www.clubnamco.com](http://www.clubnamco.com)



### DINO-LITE AM-311S DIGITAL MICROSCOPE

Get up close and personal with all the objects on your desk using this USB microscope. The included software opens a window on your screen, where the object of the scope's focus is presented in minute detail—up to 250x magnification! Gaze in wonder, take close-up pics and video, and even create a schedule for time-lapse captures—just think, you can watch the microbes on your keyboard grow and multiply! \$200, [www.thinkgeek.com](http://www.thinkgeek.com)



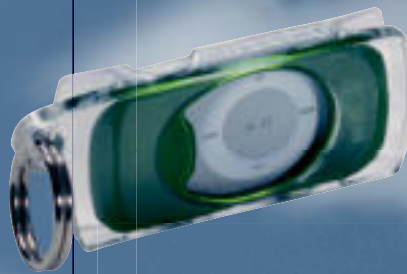
### STAR WARS MIMOBOT

Do away with that cheapo flash drive and transport your important data—and the power of the Force—in style with a Mimobot. Available in 1GB, 2GB, and 4GB versions, these limited-edition flash drives include *Star Wars* trailers, sounds, avatars, and wallpaper. In addition to Chewie, you can choose from Darth Vader, a storm-trooper, or R2-D2. \$70-\$130, [www.firebox.com](http://www.firebox.com)



### WOWWEE ALIVE ELVIS

No product brought more strife to our review process than this animatronic Elvis—yet, in the end, no other product so brought our staff together. After some initial reticence, the *Maximum PC* editors gathered around to listen and sing along with the King (dressed in his '68 Comeback Special leather jacket). He's sure to get a whole lot of shakin' going on at your next holiday party. \$350, [www.wowwee.com](http://www.wowwee.com)



### MOPHIE BEVY IPOD SHUFFLE CASE

The Mophie Bevy is the slickest iPod Shuffle case we've ever seen. You can wind your earbud cord around the grooves in its polycarbonate cover, which houses a stainless steel bottle opener—in your choice of five colors—for prying the cap off a frosty beverage. All that and a key chain too! \$15, [www.mophie.com](http://www.mophie.com)



### PRICKIE BUTTONS

This gift meets the needs of two distinct social cultures at once: hipster and geek. If you're the former, you'll love Prickie.com's plethora of emo-themed buttons, which include sad hand-drawn figures, broken hearts, and cute robots. And for the geeks? Get your videogame buttons here! \$3 per button, [www.prickie.com](http://www.prickie.com)



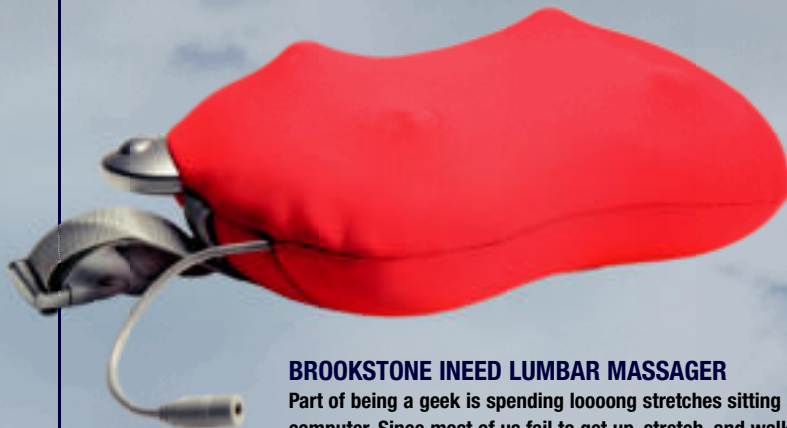
#### XANTREX XPOWER POWERPACK SOLAR 400

Give the survivalist in your life the gift of true preparedness—a backup power source with a built-in 10-amp-hour battery, augmented by a detachable 5-watt solar panel. This heavy-duty yet portable device sports two 120-volt AC outlets, one 12-volt DC socket, and one USB port, so you have multiple charging and powering options. A high-bright LED lamp on either end will see you clearly through any emergency. \$170, [www.xantrex.com](http://www.xantrex.com)



#### CTHULHU FANNY PACK

And lo, the *Maximum PC* editors fell to the ground and swore themselves over to Great Old One. They rejoiced at his coming, for he is now rendered immortal, ready to assume his Earthly rule in the form of a furry waist pack that's filled with horrifically geeky contents. *Ph'nglui mglw'nafh Cthulhu Fanny wgah'nagl fhtagn!* \$25, [www.toyvault.com](http://www.toyvault.com)



#### BROOKSTONE INEED LUMBAR MASSAGER

Part of being a geek is spending loooong stretches sitting at a computer. Since most of us fail to get up, stretch, and walk about at regular intervals, this lumbar massager makes for a nice substitute. With it strapped to the back of your chair and plugged into an outlet, you can hit the button at any time to stimulate your poor, atrophied back muscles. \$60, [www.brookstone.com](http://www.brookstone.com)



#### GENIUS PF-A01 DIGITAL PHOTO FRAME

Make sure your PC-preoccupied geek remembers what you and the rest of the family look like by planting this digital picture frame on his desk. Genius's 10.4-inch LCD can display videos and slideshows (with optional MP3 soundtracks), is equipped with a built-in memory-card reader, and will act as a USB host. \$170, [www.geniusnetusa.com](http://www.geniusnetusa.com)



#### POV.1 VIDEO CAMERA

If you want to record your forays into mountain biking, snowboarding, or driving, the POV.1 video camera is your go-to device. Video of up to 720x480 is recorded to an SD card and the included editing software makes quick work of putting together your feature. We only wish a certain editor had used one to record a first-person view of this: <http://tinyurl.com/yshyd2>. \$850, [www.viosport.com](http://www.viosport.com)



### STAR WARS LIMITED EDITION CANVAS PRINTS

We'll be the first to admit that we don't know Miro from Mondrian, but we know what we like, and when it comes to home décor, nothing beats a photo-realistic depiction of the Battle of Endor. Four other *Star Wars* motifs are also available—alas, not one of them is Princess Leia and Jabba. \$100-\$160, [www.firebox.com](http://www.firebox.com)



### IROBOT CREATE

Face it, everyone wants a robot buddy. Whether it's to fetch beers during the game or hunt your enemies for sport, a robot can fulfill a lot of personal fantasies. iRobot's Create kit gives you the foundation to build your own custom manservant. With a basic drivetrain and a ton of sensors, controllers, and motors, the Create can be programmed using C or C++ and then made to do your bidding. \$180 (with command package), [www.irobot.com](http://www.irobot.com)



### SPY DISC SHOOTER

The world's a dangerous place; be sure to protect yourself with only the finest of spy gear. This foam-disc-shooting weapon will keep pesky kids—and coworkers—at arm's length. Should you need to further increase your defensive capabilities, check out the company's wireless missile defense system as well. \$13, [www.shopwildplanet.com](http://www.shopwildplanet.com)



### SKY CHALLENGER PICOZ BATTLE PACK

What's better than RC helicopters? How about helicopters with freakin' lasers (see page 76 for more laser info). After engaging in several hours of dogfights, in which Styrofoam angels of death swooped through the sky and then plummeted to Earth as they took direct hits, we finally locked up these copters so we could finish this issue. \$80, [www.firebox.com](http://www.firebox.com)



### PB PC REPAIR KIT

As Chief Engineer Scott used to say, "Use the right tool for the right job, laddie!" PB Swiss Tool's PC Repair Kit includes the right tool for just about any job involving a PC. And you don't have to worry about sub-standard metallurgy bungling up screws. These tools are, after all, Swiss-made. With a lifetime guarantee, this surprisingly affordable collection could be the last repair kit you'll ever own. \$70, [www.pbbaumann.com](http://www.pbbaumann.com)

# GIFTS for GEEKS



## SUREFIRE M6 GUARDIAN

Call it the big daddy of flashlights—as one peep at this torch's 500-lumen output (12 times that of a flashlight with two D cells) will convince you that it doesn't get any brighter than this. Powerful enough to illuminate the dead of night, blind an intruder, or signal an alien spacecraft, this is the choice of the true flashlight aficionado.

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



## USB HUMPING DOG

Need someone who can show you a bit of can-do attitude? Someone who doesn't know the meaning of the word quit? You need a USB-powered Humping Dog. The device serves no useful purpose—it merely does what dogs do, it humps. Yet, as it works its mojo on your keyboard, it will instill in you the desire to carry on and complete the mindless set of tasks your boss has put before you.

\$35 for set of three breeds, <http://shop.digitalworldtokyo.com>



## ROCK BAND

We don't normally promote console games, but the awesomeness of Rock Band makes it a must-have for anyone who's ever dreamed of headlining their own rock and roll circus. With four different parts in every song—guitar, vocals, bass, and drums—and 40 outstanding tracks, this game cranks it all the way to 11. ESRB: T

\$60-\$200, depending on accessories, [www.rockband.com](http://www.rockband.com)



Behold, our sleepy geek has arisen and now, with the addition of his Pac-Man Plush Head (\$30, [www.clubnamco.com](http://www.clubnamco.com)) and Cthulhu fanny pack, he's ready to strut his stuff as the coolest geek on the block! **MPC**

# HD CAMCOR FINALLY ARRIVE

For less than \$1,500, crystal-clear high-def video is yours for the making! We test and compare five new HD camcorders—learn which one's right for you

BY CHARLIE WHITE

**W**hen you brought home that shiny, new HDTV, your jaw promptly dropped at the first sight of its wondrous, super-sharp video. Wouldn't it be great to shoot a boatload of that footage yourself? Well, what's stopping you?

In just the past few months, the high-definition camcorder world has changed. HD camcorders are actually priced within reason, making the prospect of owning one mighty tempting. Sure, prices have plummeted, but is it a good time to buy? Yes. Especially, if you like the idea of watching your footage by plugging that camcorder into your HDTV's HDMI port and then controlling the playback with a bundled mini-remote—a staple accoutrement. You can even do some rudimentary editing within disk-based camcorders, making playlists and arranging your footage nonsequentially and then feeding your work directly into that HDTV. Neat.



PANASONIC HDC-SX5

If you want to transfer the camera's footage to your PC, edit it, add effects, and then turn out your own masterpiece, that's getting to be an easier experience, too. But it takes some major multicore processing—even our quad-core test machine strained under all the data-crunching these highly compressed files require. That's because the majority of HDTV camcorder purveyors have embraced a new compression format



# DEERS



SONY HANDYCAM HDR-SR7



JVC G7-HD7 EVERIO



PANASONIC HDC-SD1



CANON HV20



# HD CAMCORDERS FINALLY ARRIVE

called AVCHD (Advanced Video Compression, High Definition), using an H.264 MPEG-4 format similar to the one used on Blu-ray discs.

The advantage of that AVCHD format? It can squeeze gigantic HDTV video data into files small enough to fit on a 60GB hard drive, an 8GB flash card, or even a 3-inch DVD, and then you can burn the footage onto DVDs that will play back in newer Blu-ray players. Software such as Pinnacle Studio Plus 11, Ulead VideoStudio 11 Plus, Apple iMovie 08, and Vegas Movie Studio Platinum has been tuned to handle HD content in the new format.

Beginning to see the picture? You will, indeed, once you read our reviews of five leading high-

def camcorders priced below \$1,500. The hardest task for us was trying to contain our astonishment at the stunning clarity of the video these babies cranked out. Every one of these camcorders shoots video that's so crystal clear it's downright shocking, but they record video to several different types of media. To help you decide which one is for you, we'll first show you what to look for when buying an HD camcorder. Then we'll give you the nitty-gritty on the real-world performance of the five camcorders we tested and point out the differences among them that exist behind their razor-sharp HD glow.

## Buyers Guide

There are different approaches to getting that lovely HD footage from lens to screen. Know the options you'll be faced with

### COMFORT

You want a camcorder to fit you like a glove. Most of these HD shooters are remarkably small—slightly longer than the width of the average hand—but each feels quite different to hold and control. Everyone's hands are different; some camcorders fit our hands



perfectly, while others felt awkward and difficult to use. Be sure to actually lay your paws on the camcorders you are interested in before you buy.

### INTERFACE

First, do you have an HDTV? If not, you might want to pick up one before you get an HD camcorder because your footage will be overkill for that standard-def set you're watching now. Plus, all these camcorders have an HDMI output, making it easy to plug them into a new TV and watch your footage right away. FireWire and USB ports are available for you to transfer the cam's video to a PC.

### FORMATS

**HDV TAPE:** This is the most seasoned HDTV camcorder format for consumers, using MPEG-2 compression with the highest data rate (25Mb/s), and therefore, producing the best overall picture. But there's a problem: All those zeros and ones have to go somewhere, and with this format, footage is stored on that same old-timey miniDV tape used by its DV camcorder forebears. The upside is that there is a plethora of robust editing software available for HDV, making it the best choice for those with a penchant for the cutting room.

