CD INSIDE

Includes more than **500MB** of **AWESOME SOFTWARE**

MAXIMUM PC

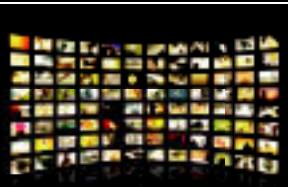
MINIMUM BS • APRIL 2009

50 Things Every PC Geek Should Know

Tips, secrets, and essential skills that will make you a PC expert!

PAGE 24

Crank Your CPU to "11" with our **CORE I7 OVERCLOCKING GUIDE** PAGE 40



How to Download & Save **FLASH VIDEO FROM THE INTERNET!**

PAGE 68

Full-Tower Cases: Experience a New World of **PC ENCLOSURE DECADENCE!**

PAGE 50

$8.99US

Future MEDIA WITH PASSION

0 70989 38753 9 04

Unleash your PC's Potential...

Try MAXIMUM PC

2 FREE Trial Issues

Each issue of Maximum PC features:

- **Brutally honest product reviews**
- **Hard-hitting editorials**
- **Tips to blast your machine's performance**
- **Insightful and innovative How-To's**
- **A CD loaded with new software, utility and game demos**

Reserve your 2 FREE Trial Issues today! There's no obligation.

To order, head to:
www.maximumpc.com/archive

MAXIMUM PC

EDITORIAL
EDITOR IN CHIEF **Will Smith**
DEPUTY EDITOR **Katherine Stevenson**
SENIOR EDITOR **Gordon Mah Ung**
ONLINE EDITOR **Norman Chan**
ASSOCIATE EDITOR **Nathan Edwards**
ASSOCIATE ONLINE EDITOR **Alex Castle**
EDITOR AT LARGE **Michael Brown**
EDITORIAL ASSISTANT **Florence Ion**
CONTRIBUTING WRITERS **Alex Castle, Tom Halfhill, Paul Lilly, Thomas McDonald, Quinn Norton, Dan Stapleton**
PODCAST PRODUCER **Andy Bauman**
EDITOR EMERITUS **Andrew Sanchez**

ART
ART DIRECTOR **Natalie Jeday**
ASSOCIATE ART DIRECTOR **Boni Uzilevsky**
PHOTO EDITOR **Mark Madeo**
ASSOCIATE PHOTOGRAPHER **Samantha Berg**
CONTRIBUTING ARTIST **Adam Benton**

BUSINESS
VICE PRESIDENT/PUBLISHING DIRECTOR **Stacey Levy**
650-238-2319, slevy@futureus.com
GROUP SALES DIRECTOR **Gabe Rogol**
650-238-2409, grogol@futureus.com
WESTERN ADVERTISING DIRECTOR **Dave Lynn**
949-360-4443, dlynn@futureus.com
EASTERN ADVERTISING DIRECTOR **Justin Schiller**
646-723-5453, jschiller@futureus.com
MIDWEST MANAGER CONSUMER SALES **Jodi Sosna**
212-217-1358, jsosna@futureus.com
MARKETING MANAGER **Kathleen Castaillac**
650-238-9218, kcastaillac@futureus.com
ADVERTISING COORDINATOR **Jose Urrutia**
650-238-2498, jurrutia@futureus.com

PRODUCTION
PRODUCTION DIRECTOR **Richie Lesovoy**
PRODUCTION COORDINATOR **Dan Mallory**
PRINT ORDER COORDINATOR **Jennifer Lim**

CONSUMER MARKETING
DIRECTOR CONSUMER MARKETING **Rich McCarthy**
GROUP CIRCULATION DIRECTOR **Peter Kelly**
NEWSSTAND DIRECTOR **Bill Shewey**
CONSUMER MARKETING OPERATIONS DIRECTOR **Lisa Radler**
RENEWAL AND BILLING MANAGER **Mike Hill**
BUSINESS MANAGER **Elliot Kiger**
SR. ONLINE CONSUMER MARKETING DIRECTOR **Jennifer Trinker**
ASSOC. ONLINE CONSUMER MARKETING DIRECTOR **Jong Lee**
CUSTOMER SERVICE MANAGER **Mike Frassica**

FUTURE US, INC
4000 Shoreline Court, Suite 400, South San Francisco, CA 94080
www.futureus-inc.com

PRESIDENT **Jonathan Simpson-Bint**
VICE PRESIDENT/CFO **John Sutton**
GENERAL COUNSEL **Charlotte Falla**
INTERNET DEVELOPMENT **Tyson Daugherty**
PUBLISHING DIRECTOR/BUSINESS DEVELOPMENT **Dave Barrow**
EDITORIAL DIRECTOR **Jon Phillips**
EDITORIAL DIRECTOR/GAMES GROUP **Stephen Pierce**
EDITORIAL DIRECTOR/MUSIC **Brad Tolinski**
DIRECTOR OF HUMAN RESOURCES **Nancy DuBois**

Future
MEDIA WITH PASSION

Future US, Inc. is part of Future plc. Future produces carefully targeted special-interest magazines, websites and events for people who share a passion. We aim to satisfy that passion by creating titles offering value for money, reliable information, smart buying advice and which are a pleasure to read or visit. Today we publish more than 150 magazines, 65 websites and a growing number of events in the US, UK, France and Italy. Over 100 international editions of our magazines are also published in 30 other countries across the world.

Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR).

FUTURE plc
30 Monmouth St., Bath, Avon, BA1 2BW, England
www.futureplc.com
Tel +44 1225 442244

NON-EXECUTIVE CHAIRMAN: **Roger Parry**
CHIEF EXECUTIVE: **Stevie Spring**
GROUP FINANCE DIRECTOR: **John Bowman**
Tel +44 1225 442244
www.futureplc.com

REPRINTS: For reprints, contact Marshall Boomer, Reprint Operations Specialist, 717.399.1900 ext. 123 or email: marshall.boomer@theygsgroup.com

SUBSCRIPTION QUERIES: Please email customerservice@maximumpc.com or call customer service toll-free at 800.274.3421

Maximum PC ISSN: 1522-4279

Don't Let Economic Woes Keep YOU from Being Maximum

In times of hardship, it's important that we, the people, step up and do our civic duty. That's why, in light of the harsh economic conditions we all face today, I implore everyone to spend more money on computers. LOTS more money. With hardware vendors reporting the worst holiday season of all time, they desperately need you to buy more components and build new PCs. And so-called "budget" machines won't cut the mustard. You need to buy $1,000 CPUs and multiple $500 videocards. Think 6GB of RAM is enough? Think again. Now, all this PC construction will undoubtedly require tough sacrifices in other areas: Your kids may not get to go to "college." You may need to cut back on your "food" budget. You may need to turn off non-essential services like "water" and "garbage collection." Just remember that baloney and ramen taste better when you have a rig that can run Crysis at 2560x1600 with everything turned all the way up. Yes, power user, some things are worth tough sacrifices.

Wait. That's terrible advice.

I don't want you to mortgage your children's future or live on reconstituted noodles for the sake of a few extra frames per second. When times are hard—and I know that they're hard for a lot of folks right now—necessities come first. And as much as we'd all like to think that a 30-inch flat panel and a new videocard are necessities, they aren't. However, just because times are tough doesn't mean you can't continue to follow the basic spirit of our Pure PC Power philosophy. It simply means you'll need to work on getting more from your existing rig.

That's what we're going to do in *Maximum PC*. Sure, we'll still tell you all about the latest, greatest hardware, but in addition to that, we're going to devote more pages to showing you how to get more from the kick-ass PC that's already under your desk. Our first step is to expand our how-to section, adding pages and running multiple step-by-step DIY guides every single month. We're also going to ever-so-slightly tweak our approach to product reviews. *Maximum PC* has always lauded raw performance at pretty much any cost. We're not changing that, but we are going to seek out and make special note of products that offer great performance for a great value. Finally, due to popular demand, we've brought Best of the Best back to the magazine, and made it better than ever. In addition to all the classic categories, we've added CPU recommendations and also included budget and midrange suggestions for every category where they make sense. Check it out on page 96, or online at http://tinyurl.com/6qo3a8.

Let me know what you think of the changes we've made and be sure to send me your favorite PC performance tweaks. As always, you can reach me at will@maximumpc.com.

CH-CH-CHECK IT OUT

- **More How-Tos!** Page 68
- **Best of the Best Returns!** Page 96
- **Useful Twitter Stuff!** Page 14

LETTERS POLICY Please send comments, questions, and lollipops to will@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, Will is unable to respond personally to all queries.