**FLASH DRIVE:** It's hard to believe you can fit 40 minutes of HDV on a 4GB flash card (or 80 minutes on an 8GB card), but that's the miracle of AVCHD compression, and using a tiny memory card makes cameras that use this tech a whole lot smaller, too.

**HARD DRIVE:** Packing 1.8-inch 60GB drives, most of these babies record in the new AVCHD format, laying down footage that looks almost as good as HDV, but all that drive space can amount to unwieldy files that truly require a maximum PC to edit.

**DVD:** You're recording that same AVCHD data onto a DVD, which does seem a bit old-fashioned but offers a convenience: Its AVCHD format lets you play that DVD back in most newer Blu-ray players.

### STILL SHOTS

You can shoot stills with all the HDTV camcorders we tested, but it seems like an afterthought—the shots don't approach the kind of quality you get with stand-alone digital still cameras. If you're serious about shooting stills, get yourself a decent still camera; most can also shoot standard-definition video that's perfect for YouTube.

# HD CAMCORDERS FINALLY ARRIVE

## CANON HV20 HDV CAMCORDER

Old-school HDV shines and stumbles at the same time If you don't

mind dealing with miniDV tape, the Canon HV20 is a fine choice. However, we prefer having nonlinear random access to shots, rather than rolling through an anachronistic tape to find a shot. We also don't care for the cheap, plastic feel of this unit or its "advanced accessory shoe" cover that pops off with little provocation. But the HV20's HDV format is a lot easier to edit, with that same familiar, comfortable workflow you get with DV tape: Capture clips on the PC via a FireWire port and then you're off and editing without a lot of annoying steps in between.

We especially like the way Canon includes features normally reserved for pros, such as a 24p frame rate that can be combined with the camera's CineLook setting in order to almost mimic film's slower frame rate and slightly diffuse look. But the

star of the show is the video—the HV20 produced the most buttah-smooth video of any camera in the bunch. While colors weren't as saturated as those produced by other cameras, they were more realistic, and the camera's silky yet sharp-looking video had fewer of the compression artifacts we saw with AVCHD. In bright light, its images were the most crisp and vivid of the bunch. In low light, there were a few artifacts, and other cameras were superior in this area. If only it had the convenience of flash-drive storage and better ergonomics, this would be the camcorder to beat.

### SPECS

VIDEO SIGNAL	1080i
RECORDING FORMAT/MEDIUM/HIGHEST DATA RATE	HDV and DV/miniDV tape/25Mbps
IMAGE SENSOR	One 1/2.7" CMOS
LENS	Canon f/1.8 - f/3.0, 10x optical zoom
SIZE/WEIGHT W/BATTERY	3.5" x 3.2" x 5.4"/21oz
VIEWSCREEN	2.7" (211K pixels), fixed viewfinder



HDV tape makes the HV20 a bit bulbous compared to other cameras, but it still gets the job done.



We like the transport controls located just below the viewscreen, but the start-stop button and too-small zoom lever are awkwardly placed.

CANON HV20 HDV  
\$950, [www.usa.canon.com](http://www.usa.canon.com)

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## JVC G7-HD7 EVERIO HARD DRIVE CAMCORDER

Feels great in your hand; not the best on the screen

With its stylish square lens hood and beautiful design, the HD7 just begs you to pick it up and start shooting. We especially like its focus ring (it's just like what's on pro lenses), which you can use to manually focus the lens. However, we don't much care for the lens cover that makes you shift a lever to move it out of the way. Nor were we impressed with its optical image stabilization, which didn't seem to do much of anything. We also didn't care for the break in the audio between each shot when we played back output via HDMI on our HDTV.

While this camcorder can shoot full 1920x1080i HD, its footage didn't look as good as the video from any of the other cameras we tested. That said, this camera's video still looked nice, and it was especially clean when scenes were bathed in bright outdoor light. But in medium light, there was noticeable noise in

the shadows, and when we moved the camera or framed up moving objects, there were slight motion artifacts. Worse, even when manually white balancing, colors looked artificial to us, and the camera didn't have enough contrast latitude, so bright objects looked blown out if there was any darkness in a scene. While its "Full HD" 1920x1080i setting uses a proprietary variable bitrate MPEG-2, if you shoot in its 1440 HD constant bitrate mode, its files are compatible with HDV editors—making it easy to edit output. In our tests, we couldn't see any difference between the 1920x1080i "Full HD" setting and 1440x1080i HD settings, making us prefer the more-compatible 1440 mode.

### SPECS

VIDEO SIGNAL	1080i, with 1920x1080i "Full HD" setting
RECORDING FORMAT/MEDIUM/HIGHEST DATA RATE	MPEG-2 TS/1.8" hard disk drive/27Mbps
IMAGE SENSOR	Three 1/5" CCDs
LENS	Fujinon f/1.8-f/1.9, 10x optical zoom
SIZE/WEIGHT W/BATTERY	3.63" x 3.06" x 7.37"/26.4oz
VIEWSCREEN	2.8" (207K pixels), fixed viewfinder



The G7-HD7 is by far the coolest-looking camcorder in the group.



There are lots of buttons on this baby, and we prefer its joystick navigation to any touch screen.

JVC G7-HD7 EVERIO  
\$1,500, <http://camcorder.jvc.com>

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# HD CAMCORDERS FINALLY ARRIVE

## PANASONIC HDC-SX5

Record on disc or flash card—your choice

Here's the most versatile camcorder of the bunch, letting you record 28 minutes of its best-quality video per 3-inch DVD. If you don't feel like dealing with discs, you can cram 80 minutes of HD footage on an 8GB SDHC flash memory card instead. If you do record to a DVD, you can pop that disc into a compatible Blu-ray player (our Sony BDP S-300 played the disc perfectly) or play the disc back directly from the camera. But the DVD format has its drawbacks—it's slow to read when you turn on the camera, taking seven seconds from a cold start. And once you're done shooting, unless you're using DVD-RAM, you'll need to finalize the disk before you can read any of the files on the computer or play them back, which takes about five minutes for each minute of footage shot.

We like the three-second preroll function that records the previous three

seconds before you push the record button when you're using an SDHC flash memory card. In bright light, this sucker cranked out images with astonishing clarity, splashing well-saturated colors all over the screen with nary a motion artifact. However, some high-contrast shots proved a challenge for the SX5, blowing out the whites while keeping the darkest objects in the frame hidden in obscurity. In medium-intensity lighting, such as indoors on a cloudy day, some mottling was visible in darker areas. These weaknesses aside, the overall quality of the SX5's video was outstanding.

SPECS	
VIDEO SIGNAL	1080i
RECORDING FORMAT/MEDIUM/HIGHEST DATA RATE	AVCHD (MPEG-4 H.264)/3" drive or SD/SDHC flash memory card/13Mbps
IMAGE SENSOR	Three 1/6" CCDs
LENS	Leica Dicomar, f/1.8, 10x optical zoom
SIZE/WEIGHT W/BATTERY	3.3" x 3.7" x 6"/19.05oz
VIEWSCREEN	2.7" (300K pixels), retracting viewfinder



**That bulge on the side gives you a love handle to grab onto.**



**The SX5 feels great in the hand, with all controls nestled in the proper place. If only that selector knob were easier to operate.**

PANASONIC HDC-SX5

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\$900, [www.panasonic.com](http://www.panasonic.com)

## SONY HANDYCAM HDR-SR7 HARD DRIVE CAMCORDER

Quality build, stylish looks, slight flaws

This Handycam felt rock solid and provided the best optical image stabilization. Its stop/start button is in the perfect place, but the zoom control is positioned right where your middle finger rests—bad idea. We like the “easy” mode, which, with the push of a button, takes care of exposure and focus for most situations.

The SR7's stop button seemed to be on a half-second delay, resulting in swish pans at the end of a few shots—an annoyance we got used to after a while. Another annoyance is the cam's use of a hard-to-find mini HDMI connector instead of the full-size HDMI port found on the other camcorders.

Getting past that, the camcord-

er's performance with our video test shots was strong, with brightly lit situations displaying lifelike color and tack-sharp resolution. It did well with low and medium room light, too, and showed us the best contrast ratio of this roundup. Points of candlelight in our low-light test revealed a warm glow, rather than the noticeable streaking we encountered with the Panasonic and JVC camcorders. Except for a few slight motion artifacts that seem common to AVCHD, we liked its video quality a lot.

SPECS	
VIDEO SIGNAL	1080i
RECORDING FORMAT/MEDIUM/HIGHEST DATA RATE	AVCHD (MPEG-4 H.264)/60GB hard drive, Memory Stick PRO Duo flash memory card/13Mbps
IMAGE SENSOR	One 1/2.9 (6.3mm) ClearVid CMOS
LENS	F/1.8-2.9, 10x optical zoom
SIZE/WEIGHT W/BATTERY	3" x 3.25" x 5.75"/21oz
VIEWSCREEN	2.7" touch panel (211K pixels), tilting viewfinder



**The HDR-SR7 includes a convenient docking station.**



**A touch screen, as opposed to the joystick all the other cams sport, makes navigation tedious and can leave your screen a greasy mess.**

SONY HDR-SR7

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\$1,400, [www.sonystyle.com](http://www.sonystyle.com)

# HD CAMCORDERS FINALLY ARRIVE

## PANASONIC HDC-SD1

More than just a pretty face

The HDC-SD1 was the smallest and lightest camcorder we tested, and the easiest one to use. It offers few buttons to confuse you and no viewfinder, but wait a minute—that's a frickin' 3-inch viewscreen, which seems huge compared to the others' 2.7-inches. And it's bright enough to show you its crispy video even on the sunniest of days. The zoom lever gives you just the right amount of speed right when you need it, and the navigational joystick is right there under your thumb. Its optical image stabilization holds those shots rock-solid unless you zoom all the way to 12x.

The most kick-ass characteristic of this cam is its awesome resolution, the sharpest of all the cameras we tested. But its low-light performance was a bit grainy, and its room-lit video revealed a few subtle noisy spots—nothing bad enough to fret over, however. In bright light, its

autofocus impressed us with its sprightly response. Its colors were nicely saturated with auto white balance, but the camera seemed to set the video slightly on the blue side. Colors appeared more realistic when we did a manual white balance by digging into the menus.

And to think, 40 minutes of crisp, clean video fits onto that tiny 4GB SDHC flash memory card at the camera's highest quality setting. The best news of all is the rock-bottom street price—we've seen this bauble selling for just north of \$800. Remarkable.

### SPECS

VIDEO SIGNAL	1080i
RECORDING FORMAT/MEDIUM/HIGHEST DATA RATE	AVCHD (MPEG-4 H.264)/Flash drive/13Mbps
IMAGE SENSOR	Three 1/4" CCDs
LENS	Leica Dicomar f/1.8-f/2.8, 12x optical zoom
SIZE/WEIGHT W/BATTERY	2.9" x 2.7" x 5.6"/17.28oz
VIEWSCREEN	3" screen (250K pixels), no optical viewfinder



The puny Panny is shaped and sized like a slimmed-down Red Bull can.



Less is more with that selector dial in the back and a start/stop button smartly placed in its center.

PANASONIC HDC-SD1

\$1,300, [www.panasonic.com](http://www.panasonic.com)



## Pretty as a Picture

For comparison, we captured a still from video taken with each camera using the same lighting, white balance, and focus



The Canon HV20's HDV format uses the less-compressed HDV MPEG-2 codec, giving its output less blockiness and noise.



JVC's G7-HD7's images had a noticeably lower resolution than all the others. Yes, this is as good as the focus gets, folks.



Panasonic's HDC-SX5 had the best resolution of the cameras we tested.



Sony's HDR-SR7 delivered the second-highest resolution of the cameras we tested.



The sharpness of Panasonic's HDC-SD1 bested all others.

**MPC**

# Become a Gaming God

Tired of spending most of your first-person-shooter game time as a corpse in a field? Check out these ways to improve your skills without wasting your time!



All right, newblet. You've eaten your dog food in *Wolfenstein 3D*, done your spirit quest in *Prey*, and even managed to set up a bomb or two in *Counter-Strike*. If first-person shooters were massively multiplayer role-playing games, that might qualify you to step out of the kindergarten zone. *Maybe*. The big leagues of head shots, m-m-m-monster kills, and first-person-shooter fragfests have no room for subpar playing performance.

Top players—including *PC Gamer's* very own Norm the Intern—all seem to have an innate talent for running-and-gunning. At least, that's the nice way to put it when you're on the receiving end of one of their rockets. But being awesome at shooters isn't just luck; follow our guide to becoming a better gamer, and you'll be on top of the leader board before you can say "pwnd."