FEATURES

DEPARTMENTS

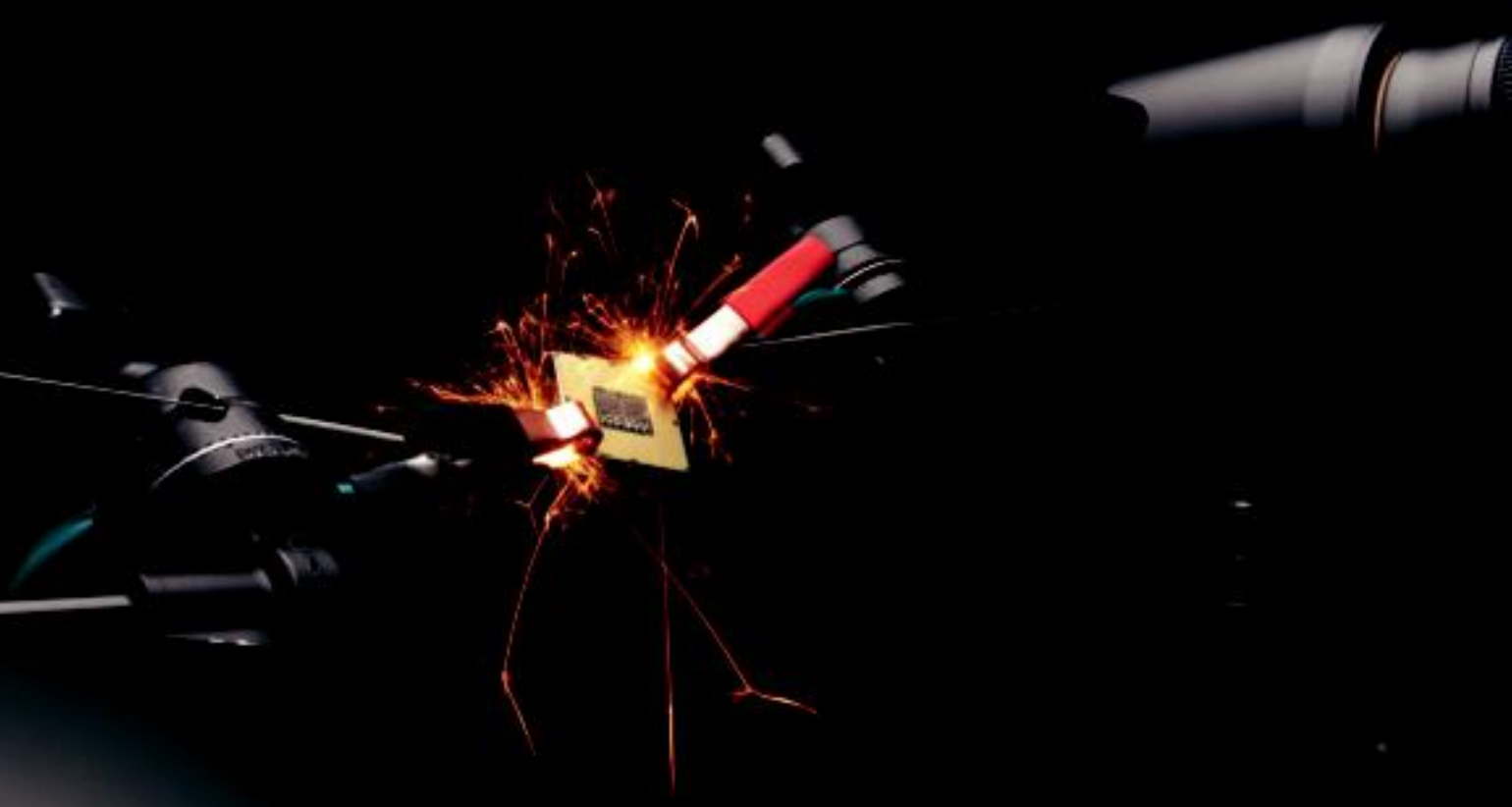
QuickStart

R&D

In the Lab

LETTERS

40

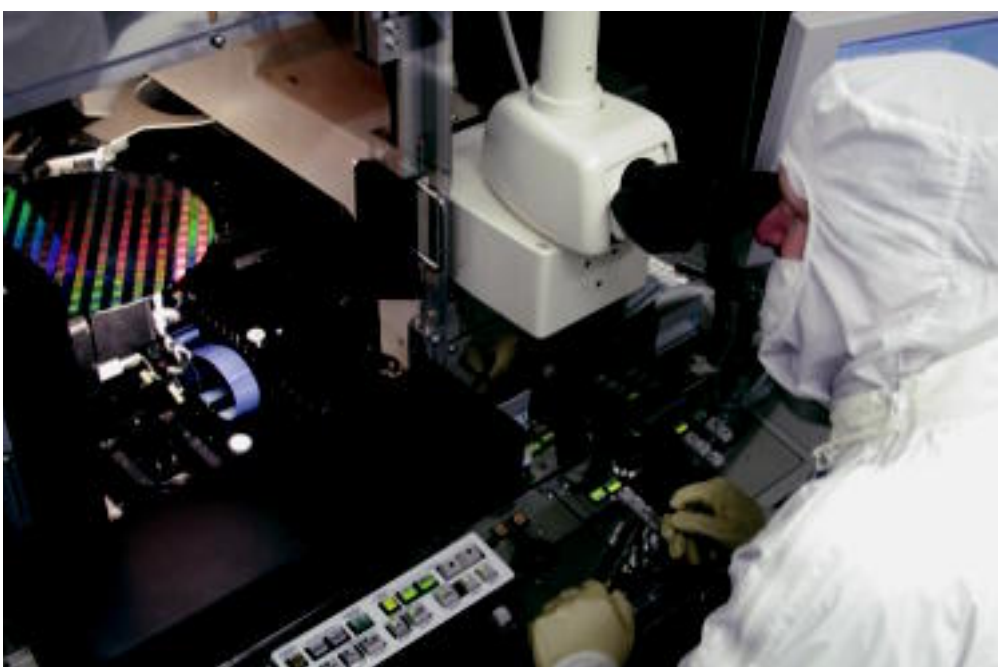


THE NEWS

Tech Not Slowing Down

Despite the economic slowdown, companies aren't putting the brakes on innovation –PAUL LILLY

It was a little more than a year ago when we first heard about multicore memory, a promising new architecture with the potential to offer dramatically faster memory speeds. Some believe magnetoresistive random access memory (MRAM) will be the next big thing in RAM. But who's going to fund these and other similar projects when memory makers are fighting just to stay alive? A-Data chairman Simon Chen noted that 2008 was the worst he's seen the DRAM market in 15 years, the result of an economic downturn that has forced some Taiwanese chipmakers to seek a government bailout.



Rather than deviate from its tick-tock release schedule and upcoming 32nm wafers, Intel will focus its cuts on older technology.

Micron, who posted a $706 million loss for its first fiscal quarter of 2009, said it doesn't have any plans to change its short-term roadmaps, but did tell us there are certain categories and product development initiatives that have been put on hold (though not all are a direct reflection of the economy). Corsair was also quick to tell us it has no plans to drift from its roadmaps, saying that most of its adjustments will center on providing higher quantities at lower prices. How the company will do that remains anyone's guess, but is it really business as usual in terms of innovation and product release schedules?

Last we checked, money still wasn't growing on trees and we don't know too many investors eager to pump more cash into a stock market headed in the wrong direction. Nevertheless, the majority of big tech companies we spoke with insisted they weren't going to abandon current and future projects. If we're to take them at their word, that still leaves the question of where the funding will come from.

During a candid phone interview, Intel's Chuck Mulloy told us, "Hey, we've been here before and we understand you can't save your way out of a recession; you spend your way out." Intel asserts that by continuing to invest in R&D and capital, it will come out in better shape. To that end, Mulloy indicated that aging technologies will bear the brunt of Intel's cleaver, such as the recent shuttering of five older chip assembly plants, which will not have an impact on current 45nm and upcoming 32nm wafers.

WE UNDERSTAND YOU CAN'T SAVE YOUR WAY OUT OF A RECESSION; YOU SPEND YOUR WAY OUT.

That might work when you're the number one chipmaker with nearly two dozen factories, but if you're AMD, you need a decidedly different strategy. AMD is banking on its recent decision to split into separate design and manufacturing firms to not only get the company through the recession, but also back in the game as a competitive chipmaker. With AMD no longer responsible for bankrolling the development and deployment of new technologies, the company claims the economy will not affect its product roadmaps laid out in November of last year.

So, there you have it—even though you may not be spending money on new gadgets, don't feel guilty; the tech world will keep on spinning with or without you, or so its leaders claim.

GEEK TESTED & DISAPPROVED

BodyGuardz

Hard-shell cases undermine the intentionally svelte design of our favorite gadgets, like the iPhone. One alternative is the form-fitting BodyGuardz skin ($25, www.bodyguardz.com). Once applied, our phone was indeed oaf-proof—even rigorously scrubbing a door key against the transparent film surface didn't leave lasting marks. Still, we wouldn't take the maker's advice and drop a BodyGuardz-skinned gadget in a bag of nails, since the plastic wrap didn't sheath our phone's entire surface area. Installing the backpiece was also a minor feat—it was difficult to apply the film without creating unsightly air bubbles or getting dust or lint stuck to the adhesive. We suggest forgoing the full body kit and just buying the front-side-only pack ($15). –NC

MS Makes Another Go at DRM

While the prevailing trend among digital music retailers is to do away with DRM (even iTunes went DRM-free!), Microsoft has launched a new mobile phone–based music store in the UK that uses some of the worst DRM restrictions yet.

Music tracks obtained through MSN Mobile Music can only be played on the phone they're downloaded from and cannot be transferred to another device or backed up on a PC. What's more, at $2 a pop, the tracks cost twice as much as the competitors'.

Hmmm. What's not to like? **–FI**

HELL YEAH!

2TB Hard Drive Arrives

LEARN MORE AT MAXIMUMPC.com
http://www.tinyurl/cq439u

Western Digital gets to don the capacity crown now that the company has released its new two-terabyte Caviar HDD. The WD20EADS sports a 7,200rpm spindle speed, 32MB of cache, and WD's eco-friendly GreenPower designation. –KS

The Fix Is In

Imagine having your car serviced and finding 100 unexplained miles on the odometer, plus evidence that burglary tools had been stashed in the trunk. Would you be pissed? I was.

Except it was my computer, not my car, that a repair shop messed with.

We're so focused on threats coming from the Internet that it's easy to forget the hazards closer to home. The best antivirus software, firewalls, and spyware scanners are worthless when someone violates a trusted relationship. Maybe you can learn from my experience.

My backup computer (a Mac) developed a minor hardware fault I couldn't fix. A local repair shop couldn't fix it, either, so I settled for tolerating the problem. Later, while downloading a software update, I discovered four mysterious entries in the web browser's download log. Quick research confirmed my suspicions—they were password-cracking programs, mainly for penetrating Wi-Fi networks.

At first, the shop manager seemed nonchalant. I was worried that my computer had been used to commit a crime, so I called the cops. A detective on the fraud squad was very interested and very knowledgeable. He investigated, but found no evidence that my computer was used for criminal purposes.

Though reassured, I still couldn't trust the machine. What else might be hidden on the hard drive? A keylogger? Botnet malware? Child porn?

My next contact with the shop manager found him more sympathetic. He apologized and said the tech who had worked on my Mac confessed to experimenting with the Unix Terminal program underneath the Mac OS. It was a poor excuse that didn't explain the entries in the browser's download log, but I was more interested in cleaning my machine. After I declined his offer to clean it for me, he gave me the latest version of Mac OS Leopard. I spent hours wiping and reinstalling everything.

A rogue repairman is always a possibility. What are your countermeasures? My personal files were safe because they were stored on an external drive. Encrypted folders are the next best thing. Perhaps the best precaution would be a better odometer—personal spyware that secretly records everything done with your computer while it's out of your hands. Peace of mind doesn't come easy.

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

PROC WATCH

DDR3 Phenom II Is Here

AMD officially embraces DDR3, then kicks it in the shins

Can you embrace and diss something at the same time? That's the message we're getting from AMD's stance on DDR3 support. A mere two months after the launch of its DDR2-only Phenom II CPUs, AMD has released newer versions of the chip that support both DDR2 and DDR3.

The five new AM3 chips are backward-compatible with DDR2 AM2+ motherboards and will also work with the newest AM3 boards, which support DDR3 RAM. The new lineup includes quad-core and tri-core versions of the Phenom II, as well as smaller-cache versions of the chip.

Interestingly, AMD's official messaging is that DDR3 RAM is not as cost-effective as DDR2; still, the company wanted to release the chips that support both RAM standards as soon as possible. The AM3-ready lineup consists of the 2.6GHz Phenom II X4 830 with 4MB of L3 for $175, the 2.8GHz Phenom X3 720 BE with 6MB of L3 for $145, and the 2.6GHz Phenom II X3 with 6MB of L3 for $125. Two other CPU models are available only as "tray," or bulk, chips and do not feature the same warranty as the three other CPUs when purchased in retail packaging. These include the 2.6GHz Phenom X4 910 with 6MB of L3 and the 2.5GHz Phenom X4 805 with 4MB of L3.

AM3 will feature two fewer pins than AM2+ CPUs to prevent older chips from fitting into DDR3-only boards.

All of the CPUs are 95W TDP parts and will feature slightly faster HyperTransport speeds than the two original Phenom II CPUs. In AMD's rush to get the original 3GHz Phenom II X4 940 and the 2.8GHz Phenom II X4 920 out the door, the company decided to scale the HyperTransport speeds back from 4GHz to 3.6GHz. That's also the reason AMD left the AM3 support out of the original Phenom II CPUs.

This is likely to infuriate buyers of the two original CPUs, but AMD stands by its decision to opt for an earlier release at the expense of DDR3 support and faster HyperTransport speeds. **—GU**

JUDGE UPHOLDS AMAZON TAX

NY state law makes online shopping more costly to customers

In what some might view as a dark day in e-commerce, a New York Supreme Court judge has dismissed a lawsuit by Amazon.com and Overstock.com over a new law requiring online retailers to collect sales tax. Whereas online retailers are exempt from collecting taxes in states where the seller has no physical presence, this cleverly conceived law taxes any online retailer who has an affiliate marketing program in New York.

At stake is an estimated $73 million for New York this fiscal year. But lawyers representing Amazon and Overstock contend that the law violates the Commerce Clause of the U.S. Constitution and the Due Process Clauses of the Fourteenth Amendment to the Constitution, and were seeking a permanent injunction prohibiting New York from enforcing the law. Judge Bransten sees it differently: "The neutral statute simply obligates out-of-state sellers to shoulder their fair share of the tax collection burden when using New Yorkers to earn profit from other New Yorkers."

Amazon and Overstock are expected to appeal the ruling. **—PL**

GAME THEORY

Grassroots Gaming

PC gaming began on mainframes and research computers. It moved to personal computers when independent developers put their games on floppy disks, sealed them in Ziploc bags with Xeroxed art, and sold them in hobby stores. If it is going to have a future that is not yoked to console design paradigms, we are going to have to recapture those roots and start paying closer attention to the small developers who are designing with *us*, and not 14-year-old console gamers, as their primary market.