BY DAVID MURPHY

## WHAT YOU NEED

- KEYBOARD
- MOUSE
- FIRST-PERSON-SHOOTER GAME
- THE SEVEN WORDS YOU CAN'T SAY ON TELEVISION

## I KNOW YOUR MAPS

The best first-person-shooter gamers spend just as much time researching as they do button-clicking. For even the twitchiest of reflexes is worthless on an unfamiliar map; you'll be riddled by railguns from every direction as you struggle to find even the most minimal of upgrades to your starting weapon. And in games like *Quake*, your opponents having quad-damage plus a knowledge of common spawning points

come with single-player bot modes. Fire up a one-on-one, set the computer to "bunny rabbit" difficulty, and resist the urge to spawn-camp your frustrations away on such an easy opponent. You're here to research, not eradicate.

So what are you trying to learn? Start by sauntering through the level to find the spawning points for the map's many weapons. You'll want to be able to get to your weapon of choice—newb-cannon rocket launcher, sniper rifle, or some other ingenious combination of death and destruction—from any position on the map (especially the spawn points).

That's just the beginning. In theory, you'll work your way up to creating actual routes. You'll be able to count the seconds between each power-up or weapon spawn. And you'll be constantly running a loop around all the major power-ups—health, armor, ammunition. Even if your game doesn't feature these goodies, you'll want to know all the possible chokepoints, so you can mount the best offensive with each spawn.

equals you minus your body parts—plus an explosion of fire and guts. What fun!

You don't have to get served up and down the battlefield to begin your most important of research tasks. After all, most multiplayer-themed shooters



The world's top *Quake* players know exactly when that quad-damage power-up is going to respawn. And once they have it, it's game over.

## 2 Know When to Wuss Out

If you're playing in a professional gaming setting, this tip is undoubtedly worthless. The second your opponent spots you, consider yourself three seconds away from corpsedom. But if you're playing an everyday match on the Interwebs, or even a match against some of your more talented friends, then you'll need to suck it up so you don't suck it down. Humility is an important part of the FPS experience.

What does that mean? Don't go charging off into battle with your starting weapon, even if your most hated of opponents just ran past the spawn point. You will die. If you're obviously outgunned in a firefight, don't keep

shooting. You will die. If you're facing off against a sniper who just head-shot two of your buddies in the face, don't run toward him. You will die.

Play smart. Turn tail. Run away, and perhaps you'll hit a teleporter and confuse your opponent. Or better yet, pull a Macaulay Culkin and set a trap—run through a doorway and immediately hug the wall on the right. Stay put, and if your opponent is stupid enough to just run straight ahead, you might be able to catch him with a quick shotgun blast to the face. Advantage: you.



**When trying to trap an opponent, make sure you're using a weapon that's going to get the job done. You're in for a ride on the pain train if you don't get the one shot, one kill.**

## 3 Gear Up

It's important to customize your hardware for the kind of gamer you are. That includes redoing your keyboard's keybindings to best facilitate your fragging experience. It'll add about 10 minutes to your prematch startup time, but the payoff is worth it. Swap the weapons you frequently use to buttons more accessible to your WSAD-style controls. And if you indeed rock with a gaming keyboard, then make sure you're using its extra input keys to their fullest potential.

If you can pick up a fancy gam-

ing mouse, do it—you might not see an increase in overall accuracy from higher DPIs, but you'll likely be able to switch your sensitivity on the fly. Need a little more machine-gun spray action? Kick the mouse up to a high sensitivity and let 'er rip. Camping spawn points in Facing Worlds? Lower your sensitivity and buzz the eyebrows off your oppo-



**Some keyboards come with fancy applications and feature a number of preset hotkeys. Use them as a base to save yourself some tweaking time!**

nents. Remember, reacting to an enemy is akin to raising the white flag; you want to anticipate your opponent's movements at all times.

## how2mini

### WAITING FOR A RESPAWN?

Here are some quick tips for your next round of gunplay

**300** Pick on the weak. That's right. We said it. If you're in a 15-player deathmatch and getting rocked by three or four people you can't compete against, stop fighting them. Find the guys you can utterly stomp on and hunt them mercilessly. They'll call you names and hate your very existence, but hey, you're on the top of the kill boards. They're just jealous.

**BE A PLANETEER** We might be speaking to deaf ears with this one, but hear us out. In team-based shooters like Counter-Strike and Shadowrun, you need to do just that: act like a team. Fun as it may be to entertain your dreams of becoming a virtual Rambo, it just isn't going to work. Like wolves, you need to hunt in groups—use each person's strengths to your advantage. And get on your headset!

**DANCE, MONKEY!** Standing still and shooting never works, but neither does jumping around like a chinchilla on speed. Create a dance—a few standard strafing/jumping moves that you're

familiar with, so you can always keep your mouse targeting trained on a player while you're moving in-game. Otherwise, you'll spend half the gunfight trying to react to your own dodging attempts instead of your opponent's.

**TALK LIKE YOU MEAN IT** Psychological warfare is every bit as important as good accuracy. So the next time you get that sweet head shot, feel free to let your fellow players know just how newb they are in your favorite combination of obscenities, epithets, and physical gestures. It works in every cartoon; it'll work in your first-person shooter. **MPC**



# Ask the Doctor

Diagnosing and curing your PC problems

## DYNAMIC DIFFICULTIES

*Recently, I installed a Maxtor 300GB hard drive. It seemed that a dynamic drive would be a good thing, so when the opportunity presented itself, I created a 300GB dynamic drive and installed Windows XP Pro on it. However, I did not intend to create a 300GB boot disk. How do I change the size of the dynamic drive?*

—Ralph Galinat

According to Microsoft, you can't resize a dynamic volume when it's the system or boot volume. Or rather, you can't do it with any version of Windows XP.

Windows Vista will allow you to resize any dynamic volume, regardless of whether it's a system volume or not. But purchasing Vista is a rather pricey fix if all you want to do is shrink or extend a volume. The Doctor knows of a good freeware solution, but it'll require a little bit of technological know-how. It's called GParted (<http://gparted.sourceforge.net>), and it's a Linux-based partition-management utility that loads off a LiveCD.

After you download the program, burn its .iso image to a CD. Once that's done, simply leave the CD in your drive and reboot your computer. If your motherboard doesn't give you a keyboard shortcut for a boot menu, you'll need to go into the BIOS and change the boot priority to CD-ROM before hard drive. GParted will fire up and you'll be able to tweak the sizes of your volumes until it hurts—easy as pie.

GParted doesn't come with any built-in help, so it would behoove you to back up your important data before mucking around with drive partitioning. If you're still apprehensive about the entire process, your other option is to pick up a copy of Norton's Partition Magic—it'll do the same thing as GParted for around \$50.

On a side note, dynamic drives in Windows are a poor man's RAID. If your motherboard supports RAID, you'll get faster speeds (and more options) by chaining drives together than any dynamic drive configuration could provide.

## I'M BURNIN' FOR YOU

*I have a homebuilt computer with the following components: an Intel Pentium 4 3.0GHz CPU, 2GB of RAM, an Asus P4S800D-X mobo, an ATI original*

*Radeon 64MB videocard, and a Lite-On SOHW 1633 DVD-RW drive.*

*When I go to fill a DVD-RW full of files (4.3GB or so), I pick maximum (16x) for the burn speed. However, the burns take almost an hour! Do you have any suggestions as to what I could do to speed up these burns? The files are mostly MP3s from 3MB to 6MB in size.*

—Dave Weinmann

The Doctor consulted with the ol' Optical Storage Technology Association for this one, which explained that a 4x DVD read/write speed translates to about a 5.28MB/s transfer rate. If you're packing 4.3GB onto a DVD, that equals about 13.9 minutes of time, which



**Windows Vista Enterprise and Ultimate will allow you to shrink or expand your dynamic drive partitions with ease.**

is nearly one-fourth of the 60-minute times you're reporting.

Now that the Doc's finished the math lesson, let's address your problem. He suspects that your computer is running your optical drive in PIO mode instead of DMA mode. The former stands for programmed input/output mode, and it's absurdly slow compared to the latter—direct memory access mode.

To switch to DMA mode, right-click the My Computer icon and select Properties. Then click the Hardware tab at the top of the System Properties window that pops

up. From there, you'll want to click Device Manager. When that window jumps to the forefront, click on the plus box to expand the IDE ATA/ATAPI Controllers listing. You'll now want to right-click each nested category, hit Properties, and scroll through the associated tabs. Look for any options that speak to a Transfer Mode or Current Transfer Mode. Undoubtedly, you will find that some are set to the PIO Only value. Change these to DMA, and you'll be set.

If you find that your write speeds are still slow or your OS doesn't exactly pick up on the changes as well as expected, you can try uninstalling and reinstalling the IDE channel. To do that, just right-click both your primary and secondary IDE channels and uninstall them. Restart your computer once you're done. Windows will refind the channels, and they should go to DMA mode by default.

## THE \_\_\_\_\_ HITS THE FAN!

*I just built my new rig, and it's great. There's one problem though. I put all my gear in an Antec P190 case, and I'm using an 8800 GTX videocard. The power cables coming off the card are millimeters from being in that huge 20cm fan on the side of my case. If any pressure is applied to the case door, the cables touch the blades and a nasty sound ensues. Is there a more malleable cable I can use?*

—Dieter Eggers

The Doctor suspects that you're using the thinnest power supply cabling possible, as opposed to chunky, hard-to-flex modular cable. Seeing as your cables just barely clear the fan, you might want to grab some cable ties and bundle the cables as close to the 8800 as you can—at the very least, you might be able to get them taut enough so that they'll always stay right up against the card and never move. Make sure the rest of the bundled cable is routed in such a way that the section near the card's PCI Express power connector will never move. **[MPS]**



When the Doctor was 17, he had a very good computer. A very good computer he ran with an OS called Windows XP. His rig's name was Brian McGee. All night it played nothing but Queen. When the Doctor was 17, if you need computer help, you should send an e-mail to [doctor@maximumpc.com](mailto:doctor@maximumpc.com).

# White Paper: How Lasers Function

The computer industry has tapped this exotic technology for a host of everyday applications. Sadly, no one has yet devised a means of equipping sharks with lasers beams.

BY GORD GOBLE

When science-fiction authors got wind of the concept of lasers, they immediately weaved the technology into their story lines as heinous instruments of interstellar destruction—not surprising, when you consider that the word “laser” is actually an acronym for “light amplification by stimulated emission of radiation.”

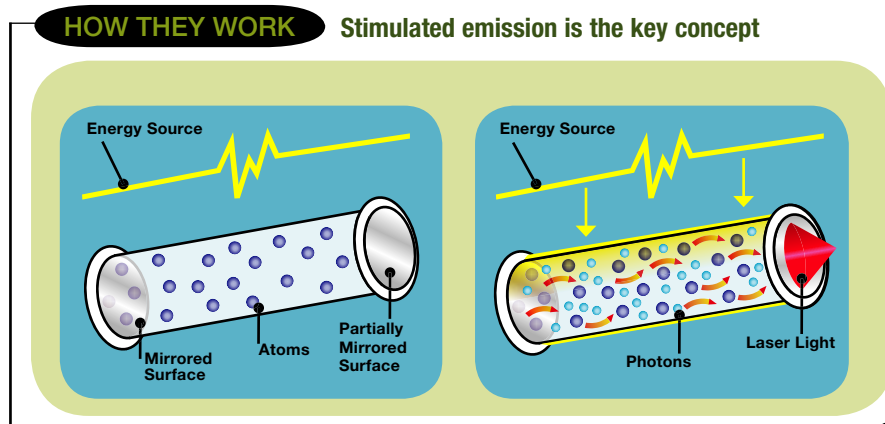
But as you sit in front of your PC, you’re likely to be in close proximity to several lasers, none of which is capable of setting paper on fire, much less blowing apart a spaceship. The same goes for those traveling shows that use such focused beams of light to create hallucinogenic displays to a soundtrack of Pink Floyd and Led Zeppelin.

Lasers today are the key technology behind CD, DVD, HD DVD, and Blu-ray players and burners. They create the images produced by laser printers, and they precisely track the movement of laser mice. How did a concentrated beam of light become so important to so many aspects of modern computer technology?

## UP AND ATOM

To understand lasers, we must start with the atom, which—as anyone with the slightest exposure to science education knows—is the basic component of just about everything in our known universe. The atom, however, can be broken down into even smaller elements; namely, neutrons and protons, which form the atom’s nucleus. Neutrons and protons exert a positive electrical charge, while a cloud of negatively charged electrons circulate around the outside of the nucleus.

Light—any type of light—is created when electrons are energized by an external source, such as electricity. Once that is accomplished,



Energy injected into a laser’s gain medium excites the atoms within it, causing the electrons circling those atoms to throw off particles known as photons. These photons exhibit the same wavelength and move in the same direction, resulting in a powerful, monochromatic beam of light.

the electrons move into a higher orbit around the atom, and the atom becomes unstable. This state is only temporary, however; the electrons soon return to their normal orbit, and this is when the good stuff happens. As the electrons return to a state of equilibrium, they release their excess energy in the form of particles called photons: light.