PC games like those we used to play are still being made, but amidst all the white noise of endless junkware and Java games, it's becoming extremely difficult to sort the wheat from the chaff. I completely missed Hinterland when it first came out last year, and played it only after its addition to the Greenhouse lineup (http://playgreenhouse.com). It's a little gem of RPG/strat play: Diablo with village building and all the boring bits cut out. Tilted Mill, the company responsible, is filled with old PC hands like Chris Beatrice (from Impressions, of beloved memory) and Jeff Fiske (who demoed Civil War General for me at the first E3).

Another company, Brighter Minds, filed for Chapter 11 protection in January, despite the success of its World of Goo, a brilliant piece of gaming design for the ridiculous price of $20. Goo, which went out DRM-free, was subject to a 90 percent piracy rate. Designer Ron Carmel told Joystiq that he saw torrents of the game with "500 seeders and 300 leechers." If you're reading this, and you played Goo on a stolen copy, you're a world-class jackoff, and probably would have stolen this magazine if you weren't afraid the dude at Borders would have caught you. I'd pay $20 just to kick you in the nuts.

EA and Activision don't need your money, and they don't care too much about you. Unless you're coughing up $15 a month for an MMO, get used to sloppy console seconds. The small guys need you, *now*, to lay off the BitTorrent, pay your $20, and keep the seedbed of PC gaming thriving by searching out worthy games from indie developers.

Thomas L. McDonald has been covering games for 17 years. He is an editor at large for *Games* magazine.

Seagate's Barracuda Woes

Faulty firmware breaks drives; users angry

Large numbers of Seagate Barracuda 7200.11 drives, including the 1.5TB model (reviewed in January), have locked up as a result of faulty firmware. Seagate's first attempt at a fix bricked even more drives, and though the company has offered free data recovery to affected users, the brand's reputation has been marred. **–NE**

AMD, Nvidia Add OpenGL 3.0 Support

Catalyst 9.1, Nvidia 181.00 drivers support the cross-platform 3D graphics API

Following the long-awaited release of OpenGL 3.0 by the Khronos Group, both AMD and Nvidia have included support for the open 2D- and 3D-accelleration standard in their latest videocard drivers.

Unlike its competitor Direct3D, a proprietary API owned by Microsoft and used in Windows and Xbox gaming, OpenGL is platform-independent, and can be implemented in Linux and Mac OSes and game consoles. OpenGL 3.0 claims rough feature parity with Direct3D 10, which works only in Windows Vista.

OpenGL 3.0 support by AMD and Nvidia allows for Direct3D 10–quality graphics on non-Vista systems—which might eventually mean more OS options for gamers. **–NE**

Netflix, Walmart Co-Conspirators?

A lawsuit filed in California is accusing Walmart and Netflix of creating a DVD rental monopoly. The suit points to a 2005 business agreement between the two companies, whereby Walmart closed its flagging online rental business and sent its subscribers to Netflix, while Netflix agreed to promote Walmart for DVD purchases. The suit claims this caused Blockbuster to raise its subscription price to match Netflix's, and thus hurt consumers. **–KS**

Not Everyone Wants Broadband

There's been a lot of talk about increasing broadband penetration in the United States—it's been a pet project of FCC Chairman Kevin Martin and a focal point of President Obama's proposed stimulus package. But a recent survey by the Pew Internet and American Life Project sheds interesting light on the subject. Pew's survey found that while price and availability are indeed barriers for approximately 50 percent of current dial-up users and 20 percent of non-Internet users, a full two-thirds of people who don't currently have broadband simply don't want it. Non-adopters cited reasons ranging from usability ("difficult," "too old," "physically unable") to relevance ("not interested in getting online," "too busy," "nothing could get me to switch"). **–KS**

BYTE RIGHTS

Friend in High Places

For years, Congressman Rick Boucher of Virginia wandered the desolate wilderness reserved for lawmakers who speak sensibly about copyright and the Internet. Well, given that criteria, the desolate wilderness was reserved for Rick Boucher. He's been in Congress since 1983 and self-identifies as a techno-geek. Boucher is a different kind of politician—*ours*—loyal to a technology community few other representatives know exists. He has worked to legalize crypto export, expand rural broadband, support net neutrality, and has pushed back on copyright maximalism.

Boucher went so far as to say, "The recent extension of the copyright term by the Congress was wholly unjustified," in a Slashdot interview in 2001. That's right—Slashdot interview. Even Cory Doctorow described him as "the closest thing to a copyfighter in Congress." (Boucher did vote for telecom immunity, confirming that no one is perfect.)

After the passage of the DMCA in 1998, Boucher spoke about how anti-circumvention measures eviscerated fair use, stymied innovation, and stifled speech, but it all fell on deaf ears.

Boucher tried to fix the DMCA with the DMCRA, or Digital Media Consumers' Rights Act, introduced to Congress in 2003 and 2005. The DMCRA explicitly allowed circumvention for non-infringing use, reaffirmed Betamax (the legal case, not the tape media), and required labeling of media with software that could, say, install a rootkit to prevent you from ripping your Sony BMG CD.

Both times it withered like a beautiful flower planted in the toxic sludge that is a house committee.

Boucher has always been mostly alone, but times are changing. Every new Congress brings the congressional shuffle, where people on congressional subcommittees you've never heard of jockey and swap positions overseeing particular specialties of lawmaking, hoping to bring home pork, enhance their political power, or even occasionally fight for a cause they believe in.

For the 111th Congress, Boucher will be chair of the House Subcommittee on Communications, Technology, and the Internet. It doesn't sound thrilling, but for the first time it's a real launching point for legislation that could fix the DMCA, or at least make it slightly less evil. So, thanks, Virginia's 9th district, for letting Rick come to the party.

Quinn Norton writes about copyright for Wired News and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST

9 Awesome Uses for Twitter

9 GET BREAKING NEWS

Receive up-to-the-minute updates the *next* time a plane safely lands in the Hudson River.