When the electrons inside the atoms of conventional light sources—such as incandescent light bulbs, fluorescent tubes, flashlights, and even the sun itself—are excited, they emit photons randomly. The “white” light generated by these sources contains a wide variety of incoherent rays of different wavelengths (wavelength being determined by the energy difference between the atom’s excited and relaxed states). The light is described as being white because it’s the sum of many different wavelengths. A laser device, on the other hand, is capable of compelling atoms to emit photons in a highly organized fashion.

## THE LIGHT FANTASTIC

The key concept behind laser light is stimulated emission. If the photon emitted by an atom encounters another atom with an electron in the same excited state, it can provoke that second atom to throw off a photon that exhibits the same wavelength and moves in the same direction.

A laser consists of a gain medium, which is a material with specific optical properties that render it capable of amplifying light of a specific wavelength. The gain medium is

housed in a cavity capped by a mirror at one end and a partially transparent mirror at the other. As energy (in the form of light, or in the case of the semiconductor lasers, electricity) is pumped into the gain medium (which can be a gas, liquid, or solid), it excites these electrons. The electrons then emit energy in the form of photons as they return to their relaxed state.

The photons then bounce back and forth between the two mirrors, repeatedly passing through the gain medium, exciting other electrons and stimulating the emission of even more photons. This cascading effect continues as long as energy is applied to the gain medium. Some of these photons escape through the partially transparent mirror, also known as an output coupler. Since all the escaped photons are of the same wavelength and are all traveling in the same direction, they form an intense, monochromatic, highly directional column of light: a laser beam.

## STORAGE APPLICATIONS

Semiconductor lasers are the most common type of laser; low-powered semiconductor lasers are used in the construction of everything from laser printers and optical drives to laser pointers and measuring devices. The semiconductor laser in a common CD-ROM drive emits light with a wavelength of 780 nanometers (very near infrared, which ranges from 750nm to 1mm) and is projected through a lens with a numerical aperture of 0.45. As a lens’ numerical aperture increases, so does its ability to create a focused spot of light.



# Gaming Mouse

We've autopsied mice before, but we were especially interested to see if there's anything inside a high-end gaming mouse that separates it from a more traditional mouse. Aside from a fancy-pants laser sensor, there wasn't much inside this rodent that's different from what's inside a typical beige OEM mouse.

The laser beam is directed at a spinning disc, which has a polycarbonate layer stamped with pits (surface areas without pits are called lands). The polycarbonate layer is backed by a reflective metal (aluminum, typically). As the disc spins beneath the laser, the light passes through the polycarbonate layer and bounces off the aluminum layer. Inside the drive, an optical pickup measures the difference between the pits and lands to create the binary ones and zeroes used to encode music, video, and other types of data.

DVDs pack more data into the same area by rendering the pits and lands smaller and closer together; DVD drives use lasers that emit light with a shorter wavelength, 650nm, projected through a lens with a higher numerical aperture: 0.65. The pits and lands on Blu-ray and HD DVD discs are even smaller and more tightly packed than those on DVDs—players that read these discs use blue lasers that emit light with a 405nm wavelength. One reason Blu-ray delivers more storage capacity than HD DVD, despite both using blue lasers, is that Blu-ray devices use a numerical aperture of 0.85, compared to HD DVD's 0.65.

## PRINTER APPLICATIONS

Next to optical drives, lasers are most commonly found in printers. And like optical drives, laser printers utilize lasers that emit light in wavelengths ranging from 650nm to 780nm (with higher-powered models using lasers with shorter wavelengths).

The laser is focused on a rotating drum inside the printer, which is coated with photoconductive material. The drum initially receives a positive electrical charge from either a charged roller or a corona wire. The laser then emits a pulse of light for each dot that is to be printed, which discharges that area of the drum. Once this pattern of dots is created for the entire image on the page, the printer coats the drum with positively charged toner. The toner "sticks" to the discharged areas of the drum and is repelled by the areas that remain positively charged.

A sheet of paper (which the corona wire has endowed with a negative charge) is then rolled over the drum. Since the negative charge on the paper is stronger than the one on the drum, the paper pulls the toner away from the drum. The paper then passes through a fuser, which melts the toner and bonds it with the fibers in the paper.

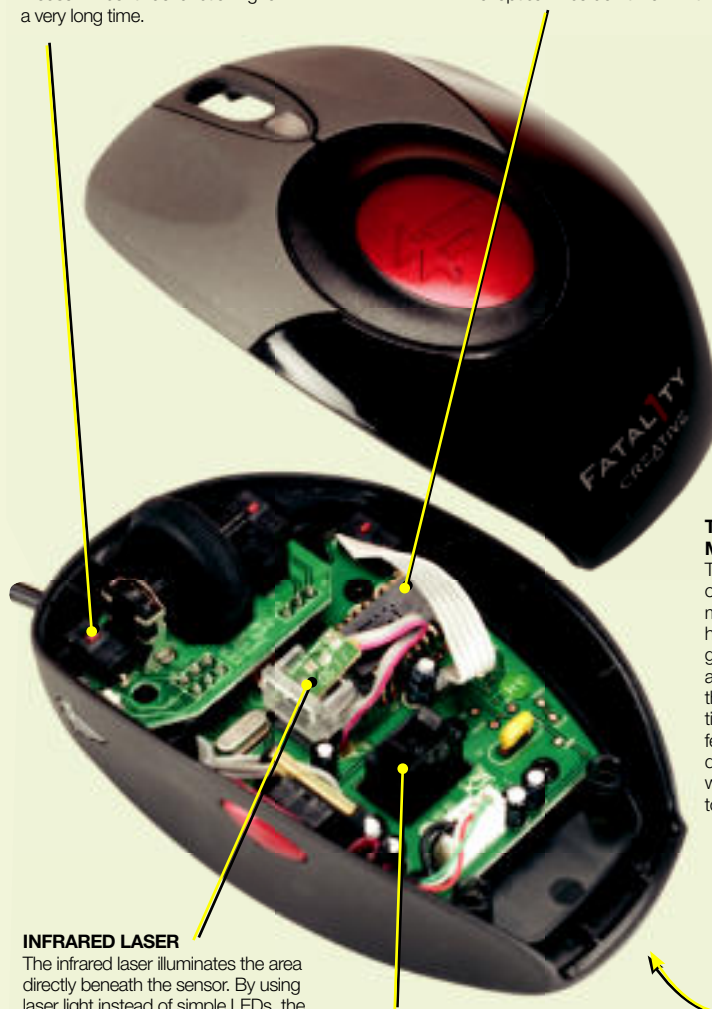
More powerful lasers may be capable of cutting through steel, and the Department of Defense has made no secret of its efforts to weaponize laser technology, but the vast majority of lasers are used in peaceful applications such as these. **MPC**

### BUTTON

Each button on the mouse's chassis is physically connected to a button housing just like this one. These buttons can stand up to repeated rapid clicking—ensuring that your mouse will continue functioning for a very long time.

### CMOS SENSOR

The secret of the laser mouse, this Agilent sensor detects minute changes in the surface beneath its camera at a rate of 5.8MP/s. This, combined with the laser that illuminates the area below the mouse, lets laser mice track on surfaces that normal optical mice don't work with.



### TEFLON MOUSE FEET

These superslick pads on the bottom of the mouse (not visible here) ensure that it will glide with ease across any surface. While they're not quite frictionless, good mouse feet make moving quickly effortless and will help you lay waste to your opponents.

### INFRARED LASER

The infrared laser illuminates the area directly beneath the sensor. By using laser light instead of simple LEDs, the mouse is more sensitive and works on reflective surfaces that would confound a traditional optical mouse.

### WEIGHT HARNESS

This particular mouse includes a top-mounted weight system, which allows you to adjust the mouse's mass. The weight cartridge clicks into this mount, letting you quickly and easily adjust the mouse's weight.

Any requests? What hardware—new or old—would you like to see go under *Maximum PC's* autopsy knife? Email your suggestions to [input@maximumpc.com](mailto:input@maximumpc.com).

DAVID MURPHY

## Explains Case Reviews



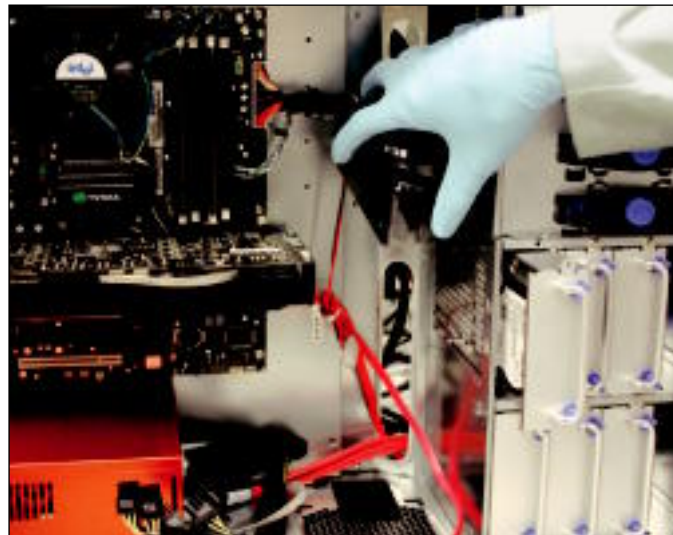
The ins and outs of determining a chassis' verdict

The art of testing cases at *Maximum PC* is a lot like the sword ceremony scene in *Kill Bill*. There's a lot of razzmatazz and showmanship at first, but in the end, a worthy case is treated with honor and delicacy as it's gently placed back in the Lab; wretched cases are also moved to the Lab... to be used as pedestals upon which we rest the worthy enclosures.

I'm being only a bit facetious when I say that because reviewing a case really does require delicacy. I start by giving a case's exterior a full inspection. Aesthetics play the smallest role in our overall verdict, but as our September 2007 review of Dynapower USA's Hachiman case illustrates, I do point out the look of a case when a vendor tries something new—or when an exterior is worthy of contempt (although I do recognize that one person's pile of garbage is another person's Pieta).

The real fun begins once I've popped off the side panel—and if that's not a pleasant experience, the chassis earns its first ding. Inside, I'm looking for elements such as screwless mounts that are easy to use but secure, convenient and accessible drive bays, and cooling potential. Mounting a motherboard in the case typically exposes any flaws in the overall design: We experienced this with an early version of Antec's Nine Hundred case, which didn't allow certain cables to be connected. (The problem was fixed prelaunch.)

I like to come at case reviews as if I'm a basic user, and in doing so, I ask myself a series of questions during the review process: Is the case difficult to work in? Is this case easy to manipulate and fill



**There are two primary case design styles: classic and over the top and gamer themed. Depending on your needs, even a 10 Kick Ass case might not be exactly what you're looking for.**

with components? Is there a better way to do what I'm doing? Do I need extra parts, tools, or products to complete my rig? And once the rig is built, are the provided cooling solutions too loud? Does the case adequately muffle my noisy components? Is its cooling sufficient? Does the case lack anything that would be necessary for me to build the perfect rig?

A case can have a lot of features and still have a horrible design. Conversely, a case can be a little skimpy with its add-ons—holes for water-cooling tubes and included tri-speed fans and LCD display panels—but still deliver an amazing experience for rig builders. Reviewing cases is part exact science, part surprise and delight.

Tom Edwards

## Delves into the Intricacies of Gift Guide Testing



And answers the question, How do you benchmark Pac-Man shot glasses?

Reviewing the gear that typically graces our pages is pretty straightforward: We run benchmarks, test in real-world conditions, and then determine where a given product fits in the spectrum of devices we've previously tested. That methodology, however, doesn't work when it comes to choosing what will be included in our annual gift guide. And while our normal protocols aren't followed, there is, indeed, a method to our gift-suggesting madness.

First, we include only items that would not normally appear in the magazine. Why? If you want to give your special someone an AM2 motherboard this holiday season, simply check out our

Best of the Best column; there, you'll find our top choices in the major categories we cover. The gift guide, instead, focuses on those items we think geeks will love but that fall out of the normal range of what you'll typically see in these pages.

Each editor is given free rein to select items he or she thinks will be geek must-haves this holiday, and through this process we learn a bit about the psyches of our fellow tech heads, whether it be that we have a budding Mr. Wizard calling in microscopes and star finders or someone with a yen for both sci-fi and world travel who thinks a Cthulhu fanny pack should be under every brainiac's tree this year.

Next up comes the testing phase, which causes our normally staid Lab to become a land of dogfights and karaoke sing-offs. We then narrow down our list, with each editor lobbying for his or her products (one editor, who shall remain nameless, is *still* trying to make us believe every geek would love a magnetic bracelet). In the end, we have strived to bring you the best gifts for geeks—and justify spending time at work flying laser-shooting helicopters.

# How We Test

Real-world benchmarks. Real-world results

Computer performance used to be measured with synthetic tests that had little or no bearing on real-world performance. Even worse, when hardware vendors started tailoring their drivers for these synthetic tests, the performance in actual games and applications sometimes dropped.

At *Maximum PC*, our mantra for testing has always been "real world." We use tests that reflect tasks power users perform every single day. With that in mind, here are the six benchmarks we use to test every system we review.

**SYSmark2004 SE:** This is an update of the SYSmark2004 benchmark, which uses a suite of such common applications as Microsoft Word, Excel, PowerPoint, Macromedia Dreamweaver, Flash, and Winzip to test general performance. It isn't heavy in multithreading, but it does feature multitasking tests.

**Adobe Premiere Pro 2.0:** We finally ditched our old standard-def Premiere test for one that uses high-def source material. The test is multithreaded, uses the GPU for transitions, and is brutal. It takes about an hour on our zero-point to render a short two-minute, 46-second benchmark movie in the program.

**Adobe Photoshop CS2:** We start with a RAW photo shot with a Canon EOS 20D, and apply a crapload of filters and other tasks from CS2 to see just how fast a rig can chew through the workload. Because we use every filter we can, the test is more fair and balanced than the usual cherry picking of Photoshop tests.

**Ahead Nero Recode 2.0:** Nero Recode 2.0 is one of the fastest video-transcoding utilities. We copy unencrypted VOB files to the hard drive, then convert the movie to an H.264 file formatted for the Apple iPod's screen. The version included with Nero 7.5, is the only multithreaded H.264 encoder we've found thus far and is optimized for dual-core CPUs.

**Quake 4:** Based on the Doom 3 engine, Quake 4 is a popular OpenGL game. We run our test at 1600x1200 with 4x antialiasing and 4x anisotropic filtering. Generally, more robust OpenGL drivers yield better performance. We use a custom timedemo recorded using the 1.2 patch, which supports Hyper-Threading and dual-core processors.

**FEAR:** Monolith's FEAR is a cutting-edge DirectX game that pushes PCs and graphics hardware to the limit. We run FEAR at 1600x1200 with soft shadows, physics, and audio acceleration enabled, using the 1.07 patch.

Our monthly category-by-category list of our favorite products. New products are in red.

## High-end videocard

XFX GeForce 8800 Ultra

## Midrange videocard

PowerColor HD HD2900 XT  
512MB DDR3

## Soundcard

Creative Labs X-Fi XtremeGamer  
Fatal1ty Pro Series

## Hard drive

Hitachi Deskstar 7K1000

## External backup drive

Western Digital My Book Pro II

## High-def burner

LG GGW-H10N

## DVD burner

Samsung SH-203B

## High-end LCD monitor

Dell 2707WFP

## Budget LCD monitor

Samsung SyncMaster 206BW

## Socket AM2 Athlon 64 mobo

Gigabyte GA-M59SLI-S5

## Socket 775 Core 2 Duo mobo

Asus Striker Extreme

## HD-based MP3 player

Apple iPod

## Flash-based MP3 player

SanDisk Sansa Connect 4GB

## 5.1 speakers

Gigaworks S750

## 2.0 speakers

Audioengine 5

## Midtower case

Antec Nine Hundred

## Full-tower case

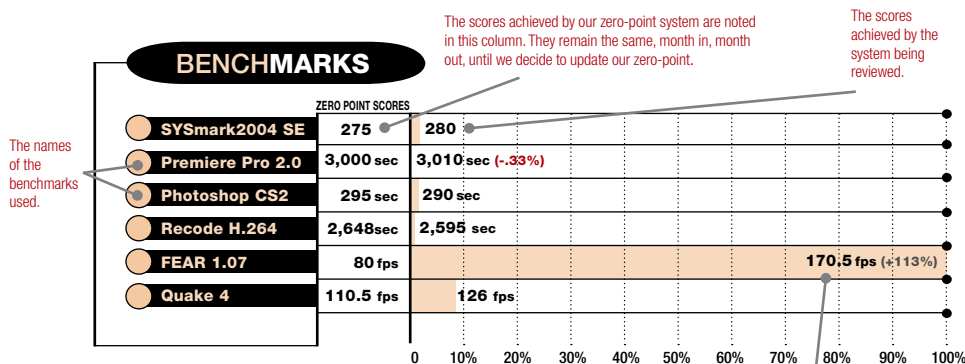
Cooler Master Cosmos

## Games we are playing

Peggle Extreme, Team Fortress 2,  
Quake III: Arena, BioShock,  
Guild Wars

## How to Read Our Benchmark Chart

*Maximum PC's* test beds double as zero-point systems, against which all review systems are compared. Here's how to read our benchmark chart.



Our current desktop test bed is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000KD hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.

Every month we remind readers of our key zero-point components.

The bar graph indicates how much faster the review system performed in respect to the zero-point system. If a system exceeds the zero-point performance by more than 100 percent, the graph will show a full-width bar and a plus sign.

# HP Blackbird 002

Vista clips this bird's wings

Label us Luddites for resisting Windows Vista, but there's no arguing the point that the new OS currently offers very little you can't get faster with Windows XP. That goes double for games, which is why we're baffled by HP's decision to run Vista Ultimate on the groundbreaking Blackbird 002 gaming rig it sent us.

We're equally surprised that HP sent us a machine it knew would blue-screen when going into suspend mode (and then leave it to us to discover this). Those two decisions are unfortunate because nearly every other facet of the Blackbird is utterly brilliant. Here's proof that HP's acquisition of VoodooPC was much more than an opportunistic move (by a company that many gamers dismiss as stodgily conservative and more appropriate for middle-aged newbs) to glom on to the cachet of a high-profile boutique PC vendor.

Actually, we'd argue that HP shed its old-fogey image months ago when it shipped the superbly designed TouchSmart IQ770 (reviewed April '07). Although that desktop system is also limited to Vista, the embedded 17-inch touch-screen LCD justifies the decision (and you wouldn't play games on it anyway).

The Blackbird is a different story. Although

HP tells us consumers will be able to order machines with either XP or Vista, we review rigs as they are sent to us. As for the blue-screen issue, HP says it'll have it fixed before you read this review.

Those issues aside, HP and Voodoo deserve high praise for building an exciting and innovative personal computer while using industry-standard parts for every key component. One glance at the all-aluminum case reveals that it's highly customized; nonetheless, it will accommodate any ATX motherboard and any standard power supply.

Swinging open the side access panel, which easily lifts off its smooth-as-silk hinges, reveals an Asus Striker Extreme motherboard. In a ballsy move, HP adjusted Nvidia's nForce 680i SLI BIOS to allow a pair of ATI Radeon HD 2900 XT cards to run in CrossFire mode—tweaking the noses of AMD and Nvidia in the process.

Each of the Radeons is outfitted with 1GB of DDR4 RAM and cooled by an Asetek LCLC liquid-cooling system. The LCLC also wicks heat away from the 3GHz Intel QX6850 (Core 2 Extreme quad core), which HP overclocked to 3.76GHz. You can order a Blackbird with an X-Fi soundcard and an Ageia PhysX card,

but our unit had neither (relying on Analog Devices's Integrated Digital SoundMax HD Audio for sound, installed on a riser card to escape electrical noise on the mobo).

The Topower Computer TOP-1100W DVT power supply is rated to deliver 1,100 watts (the 2900 XTs, you'll recall, are insatiable



The Blackbird has the best access panel we've ever seen on a PC, with a chrome-plated latch, slick hinges, and a foam-rubber gasket that dampens all vibration-induced noise.



Close this swing-out panel and its spring-steel strips will push installed PCI Express cards firmly into their slots.

## UNDER THE HOOD

### BRAINS

**CPU** Intel Core 2 Extreme QX6850 quad core (3GHz overclocked to 3.76GHz)

**MOBO** Asus Striker Extreme (Nvidia nForce 680i SLI)

**RAM** 2GB Corsair Dominator XMS2 DDR2 (800MHz overclocked to 1,066MHz)

**LAN** Dual Gigabit LAN (Nvidia)

**HARD DRIVES** Two 160GB Raptors (10,000rpm SATA) in RAID 0, one 750GB Seagate Barracuda 7200.10

**OPTICAL** Two TSST TS-T632L DVD burners

### BEAUTY

**VIDEOCARD** Two ATI Radeon HD 2900 XTs with 1GB GDDR4 memory in CrossFire

**SOUNDCARD** Analog Devices Integrated Digital SoundMax HD Audio

**CASE** HP Blackbird

**BOOT: 62 sec.      DOWN: 11 sec.**

## BENCHMARKS

	ZERO POINT SCORES		
<b>SYSmark2004 SE</b>	275	WNR	
<b>Premiere Pro 2.0</b>	3,000 sec		1,380 sec (+117%)
<b>Photoshop CS2</b>	295 sec		131 sec (+125%)
<b>Recode H.264</b>	2,648 sec	WNR	
<b>FEAR 1.07</b>	80 fps		130 fps (+38%)
<b>Quake 4</b>	110.5 fps	105.3 fps (-5%)	

Our current desktop test bed is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000K hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.



**Removing the Blackbird's access panel reveals beauty that's more than skin deep.**

power hogs). The PSU is mounted at the bottom of the case, which is elevated by a large aluminum foot to allow cool air to enter the case from the bottom as well as the sides. Cable management is simplified by modular power plugs, but there's more to it than that. The SATA cables for the hard drives, for example, are routed to a set of sockets mounted on an internal backplane. The drives are mounted on trays that slide into a rack and plug into this backplane.

Two vertically mounted slot-fed DVD burners are hidden inside the case's heatsink-like grill, with only LED-lit eject buttons revealing their presence. The case can accommodate a third (tray type) optical drive next to the other two. An equally well-disguised pop-up module on top of the case harbors a 15-in-1 media-

card reader, jacks for a headphone and mic, two USB ports, and a FireWire port.

We're excited about many of the Blackbird's innovations, but HP's decision to send us a Vista PC severely undermined the machine's gaming benchmark numbers (including a Quake 4 performance that was slower than our aging zero-point rig's). "What about DX10?" you ask. "Pretty much irrelevant for now," we say. And while we applaud the company's decision to enable CrossFire on an nForce motherboard, our experience has been that Nvidia's GeForce 8800 GTX and 8800 Ultra are both faster than the Radeon HD 2900 XT (although the GTX's edge evaporates when running Vista).

Buy this machine and you won't care which camp wins the next skirmish in the

GPU wars because you'll be covered either way—as rightly you should be. That's just one of the features that endow the Blackbird 002 with such potential for greatness. Yes, this PC deserves so much better than Vista.

—MICHAEL BROWN

**HP BLACKBIRD 002**

<span style="color: green;">+</span>	<p><b>RAVEN</b></p> <p>Awesome design using standard components; CrossFire running on nForce.</p>	<div style="background-color: orange; border-radius: 50%; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> <span style="font-size: 48px; color: white; font-weight: bold;">7</span> </div>
<span style="color: red;">-</span>	<p><b>CRAVEN</b></p> <p>Videocard driver crash bug; unimpressive gaming performance (due to Vista).</p>	

**\$5,500, [www.hp.com](http://www.hp.com)**

# Toshiba Portege R500

Two inches thick and a tad over two pounds—that's an itty-bitsy notebook!

When we first laid eyes on Toshiba's latest ultraportable, we were in awe of its crazy-thin, crazy-light profile. In the past, such notebooks sacrificed performance to fit into such tiny shells. To combat this performance sag, Toshiba paired its machine with Intel's new ultra-low-voltage Core 2 Duo.

We don't generally go for road warrior notebooks, but the R500 packs a whole lot of power into a diminutive body. With a 1.2GHz Core 2 Duo U7600 under the hood, there's plenty of power for day-to-day computing tasks. We wouldn't run intensive Photoshop scripts or edit video on this rig, but for web browsing, word processing, and spreadsheet use, it's plenty peppy.

Toshiba filled the R500 with loads of features. We love its full-size keyboard, 120GB hard disk (a 64GB solid-state drive is optional), and 12.1-inch 1280x800 widescreen display. But the best feature is the sunlight-friendly transfective nature of the display, which lets you disable the backlight when you have another bright source of light.

Most other transfective displays we've tested either don't do well outside or look terrible when you use them with a back-



**At just over three pounds (with the power brick) Toshiba's R500 delivers a ton of power in a tasty little package.**

light—but the R500's screen looks great in either scenario. And we're talking about a number of outdoor environments, ranging from direct sunlight to indirect sunlight in the back of a car. You wouldn't want to watch a movie outside on a sunny day, but the screen is perfect if you want to sneak off to the pool during a "work at home" day.