Photo credit: Twitter user Jkrums

8 WIN THE PRESIDENCY

TRAFFIC AND WEATHER REPORTS

7 Track road hazards and zombie outbreaks for your commute.

TAP INTO THE 'WISDOM' OF THE CLOUD

6 Uncover obscure facts or poll fellow *Lost* addicts about their latest plot theories.

5 INFILTRATE PRIVATE CONFERENCES

Micro-bloggers clue you into major keynote announcements.

4 DEMAND CUSTOMER SERVICE

Dell, Comcast, and Southwest Airlines have all reportedly made amends with unsatisfied customers who tweeted their complaints.

3 LOCATE SECRET CONCERTS

With the power of Twitter, *Nick and Norah's Infinite Playlist* would've been a 10-minute movie.

2 FIND ONLINE DEALS

Follow @amazondeals and @woot for great bargains.

Photo credit: Woot, Inc.

#1 STALKING CELEBRITIES

Photo credit: Veronica Belmont

Keeping tabs of celebreties, like Levar Burton (@levarburton), or the Internet-famous, like Veronica Belmont (@veronica), is easy when they broadcast their every move.

DEATHMATCH

GeForce GTX 295 vs. Radeon HD 4870 X2

Once upon a time, dual-GPU videocards were kludgy, power-hungry beasts that didn't actually perform much better than their single-GPU brethren. They lacked key features like multi-monitor support, and the second GPU accelerated only a scant handful of titles. Lucky for power-seeking enthusiasts, the tide seems to have turned. ATI released its dual-GPU Radeon HD 4870 X2 last year, while Nvidia just launched the GeForce GTX 295 in January. It's time to pit the two against each other in a fight to the death. —WILL SMITH

GeForce GTX 295
$500, www.nvidia.com

ROUND 1

PERFORMANCE

The newer Nvidia board clearly wins the performance title, although the Radeon 4870 X2 holds its own in a couple of tests (see page 77 for complete benchmark results). With a greater than 10 percent speed difference in every benchmark except Crysis with AA and anisotropic filtering on and Call of Duty 4, the GTX 295 is the new performance leader.
Winner: GeForce GTX 295

ROUND 2

STREET PRICE

Oh, how quickly the tables turn. While the GeForce is the undisputed performance leader, you'll pay dearly for that extra speed. At press time, street price for a stock GTX 295 is a little more than $500, while the price of a stock Radeon 4870 X2 is hovering around $415. That's a pretty substantial price difference between the two boards, which makes the decision easy.
Winner: Radeon 4870 X2

ROUND 3

POWER AND HEAT

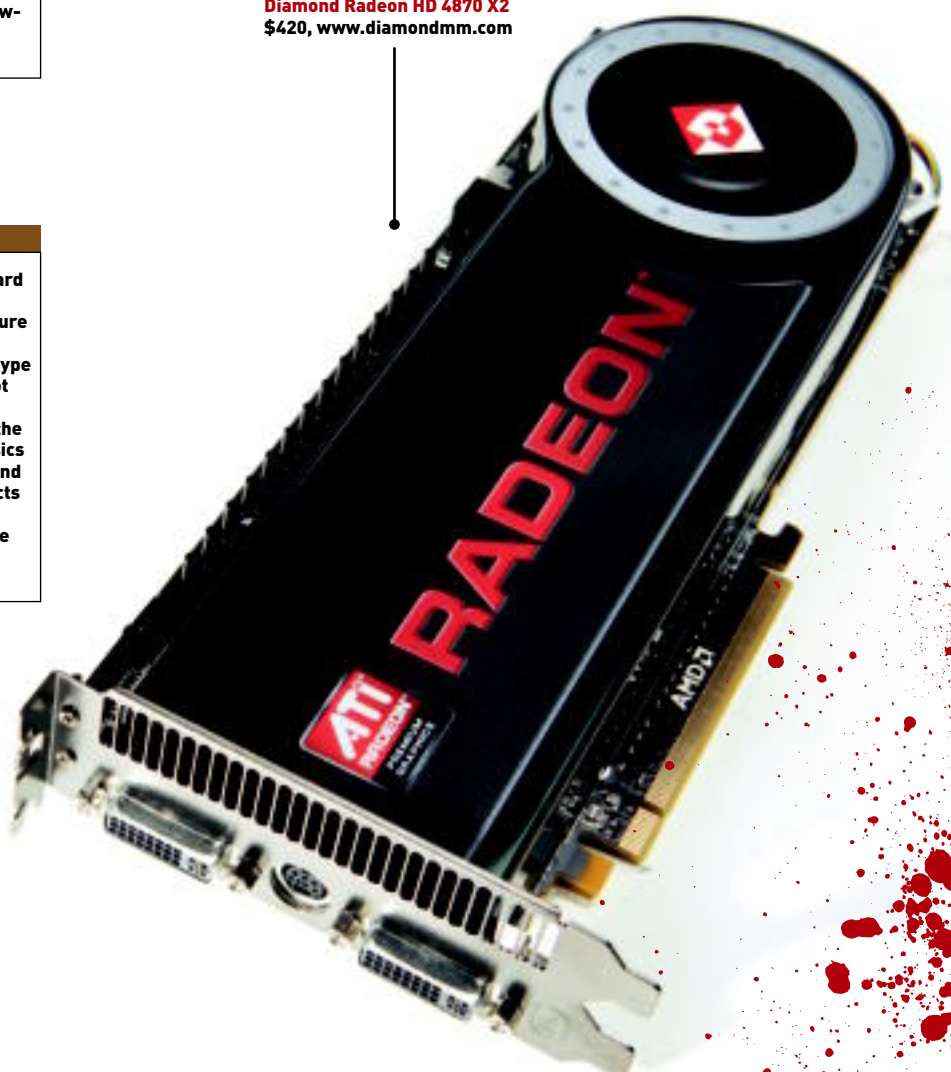
With great performance come great power and heat. While the GeForce GTX 295 is markedly faster than the 4870 X2, its new cooler doesn't do a particularly good job dissipating heat. The X2 exhausts out the back of the case; the GTX 295's heatsink sandwich (two daughterboard's sandwich a cooler) seems to blow most of the card's hot air back into the case. On the power front, the 4870 X2 also has an advantage, drawing 264W vs. 289W for the GTX 295.
Winner: Radeon 4870 X2