Battery life, courtesy of the ultra-low-voltage Intel processor was exemplary. With the backlight set to medium, the R500 survived for three hours and 17 minutes during our *JFK* movie-viewing test. With the backlight at its lowest setting and Wi-Fi disabled, we got more than five hours of actual runtime from this little guy.

Battery life is good, the screen looks great, and it's easy on your shoulder—what's not to love? While the R500's performance is praiseworthy for an ultraportable, this notebook PC simply isn't competitive against any machine with discrete graphics, even an ancient one. Of course, it's not reasonable to expect to replace your desktop with an ultraportable, but we'd like to see better 3D performance than what the integrated Intel 945GM can crank out; the R500 is as slow as molasses on a January morning—it's even too slow to run accelerated casual games like *Peggle*.

The chassis is also a tad flimsy. Pick up the notebook and the entire thing flexes. Lift it while a DVD is spinning, and you'll hear the lovely sound of the disc surface hitting the notebook and scratching the hell out of the disc.

But even with a few minor gotchas, the R500 is one amazing ultraportable notebook. For anyone who spends more time on the road than behind a desk, it's a perfect traveling companion.

—WILL SMITH

## UNDER THE HOOD

### BRAINS

<b>CPU</b>	Intel 1.2GHz Core 2 Duo U7600
<b>RAM</b>	1GB DDR2/667 (soldered to mobo)
<b>LAN</b>	802.11g/Gigabit
<b>HARD DRIVE</b>	120GB Toshiba MK1237GSX (5400 rpm)
<b>OPTICAL</b>	Matsushita DVD-RAM/DVD+-RW Dual Layer (UJ-844S)
<b>PORTS</b>	VGA, 3 USB, 1 FireWire, SD card reader, PC card, audio in/out

### BEAUTY

<b>VIDEOCARD</b>	Intel 945GM Express
<b>DISPLAY</b>	12.1-inch transfective (1280x800)
<b>SOUNDCARD</b>	Realtek HD Audio
<b>LAPTOP WEIGHT</b>	2lbs, 6oz
<b>CARRY WEIGHT</b>	3lbs, 1oz

**BOOT:** 28 sec.

**DOWN:** 3 sec.

## WHERE ARE THE BENCHMARKS?

As we went to press, a new version of MobileMark 2007 was released. Unfortunately, due to technical difficulties, we were unable to get reliable MobileMark 2007 results for this laptop or our zero-point system in time for this issue. We'll publish complete benchmarks online at [www.maximumpc.com/articles/toshiba-r500](http://www.maximumpc.com/articles/toshiba-r500) by the time you read this.

## TOSHIBA PORTEGE R500



### THIN MINTS

So, so tiny. Transfective screen rocks! Amazing battery life.



### WAFER-THIN MINTS

More flexible than we usually like our notebooks.



\$2,150, [www.toshiba.com](http://www.toshiba.com)

# Notebook Drive Throwdown

Solid state vs. spinning platters: What tech will win this grudge match?

We pit the highest-capacity notebook hard drive against the fastest notebook hard drive; then we throw both into a steel cage with what may very well be the fastest solid state drive on Earth. The results will shock you!

—GORDON MAH UNG

## MTRON MSD-S25032

An early 16GB SATA solid-state drive from Mtron wowed us, but that was just the beginning. The company's 32GB version of the drive slays all other contenders for the speed crown.

How fast is this bad boy? We put it up against a desktop Western Digital 150GB 10,000rpm Raptor for reference, and the 32GB Mtron MSD-S25032 flat-out smoked it. In fact, the only reason the MSD-S25032 isn't the fastest hard drive we've ever tested is because it's not a hard drive—it's a solid-state drive.

So it goes without saying that the other two drives reviewed here, the Seagate Momentus and the Western Digital Scorpio,

had no chance of touching the Mtron's benchmark scores. You can read the scores for yourself and weep for disk-based storage. Average read speeds of 138MB/s—equivalent to those of a striped RAID—and a .1-second access time put hard drives to shame.

The access time is no surprise, as this drive stores data in nonvolatile flash RAM instead of the magnetic platters of a hard drive. This greatly improves reliability since there are no moving parts to crash, no bearings to wear out, and no delay while waiting for the head to seek. To test the drive's durability, we repeatedly pounded it on a lab bench while we ran our benchmarks. That treatment would kill most hard drives, but the Mtron shrugged it off without even a performance dip.

In HD Tach, the Mtron's average read speeds of 138MB/s blazed past the 48MB/s achieved by the fastest notebook drive we've tested, Seagate's Momentus 7200.2. Even the desktop 10,000rpm Raptor (reviewed March 2006) can achieve only 92MB/s average read speeds. The MSD-S25032 produced similar results with HD Tune, achieving read speeds of 121MB/s.

We also used PCMark05's hard-drive suite to judge real-world workloads. PCMark05 uses trace patterns to simulate the read and write loads that a drive goes through when booting Windows XP or starting Microsoft Word, the Mozilla browser, Acrobat Reader 5, or virus scan workloads. The MSD-S25032 crushed all other hard drives in these tests. We saw a healthy boost in our Photoshop CS2 test, as well, but no major gains in hibernation time or XP boot times. Perhaps the bottleneck is the OS?

Unless our benchmarks are lying to us, the MSD-S25032 is the fastest notebook



Data pack rats, rejoice! Western Digital's Scorpio fits 250GB into a notebook HD.

drive available, achieving near RAID 0 performance with a single drive.

Despite the amazing performance, there's an obvious shortcoming. Let's face it, 32GB isn't much capacity today. And the speed comes at an exorbitant price. The MSD-S25032 costs a whopping \$2,000. (We're told by the U.S. distributor of the drive, DVNation.com, that it should be in the \$1,000 range very soon.)

Still, for those who need amazing durability and speed, the MSD-S25032 is a winner. Despite the sticker shock, with this kind of performance, we have no choice but to award Mtron's MSD-S25032 high honors.



Meet the Mtron MSD-S25032, aka the fastest notebook drive on the planet.

**MTRON MSD-S25032**

**+ ROCKY ERICKSON**  
By far, the best performance in a notebook drive; nothing to break.

**- ROCKY ROAD**  
Room for only the OS and one Blu-ray rip.

**MAXIMUM PC KICKASS**

**\$2,000, [www.dvnation.com](http://www.dvnation.com)**

## WESTERN DIGITAL WD2500BEVS SCORPIO

Western Digital has pulled off a significant coup with its 250GB Scorpio notebook hard drive; the device is the current capacity champion. (Fujitsu has also announced a 250GB drive but has not shipped it yet.) Packing 250GB into two platters, the areal density of the Scorpio easily outstrips that of the other hard drive reviewed here—Seagate's two-platter 160GB Momentus drive.

While 250GB isn't impressive next to 1TB desktop drives, it's more than enough to keep most notebook users happy. But to get that storage, you give up some performance. Though it didn't post terrible numbers, the 5,400rpm Scorpio lags behind the 7,200rpm Momentus. The Scorpio trailed Western Digital's drive by up to 22 percent in our benchmark tests. Access times were also off by 25 percent against the Momentus due to the Scorpio's spindle speeds.

Don't read this review as too negative though. The Scorpio isn't pokey, it's just that

the Momentus is faster and the Mtron is in an entirely different league. But if you crave maximum capacity from a notebook drive, the Scorpio has that, while offering decent performance as well.

## SEAGATE MOMENTUS 7200.2

Seagate wasn't the first to the 7,200rpm mark, but that hasn't stopped it from making the fastest hard drive around. The Momentus 7200.2 has a well-deserved reputation as the notebook hard-drive performance king. What you give up in space, you gain in speed—the Momentus easily eclipses the ginormous Western Digital Scorpio in read speed, access time, and all around zippiness. (Seagate has announced but not shipped a 200GB version of this drive.)

Although the Scorpio didn't lag too far behind in average reads, the drive's spindle speed kept its access time about 25 percent slower than the Momentus's. The Momentus also had a 22 percent advantage in PCMark05's application tests.

Certain Momentus models feature a G-Force Protection sensor that can tell if the drive is in free fall and



The Momentus's five-year warranty and speed make it king.

quickly park the heads to avoid damaging the drive. While the sexy-fast Mtron SSD will grab the spotlight, the majority of folks looking to upgrade their notebooks will reach for either the Western Digital or Seagate models.

We lean toward the Seagate Momentus because of its speed advantage and killer five-year warranty. Its free-fall sensor also makes us feel warm and fuzzy about data integrity and seals the deal.

### WESTERN DIGITAL SCORPIO

**+ DANIEL JOHNSTON**  
Provides enough space to rip all your Blu-ray movies.

**- DANIEL WEBSTER**  
Lags in performance; pathetic one-year warranty.

8

• \$220, [www.westerndigital.com](http://www.westerndigital.com)

### BENCHMARKS

	WD 250GB SCORPIO	SEAGATE 160GB MOMENTUS 7200.2	WD RAPTOR	MTRON MSD-S25032
HD TACH AVG. READ (MB/s)	45.5	48.4	75.4	<b>138.1</b>
HD TACH ACCESS (MS)	17.7	14.2	8.2	.1
HD TUNE AVG READ (MB/s)	43.6	49.2	70.9	<b>121.5</b>
HD TUNE ACCESS (MS)	17.9	14.7	8.3	.1
PCMARK05	3,997	4,874	7,266	<b>25,440</b>
PCM XP STARTUP (MB/s)	6.3	8.5	11.9	<b>85.5</b>
PCM APP LOADING (MB/s)	4.8	6.7	11.6	<b>70.2</b>
PCM GENERAL USAGE (MB/s)	3.8	5.2	9.6	<b>52.0</b>
PCM FILE WRITE (MB/s)	42.9	47.9	71.3	<b>104.2</b>
PHOTOSHOP CS2 (SEC)	4:43	4:46	N/A*	<b>4:05</b>
HIBERNATE (SEC)	<b>12</b>	13	N/A*	<b>12</b>
WAKE (SEC)	25	25	N/A*	<b>22</b>
BOOT (SEC)	57	58	N/A*	<b>48</b>

Best scores are bolded. We tested the hard drives using an Asus C90s notebook with a Core 2 Duo E6600, 2GB of RAM and Windows XP. \*The 3.5-inch desktop WD Raptor 150 would not fit inside of our notebook and could not be tested as a host drive.

### SEAGATE MOMENTUS

**+ HALF JAPANESE**  
Notebook hard-drive speed king; sweet warranty.

**- HALF NELSON**  
Needs capacity bump to stay competitive.

9

• \$190, [www.seagate.com](http://www.seagate.com)



# HIS Radeon HD 2600XT iSilencell

Silence can be deafening

We're so accustomed to noise in the Lab that we're often taken aback by its absence. We knew HIS's new Radeon HD 2600XT would be quiet, thanks to the factory-installed Zalman iSilencell, but it still surprised us.

The card's modest performance with 3D games (at very high resolutions) was no surprise at all. It came from the factory with a core clock speed of 800MHz and its 256MB of GDDR3 memory set to 700MHz (the GPU has a 128-bit memory interface). The 2600XT mustered just 20 frames per second with FEAR at 1920x1200 and only 27.7 frames per second with Quake 4.

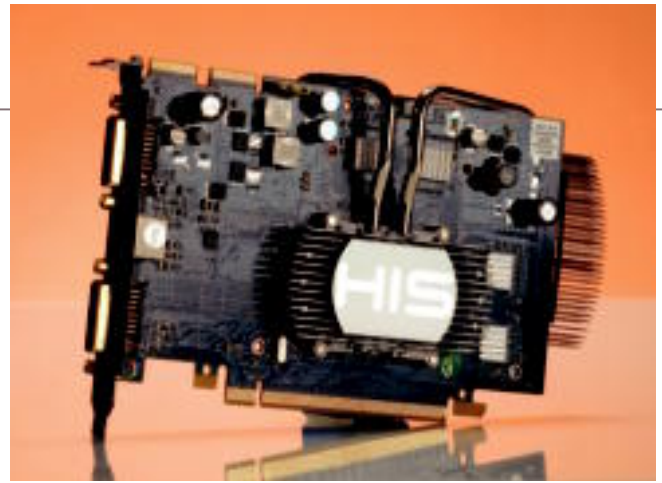
The HIS Radeon HD 2600XT's performance looked much better when we dropped our resolution demands to 1280x720, which might be all you need if you're plugging your home-theater rig into a big-screen TV or a video projector. Reducing the card's workload resulted in a doubling of performance on many of our tests.

## BENCHMARKS

	RADEON HD 2600XT (1920x1200)	RADEON HD 2600XT (1280x720)
3DMARK06 GAME 1 (FPS)	7.3	14.7
3DMARK06 GAME 2 (FPS)	7.1	14.5
QUAKE 4 (FPS)	27.7	53.6
FEAR (FPS)	10.5	18.8
SUPREME COMMANDER (FPS)	20	46

All benchmarks run with 4x AA and 8x aniso. FEAR tested with soft shadows on; Quake 4 tested in High Quality. Cards were installed in an Intel D975XBX2 motherboard with a 2.93GHz Intel Core 2 Extreme X6800 CPU and 2GB of Corsair DDR2 RAM.