ROUND 4

EXTRA FEATURES

Despite having a pair of GPUs each, neither card sacrifices multi-monitor support like some earlier multi-GPU boards did. The bonus feature of note for videocards these days is general-purpose GPU computing. But despite all the hype surrounding this concept, it's essentially moot to consumers as long as we're without an API that works on multiple platforms. That said, the games that support Nvidia's proprietary physics acceleration technology, PhysX, look better and have more impressive cloth and particle effects on Nvidia cards than on ATI cards. That gives Nvidia an advantage, even if it's only in the eye candy department.
Winner: GeForce GTX 295

Diamond Radeon HD 4870 X2
$420, www.diamondmm.com



And the Winner Is...

It's the obvious choice, but we have to respect the performance advantage that **Nvidia's GeForce GTX 295** card has over the older ATI dual-GPU part. The most interesting thing that's come out of this generation of GPUs, though, is that two-GPU videocards work exactly the same as their single-GPU brethren do—with full multi-monitor and none of the gotchas that plagued earlier dual-GPU boards. These are cards that are suitable for mainstream users—no more fiddling with profiles to get your games working—yet deliver better performance in all of our tests than any single-GPU cards. That's something everyone can be happy about.

Our consumer advocate investigates...

Samsung LCD Switcheroo?
Warranty Woes
Questionable Vista Certification

Will the Real LCD Please Stand Up?

Maximum PC and every other major review site lists the Samsung 245T as an S-PVA panel. However, Samsung has replaced the S-PVA panel with an "a-si TFT/TN panel," which is the worst of any LCD panel technology.

For those who don't know, unlike most 8-bit S-IPS/S-PVA/MVA panels, TN panels are only 6-bit and unable to display the full 16.7 million colors available in 24-bit true color, which your review was based on.

My proof of a "bait and switch" is Samsung's own website. In one place, it says the monitor uses S-PVA, in another it says it uses TFT/TN. I contacted the company about it and the tech initially said it was S-PVA, but after I showed him the other spec sheet that said TFT/TN,

Conflicting spec sheets on Samsung's website list the 245B as being either an S-PVA or a TFT/TN panel.

The Dog looked at the two conflicting documents from Samsung's website and there is indeed something wacky going on. One spec sheet lists the 245T as S-PVA and the other says it's the inferior TFT/TN panel type. Which is correct? The Dog contacted Samsung and was told that the panel used in the 245T is indeed the superior S-PVA type. So why the conflicting documents? The spokeswoman didn't know but said it is likely a typo and she would look into getting it corrected. So no apparent bait and switch, just a typo—you can put away the Jump to Conclusions mat.

I GUESS SAMSUNG BELIEVES ITS DISCLAIMER IS FAIR WARNING, BUT I THINK IT'S WRONG

he was stumped.

I guess Samsung believes its disclaimer that "features and specifications are subject to change without prior notification" is fair warning, but I think it's wrong. I need you to look into the matter further to raise public awareness regarding this tactic from a major company.

—Morgan J. Epperly

No Support for Vista Ultimate

I purchased a retail copy of Microsoft Windows Vista Ultimate from Best Buy in November. I was having problems, so I contacted technical support in December. Instead of getting help, I was told that I did not have a warranty on this version of Windows Vista Ultimate. When I asked why, I was told it was an International version. The warranty had lapsed and it might be an illegal copy.

I told the tech that I had all the paper work, the original box, and the receipt. I also read to the representative the description on the package, that it was not an International version that it was for distribution in the U.S. and Canada only. I activated Windows a few days after I bought the program. Somehow Microsoft claims that my product identification number is invalid. Microsoft is the one that gave me the PIN for the product.

I asked to speak to a supervisor. He, again, said my warranty had expired. I asked how that could be as I just bought it. He said that I get a 90-day warranty after the first call in for support. I said "great," because this is my first call. He then said that I do not get a warranty because I bought it from Best Buy. I asked what that had to do with it. He didn't know, but said that Microsoft doesn't make warranties available for everyone who purchases Vista Ultimate. I said it was a retail version and came with a warranty. He said that it did not and if I wanted support I would have to pay for it. The supervisor said he was the last stop and that I could not escalate it and that my call was over and nothing could be done.

My question to you is how many other people is Microsoft cheating out of support for the premium edition of its operating system? Is Microsoft going bankrupt and can't support its customers anymore? Or is Microsoft just setting itself up for a trip to Washington to beg for a government handout?

Can you help me? Do you know anyone higher up at Microsoft that can explain why retail purchasers of Vista Ultimate get no tech support at all? Why should I purchase its premium software and then have to pay $59 to see why it isn't working correctly? Please

help. Please print this letter so everyone sees what Microsoft is up to.

—Gary Teal

Gary's problem sounded quite intriguing. After reading it, the Dog assumed three possible explanations: One, Gary some how got his hands on an OEM copy instead of a retail copy of Vista Ultimate. Two, Best Buy was selling some odd-duck boxed copies without support (education versions, perhaps). Three, the store where Gary bought Vista Ultimate somehow got its hands on counterfeit copies of the OS—it's been known to happen in the past, even with very large retailers.

So what's the answer to Gary's quandary? Blame Vista's upgrade process. The Dog pinged Microsoft officials who had engineers contact Gary. This was what they reported back: "While talking to him, they have discovered that Mr. Teal's (OS copy) is in fact genuine; the issue is related to Windows Setup while conducting an inline upgrade. Microsoft will be running some diagnostics on Mr. Teal's current setup kit and, in addition, they're sending him a new 64 Bit Windows Vista Ultimate Kit along with a new product key."