Zalman's cooling apparatus consists of a heatsink, two heat pipes, and a large array of aluminum



Videocards using AMD's Radeon HD 2600XT deliver HDCP decryption on both DVI links. They also come with a built-in audio controller and a DVI-to-HDMI adapter.

fins on the back of the card. The extra hardware doubles the thickness of the card, compared to AMD's reference design, but you shouldn't have a problem fitting at least one inside a typical HTPC case. Incidentally, Zalman's device cools only the GPU; heat dissipates via individual heatsinks attached to each of the four memory modules.

The presence of AMD's ATI Avivo HD—a unified video decoder for Blu-ray and HD DVD playback—is another feature that renders this card more appropriate for home-theater use than straight-ahead gaming. This dedicated circuitry in the GPU offloads much of the video-decoding chores from the CPU (a feature that's curiously missing from AMD's top-shelf part, the Radeon HD 2900XT).

—MICHAEL BROWN

HIS RADEON HD 2600XT  
\$140, [www.hisdigital.com](http://www.hisdigital.com)

7

# SilverStone Temjin TJ10

Why didn't they call it the TJ09 Part 2?

The ongoing joke at *Maximum PC* is that SilverStone releases a new TJ series case but once a year. Like the arrival of Punxsutawney Phil, the Video Music Awards, and the Dream Machine, this glorious event is marked with celebrations and drunken revelry—only this time around, instead of booze, we're tipping back kegs of awesome. SilverStone's TJ10 case is a welcome addition to the company's strong dynasty of chassis. Like its father before it, the TJ10 is polished and almost perfect... almost.

We'd normally take this paragraph to gush over the TJ10's design, but we've already done that—just read December 2006's review of the TJ09 case. Functionally, the two are almost identical. The TJ10 differs in only one minor aspect—the large fan mount attached to the side of the hard drive bays is now notched, giving you a place to rest your extra-long graphics card. And that's all she wrote, folks.

Since we last looked at a SilverStone case of this magnitude, however, a number of vendors have devised features that surpass those in the 9 Kick Ass—scoring TJ09. For example, Cooler Master's Cosmos case redefined our notions of screwless with its handy door-removal mechanism and push-button locks for its 5.25-inch bays. Antec's P190 is the supply depot of cases, with its two included power supplies and five fans. And the Zalman FC-ZE1 case? It's a tank—a freakin' tank.

In a perfect world, SilverStone would have included some kind of rails—even dinky plastic ones—so users could mount hard drives and peripherals without screws. We also would love to have seen screwless holders for the PCI cards. Filling all of the bays with fans would have been



The TJ10 does a great job cooling your components, although including a fan near the hard drive bays would have been a welcome touch.

a pleasant touch that surely wouldn't have shot this \$300 case's price tag through the roof. And still, no eSATA on the front panel connectors?

The TJ10 is still a rockin' case, but old age has started to creep up on this old faithful. Perhaps we'll see some innovation come this time next year.

—DAVE MURPHY

SILVERSTONE TJ10  
\$300, [www.silverstonetek.com](http://www.silverstonetek.com)

8

## iZ3D 22-inch 3D LCD

Greater realism doesn't make for a realistic product

Over the years, 3D displays have periodically surfaced, but none has taken hold. The public just hasn't had the stomach for them. Cost has been one factor, but also, the stereoscopic imagery used to create a 3D effect tends to cause dizziness and nausea in users after even short periods. Nevertheless, vendors keep plugging away at the concept, hoping to capitalize on the growing number of games and movies produced in 3D.

In fact, iZ3D stakes its very existence on this concept. The brand-new company's only product is its 22-inch, 1680x1050 3D monitor. The display comprises two distinct panels, each of which connects to your videocard (two DVI ports and one VGA port are included). The back screen is a standard LCD, which displays all 2D content. The front screen is transparent; images on it are visible only when you wear polarized glasses—the display comes bundled with two pairs, as well as a clip-on set to wear over your prescription specs. The iZ3D driver you install renders content three dimensionally, creating both an image and its inversion, which come together when viewed through the glasses.

The iZ3D supports a number of popular titles (see [www.iz3d.com/games](http://www.iz3d.com/games))—we tested it with Far Cry and Call of Duty 2. In both instances, we found the 3D effect most pronounced when all the room lights were out. Hotkeys let you tweak the separation between the stereo images, but we found there was a very narrow gap at which images were comfortably viewable. The iZ3D seems more usable than other 3D monitors—although, we weren't convinced we would enjoy it for long periods.



If you're not crazy about the polarizing glasses that come with the iZ3D, you can buy one of the company's several other styles.

At least not enough to overlook some of the \$1,000 display's less appealing features. For 2D use, it has a washed-out appearance and poor vertical off-axis visibility—like all the 22-inch screens we've reviewed. The iZ3D also lacks ergo adjustments beyond forward and back tilt, and its only picture adjustment is brightness control. But the most amazing omission is this display's lack of HDCP support. How can a product aimed at enlivening entertainment leave out support for commercial high-def movies?

—KATHERINE STEVENSON

**iZ3D 22-INCH 3D LCD**  
\$1,000, [www.iz3d.com](http://www.iz3d.com)

**5**

## Hanns.G HG281DPB

Small player enters the big-screen desktop market

We hadn't even heard of Hanns.G until about five months ago, when we tested the company's HW223DPB. That 22-inch model's 6-bit color, bare-bones build, and lack of HDCP earned it just a 6 verdict in our August issue. But Hanns.G is clearly stepping it up a notch with its HG281DPB. The monitor's 27.5-inch screen and 1920x1200 resolution put it in a league with Dell's stellar 2707WFP, but for almost \$500 less—making us wonder if this is a bargain we should pounce on.

The HG281DPB has a slick aesthetic that should blend in well in entertainment setups—although the reflective black trim is prone to fingerprints. The screen tilts forward and back and swivels side-to-side but, unfortunately, cannot be raised or lowered. Interestingly, the display comes with an HDMI port (an included DVI-to-HDMI cable makes it compatible with any modern videocard) as well as VGA; an audio port is included, should you care to use the built-in speaker. The onscreen display menu offers all the options we'd expect, save for a picture-in-picture mode. In terms of build quality and flexibility it doesn't match Dell's 2707WFP, but it's acceptable.

The screen's performance is also acceptable. The HG281DPB was fairly adept at DisplayMate's obstacle course test patterns. Grayscale reproduction was smooth up to 256 steps, but the light end was a little blown out at 64 or more steps. We detected some evidence of this in high-res images featuring subtle transitions of lighter shades.

But in general, we were satisfied with the HG281DPB's handling of all



The HG281DPB's appearance doesn't betray its bargain price.

the content we threw at it. It has the HDCP support required to play commercial Blu-ray and HD DVD discs, and we didn't detect any motion artifacts in our game tests. We just wouldn't call the HG281DPB exceptional. In fact, next to Dell's 2707WFP, its picture really pales. The color-gamut boost in Dell's screen creates a more vivid picture that, along with all the other Dell extras—a media card reader, USB port, and adjustable stand, to name just a few—are what you will do without when you opt for Hanns.G's lower price point.

—KATHERINE STEVENSON

**HANNS.G HG281DPB**  
\$750, [www.hannsg.com](http://www.hannsg.com)

**8**

## Icy Dock MB664US-1S

The coolest external enclosure we've ever tested

Finally, somebody gets it right.

Although it seems impossible, we have reached an apex of technology in the exciting world of external storage. Icy Dock's MB664US-1S hard drive enclosure is an absolute dream come true. It's a marvel of functionality and form, a shining beacon that serves as an example to every competing product we've come across. It is the steel-colored Lancelot of your storage needs, the kind of friend you hope your hard drive keeps for the entirety of its life span. With the MB664US-1S, your data will stay safe, speedy, and easily swappable.

The MB664US-1S connects to your computer using either the nigh-antiquated USB protocol or fresh and speedy eSATA. Speeds for the two are just as fast as they could be. We tested the device using a 150GB Western Digital Raptor drive and found that the hard drive utterly fills the pipe. The MB664US-1S doesn't hamper performance in the slightest, as eSATA speeds were nearly identical to the figures we received when we connected the drive

directly to the motherboard. That's the kind of performance we like to see from an external enclosure.

But eSATA and USB are hardly new features for an external

### BENCHMARKS

	USB	ESATA	SATA
<b>BURST SPEED (MB/S)</b>	35.2	125.9	<b>132.2</b>
<b>AVERAGE READ (MB/S)</b>	33.0	<b>78.0</b>	77.8
<b>CPU USAGE</b>	9%	<b>1%</b>	4%
<b>RANDOM ACCESS (MS)</b>	8.2	8.0	<b>7.7</b>

Best scores are bolded. HD Tach Benchmarks were run using a 150GB Western Digital Raptor drive.



A light on the bottom of the front bezel lets you know when the drive is up and running.

device. We love the MB664US-1S for its fringe benefits, like its totally screwless design. To mount a hard drive, you simply push on the front of the unit—the front bezel slides up and you insert the drive into the device's hot-swap-style bay. Push the bezel back down and you're good to go; it's that simple.

This might seem obsessive, but we adore the MB664US-1S's feet. The rubber-tipped mechanisms do an OK job of keeping the device vertical by default, but you can get better balance by swinging them out to the sides to create a sort of landing gear for the enclosure. Indeed, Icy Dock has left no stone

unturned when it comes to usefulness. And for that, we leave no Kick Ass unrewarded.

—DAVID MURPHY

ICY DOCK MB664US-1S

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



## Griffin Journi Mobile Speaker

This Journi is not the reward

There are so many iPod speaker systems these days that we've resolved to cover only the most interesting devices. Boring, me-too products need not apply. Griffin's Journi made the cut by virtue of its stylish industrial design.

When closed, the Journi looks every bit like a stylish woman's clutch. Unfold the rigid outer shell, insert tab A into slot B, and you have a convenient speaker stand with a built-in iPod docking port.

An ingenious dial on the back of the speaker adjusts a rubber support disc behind the iPod, so you can mash any model iPod's buttons without putting undue stress on its dock connector. You can keep the iPod ensconced in its dock when you take the speaker system with you, too. A magnetic catch holds the assembly securely closed. The Journi's shell offers genuine protection, but take care when you unwrap it: The top of the iPod can flop around, putting strain on the docking connector.

Another set of magnets holds a small infrared remote control inside a well on the back of the Journi. The remote lets you skip tracks forward and back and play and pause songs; it also switches the speakers on and off and controls their volume.

The Journi's Lithium-Ion battery can be recharged using either A/C power or a USB connection (you can sync a docked iPod to iTunes in the latter scenario). You can measure battery strength by pushing a button on the left side and counting how many of the four LEDs light up.



If only the Journi sounded as drop-dead sexy as it looks.

After giving the Journi all those style points, listening to it was a bit of a letdown. We typically shun post-processing audio tricks (Creative's 24-bit Crystalizer being a notable exception), so we were disappointed to discover we couldn't defeat the Journi's SRS Wow circuit. The amplifier, meanwhile, is noisy enough that we heard its hiss above our PC's fan, and it distorts badly when pushed. Finally, the 2.5-inch passive radiators offer little bass compensation for the small 1.97-inch active drivers, resulting in a rather shrill audio experience.

—MICHAEL BROWN

GRIFFIN JOURNI

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



# BioShock

Believe the hype, this undersea action-adventure is the best game so far this year

I've played thousands of games since I stomped my first Koopa in Super Mario Brothers—way back in 1986.

**WARNING:**  
This review contains spoilers!

Since then, I've played text games, 2D adventures, first-person shooters, simulations of every sort, strategy games, and role-playing games. I even played a "cyberpunk thriller" once. Of all the games I've played in the last 21 years, none has evoked such powerful emotions as BioShock.

Not one of those other games made me feel compassion for a character. I enjoyed having Alyx along in Half-Life 2, but I wasn't concerned about her safety because I knew she was never in danger. I wasn't excited about her accomplishments because she was nothing more than a well-animated prop to me. Come to think of it, characters in games rarely feel like more than 3D automatons.

None of those other games presented me with truly painful choices. Sure, there were choices to be made: Should I turn left or right at the intersection? Should I equip a sword or a bow? Should I complete an easy quest or a difficult one? Even when a game presented an ethical dilemma, the choices were usually black and white.

I've played dozens of "story-driven" titles in which the story was obviously tacked on during the final moments of development. Usually, the plot is some variation of "defeat the monster, escape from this maze, and then save the girl." Even the most satisfying game stories are as shallow as a dime-store serial novel.

BioShock tells a generic story: Kill the bad guy, escape from the dystopia. In that

regard, it's just like countless games I've played before. But unlike those other games, BioShock's story is rife with subtext—objectivist philosophy is obviously the underpinning for Rapture, the game's underwater setting, but the game is also injected with parables illustrating the dangers of hubris and science unchecked by a code of ethics.

The choice in BioShock is terrifying—do you kill a little girl to get a material reward or do you let her live and settle for a lesser reward? To make the choice more difficult, you're presented with conflicting advice from conflicting archetypes. A friend encourages you to kill the girls; an enemy tells you to save them. Choosing to kill the children has absolutely no gameplay impact—but you don't discover that until you kill the little girl. You have to make the conscious decision to kill an innocent child.

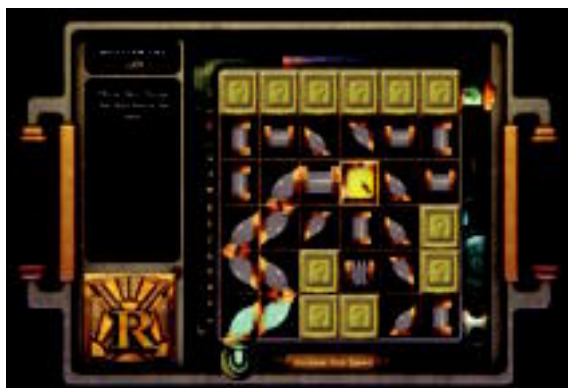
Of course, if I didn't feel empathy for the characters, killing the little girls would be an easy decision. But, by introducing you to the victims' families via audio diaries and in-game events, as well as a constant stream of one-way audio communications from every living character in the game, BioShock left me with a deeper feeling of investment in its characters—from Andrew Ryan to the character you play, to the bit players who show up for mere moments—than any game I've



**Big Daddies provide the game's most challenging battles, requiring you to use your plasmids and ammo wisely.**



**Foolish splicers lounge about in standing water—leaving them vulnerable to your electro-shock plasmid.**



**Arguably the worst part of BioShock is the Pipe Dream-esque minigame, which is tedious and boring.**

played in the last decade.

Completing BioShock isn't about the ending—the final battle and three endings are the weakest parts of the game—but about the journey along the way. I can say without reservation that this journey is far superior to any other I've ever taken.

—WILL SMITH

**BIOSHOCK**

**+ LITTLE STAR**  
Amazing setting under the sea, rich subtext, and outstanding character development.

**- BIG DADDY**  
Final battle seems misplaced. Game falters in final moments.

10

MAXIMUM PC  
KICKASS

\$50, [www.2kgames.com/bioshock](http://www.2kgames.com/bioshock)  
ESRB: M

## **WIN Rig of the Month**

**If chosen, your rig will be featured before all the world in Maximum PC—  
and you'll win a \$500 gift certificate for Buy.com**

**TO ENTER:** Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs (minimum size 1024x768) of your modified PC; and a 300-word description of what your PC represents and how it was modified. Emailed submissions should be sent to [rig@maximumpc.com](mailto:rig@maximumpc.com). Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080.

The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

**ONE ENTRY PER HOUSEHOLD.** Your contest entry will be valid until (1) six months after its submission or (2) October 15, 2007, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries, and featured in the Rig of the Month department of the magazine. The final winner in this contest will be announced in the December 2007 issue. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future US, Inc. may use your name and your mod's likeness for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future US, Inc. is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future US, Inc. c/o Maximum PC Rig of the Month, 4000 Shoreline Ct, Suite 400, South San Francisco, CA 94080. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.



**We tackle tough reader questions on...**

- ✓ USB Speakers
- ✓ Modest PCs
- ✓ Canadian Contests
- ✓ Digital Archives

**WHITHER ANALOG AUDIO?**

*I am at a loss as to why USB speakers are becoming more popular. Was there something wrong with the mini phono connection? Could USB possibly be better quality since it's digital? Will this cost my computer processing power? Does it affect USB's back-end bus? Why was this architectural USB decision ever made?*

*I just received a Bose Companion 5 system as a gift. To my amazement, it offers only a USB sound connection unless I want to use the mini phono input on the control pod. Unfortunately, the four USB ports on my brand-new Dell are already maxed out. Looks like I'll be buying a USB add-on card.*

*While I am not usually resistant to change, this USB connection is really barking my noodle. I finally decided to sacrifice a few less-important USB devices and try the Bose speakers. I was off and running right out of the gate. Vista detected the speakers as I expected and sound was working almost immediately. But the sound didn't blow me away—this USB connection thing prevented me from savoring the moment. While I am not usually overly sentimental, my Cambridge SoundWorks MicroWorks speakers kept this audiophile more than satisfied for 12 years, and now my kids will get this old but very competent hand-me-down.*

*Only time will tell if my new USB speakers will make it that long. Will USB problems ever prevent me from hearing sound? Can you please ease my angst and bestow your wisdom on this topic of analog versus USB?*

—Brian Hart

**SENIOR EDITOR GORDON MAH UNG RESPONDS:**

**Actually, it sounds like Bose doesn't really understand the PC sound market. By using USB as the primary audio source for the speakers, the Companion 5s bypass a very important component in most systems: the soundcard (or onboard audio). By using the Companion 5 instead of, say, an X-Fi to render audio from a game, you lose EAX or any of the advanced audio available from the soundcard.**

**Also, if you want to add more USB ports to your PC, the easiest way to do that is with an inexpensive USB hub. You don't need to add a second controller to your system just to add more ports.**

**SOUPING IT UP FOR SUPREME COMMANDER**

*For all the people complaining about your low-price PC build-off ("\$500 Building Challenge," November '07), I have successfully played Supreme Commander on a 2.7GHz Athlon 774 and an Nvidia 6800 GTX AGP card. In spite of all the features I had to turn off, the game still looked better (in some respects) than other strategy games I've played.*

*Most games are designed to be playable on hardware that's at least two years old; a top-of-the-line gaming rig isn't required. That said, I recently upgraded to an Intel e6600 dual core and an Nvidia 8800 GTX, and I haven't looked back! Supreme Commander is even better with all of its graphical goodness enabled!*

—Matthew

**EDITOR IN CHIEF WILL SMITH RESPONDS:** It's always worth remembering that while we

love to play games at 1920x1200, you can actually have a really great PC-gaming experience on much more modest machines. Thanks for the reminder, Matthew!

**SOMETHING DOESN'T QUITE LINE UP**

*I loved your Dream Machine 2007, especially the case. How did you attach the radiator to the case? It looks like only one set of holes would line up. Did you only use one set of holes?*

—Gabe

**ASSOCIATE EDITOR DAVID MURPHY RESPONDS:**

**You're correct, Gabe. While the Cosmos case includes drill holes for a three-fan radiator, we found that in practice the holes didn't line up with our Swiftech MCR320 QP radiator. However, it's not that big of an issue. Securing the radiator to the case using one set of fan holes didn't affect our ability to**

**No Love for the Great White North?**

*I have only one complaint with Maximum PC: Your contests are not valid in Canada! I know it's a minor complaint, but we Canucks would love to be able to participate.*

—John A. Barazzuol



**EDITOR IN CHIEF WILL SMITH RESPONDS:** Sorry about the exclusionary behavior, John. We'd love to be able to include Canadian readers in our contests, but unfortunately, our crack team of legal eagles tells us that contest law in several Canadian provinces explic-

itly forbids games of chance, such as random drawings. We don't actually hate Canada—we just hate your laws, fancy public health care, and strong currency.

water cool in the slightest, nor did any issues pop up during testing.

### WHY SUBSCRIBE?

*I have been a subscriber for a few years now. I was missing a few issues, but since you've posted PDF back issues, it hasn't been a problem. But what do I get from subscribing, other than the CDs, which contain software that is free and easily downloaded online anyway? I still prefer printed media over digital content, but I'm sure many other power users do not. What is your take on this?*

—Mike DeLisa

**EDITOR IN CHIEF WILL SMITH RESPONDS:** Glad you found the PDF archives, Mike! What you get when you subscribe to the magazine is information in a more timely manner. Right now, we're not selling the content online; we post it to the website after the issue is off newsstands. If we wanted to post the magazine online for sale, we'd have to set up a digital storefront and make a business case for it. By releasing the issues online a few months after they come out, we have the freedom to do something nice for *Maximum PC* readers without having to go through a bunch of hassle.

If you're interested in downloading PDF back issues, go to <http://tinyurl.com/2zp25a>.

### MAXIMIZING YOUR RAID

*I have two hard drives in my computer (a WD 250GB and a Seagate 400GB) and just bought another Seagate 400GB drive to pair with my existing one. Can I partition a RAID drive? If so, where should I put my OS, page file, and games? I want to maximize gaming speed with the RAID setup.*

—Ron

### ASSOCIATE EDITOR DAVID MURPHY

**RESPONDS:** I'm assuming you're speaking of a RAID 0 configuration, as you mentioned your focus is on performance. To answer your first question, yes, you can partition a RAID volume. Your OS treats a RAID volume the same as it would a stand-alone hard drive, even though in reality two drives are powering the array.

To answer your second query, you should slap your OS and your games on your RAID, seeing as it will be much speedier than what you'll see on a single drive. Microsoft recommends you split your paging file across multiple drives for maximum performance—in

your case, that would mean creating a paging file on your RAID array as well as your Western Digital drive.

Remember that a new partition doesn't qualify as a new drive. By putting a paging file on each partition of the RAID, you'd actually be downgrading your system's performance.

### REQUIEM FOR RHAPSODY

*You said in your review of the Linksys WRT350N that you couldn't stream your music from a subscription service such as Rhapsody because you have to play the files using that service's player. But Rhapsody has an option to save your downloaded music into a separate folder on your HD. I can stream music to my Xbox 360 with no problems. If I put my music folder on an external hard drive I don't see any reason I couldn't stream it from the Linksys WRT350N. Could you check this out for me?*

—Jack E. Bryant, Jr.

### EXECUTIVE EDITOR MICHAEL BROWN

**RESPONDS:** You can store your subscription music tracks on any drive on your network, but your PC must be running in order for Rhapsody to validate your limited-time license. If you store ripped or purchased music on the WRT350N, you can stream it without having to first fire up your computer. The Sonos system lets you do this with Rhapsody tracks, but in that situation, the Sonos is streaming the music straight from Rhapsody's servers, as opposed to a local storage device on your network.

### FINDING CHEAP XP

*In numerous computer-build articles in *Maximum PC*, including "Build Your Own \$1,500 PC" (February '07), I have seen Windows XP Pro listed as costing \$99.*

*Please tell me how you purchase this OS for such an extremely low price. An additional license from Microsoft is around \$269.*

—John K. Litton

**EDITOR IN CHIEF WILL SMITH RESPONDS:** For budget-building challenges, we usually use OEM editions of Windows, which are available at [Newegg.com](http://Newegg.com) and other online retailers. These versions of Windows are perfectly legit, but they preclude you from transferring your Windows license to a new PC when you upgrade or build a new rig. **MCP**

# COMING NEXT MONTH

## IN *MAXIMUMPC*'S

### PREWASHED AND READY TO EAT

## DECEMBER ISSUE

• BEST PRODUCTS EVER.

Which 100 pieces of hardware and software have had the biggest impact on power users' lives? We'll give you our definitive list—ranked in order of importance! It's sure to incite controversy.

• BEST OF THE BEST 2007

Then we'll narrow our focus to this year's premium parts and school you on the merits of our top picks in every major component category. Once we're done, there'll be no question about which hardware you should be lusting after.

• MUM'S THE WORD!

To learn what's behind door number three, you'll have to wait for next month's issue. That's how closely guarded the subject of this story is. We *can* tell you this: You won't be disappointed!



**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.

# TROY FRYFOGLE'S Hellusion

Sequels always suck, right? Well, sometimes that's not the case. How about *Godfather II*? Troy Fryfogle's Hellusion mod is another example of the exception proving the rule. A year in the making, this mod is the follow-up to Troy's HellRaiser Cenobite PC (<http://tinyurl.com/23xoyx>).

The Hellusion was built from the inside out, with the puzzle box illusion created first since it's the primary visual aspect and innermost point—and because if it didn't work correctly, the rest of the mod wouldn't come together. We say it came together perfectly—and we're hoping this series becomes a trilogy!

Where's the rig? This box seems to hold only the Hellraiser puzzle cube, yet it's a fully functional machine.



The case was built entirely from scratch, and there's not a single screw or rivet holding it together. Instead, Troy used Alum Angle and AcrylPanel throughout.

This magician has chosen to reveal his tricks. While the Hellraiser cube sits in the center of the rig, all the components are cleverly hidden around the edges of the case.



For his winning entry, Troy wins a \$500 gift certificate for Buy.com to fund his modding madness! See all the hardware deals at [www.buy.com](http://www.buy.com), and turn to page 108 for contest rules.



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