Drivers Work, Just Not the Apps

I purchased an Epson Perfection V500 Photo Scanner last year. Two of the deciding factors in choosing the Epson over a Canon model was the full version of Photoshop Elements and that the scanner has a big logo that says "Certified for Windows Vista." The problem is, the scanner includes Adobe Photoshop Elements 4.0 which does not work with Windows Vista. I figured that "Certified for Windows Vista" would mean the software bundle would work with Vista, but I guess not. I contacted Epson support and was told: "I apologize for the inconvenience you have experienced. Please understand that the software versions bundled with Epson products are the version the manufacturer has provided Epson. The software bundles are included with an Epson product so that customers have immediate access to the features provided with the product via the software. However, customers are free to use other software, upgrade to the full version, or purchase later versions. For this you will need to contact the software vendor directly, as this service is not provided by Epson. Therefore at this time we are not able to offer you an upgrade."

—Sean Fowler

The drivers might be "Vista Certified," but that doesn't mean the apps in the box are.

Not all is lost, Sean. Although Photoshop Elements 4.0 is not technically compatible with Windows Vista, many folks have reported that it mostly works in the newer OS. You need to run a patch (http://support.microsoft.com/kb/932246) on Windows Vista (provided you don't have Service Pack 1 installed, which should roll this support into the OS). People are reporting that the only issue with Elements 4.0 on Vista seems to be the Adobe Updater, which automatically finds and installs updates for Elements 4.0.

The Dog does side with you on this one, though. If Epson is touting Vista support on the box, shouldn't all of the applications also be Vista capable? The Dog pinged Epson for its side of the story and after a couple of weeks was told: "Thanks for your patience on this inquiry. It's important to note that Vista support was added after the Epson Perfection V500 was originally manufactured and introduced. However, in order to accommodate the needs of customers, Epson Customer Service provides Photoshop Elements 5.0 and the Vista patch for that version for those customers using Vista who want to use the included Photoshop Elements 4. The Epson Connection can be reached at 1-800-922-8911. Also, please find the link to the Vista patch at: www.adobe.com/support/downloads/detail.jsp?ftpID=3569."

Although this seems to contradict what you were told earlier by tech support, Epson has apparently since had a change of heart and will offer the upgrade to people who request it. Woof.

EMAIL THE WATCHDOG If you feel you've gotten a raw deal and need assistance setting a vendor straight, email the Dog at watchdog@maximumpc.com. Please include a detailed explanation of your problem as well as any correspondence you have sent concerning the issue.

50 Things Every PC Geek Should Know

Maximum PC presents the be-all, end-all guide to the complete and utter mastery of the geek arts

BY NORMAN CHAN, ALEX CASTLE, AND WILL SMITH

Back in our September 2008 issue, we published a list of "9 Skills Every Nerd Needs"—a lighthearted declaration of the essential abilities we believed every *Maximum PC* reader should have in his or her mental toolbox. Then the letters started. Boy howdy, did the letters start! The outspoken response to the article—correcting and amending our list—followed by a Gizmodo story on the same topic, convinced us that we needed to revisit the topic of the geek (and nerd) skill set in greater depth. To make this, the ultimate list of geek skills, we expanded and refined our original story, pulled in the best suggestions from the Internet, and then figured out how to actually teach a geek-in-the-making these talents. The result fills the next 10 pages, a complete compendium of the skills that define a true Renaissance geek. Have anything to add to our list? Think we missed something? Email us at comments@maximumpc.com.

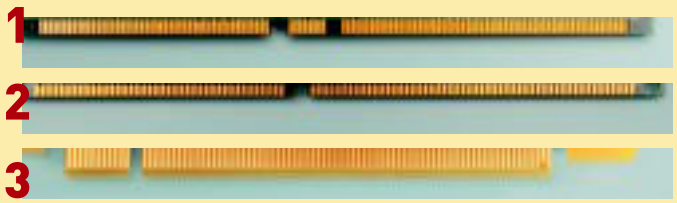
ILLUSTRATION BY ADAM BENTON

IDENTIFICATION

Name These Connectors

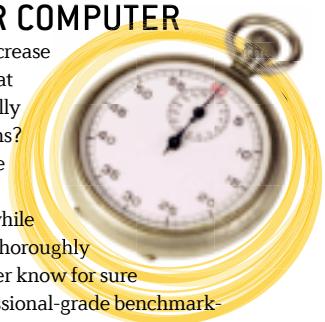
Finding hidden hardware gems in bins of archaic parts at computer shows and swap meets is an ever-so-crucial geek skill. Frequently, the only way to discern the difference is to do an on-the-spot ID of the edge connector. True hardware aficionados should be able to identify even the most esoteric connector in their sleep (if they sleep with their eyes open, that is). Can you separate the crap from the kick-ass? No cheating!

A PCI Express connector, **B** DDR memory, **C** Dual-channel RIMM



Answers on page 27

BENCHMARK YOUR COMPUTER



There are numerous ways to increase your PC's performance. But what fun is that unless you can actually measure how much faster it runs? You might be able to get a vague idea of how much it's improved by observing its performance while playing games, but unless you thoroughly benchmark your rig, you'll never know for sure what gains you've made. Professional-grade benchmarking software like the kind *Maximum PC* uses for hardware reviews can be pretty pricey, but it's possible to benchmark your system using entirely free software. For the full scoop on benchmarking your PC, check http://tinyurl.com/bezhq2.

BUILD A HACKINTOSH

Admit it, you've cast some sidelong glances at OS X, wondering to yourself if Apple's shiny operating system really lives up to the hype. Well, we're here to tell you that it's OK to be curious.

Even if your pro-PC leanings have prohibited you from buying a Mac, they don't have to keep you from trying out OS X. There's a great Lifehacker Hackintosh how-to here: http://tinyurl.com/2adfwh. That's right, you can build your own rig from non-Apple components and run OS X. So go ahead; let yourself experiment. Who knows, you just might like it.

Beat Quake in Less Than an Hour

The speed run seems to be a lost art. Sure, new games have time trials, but they just don't carry the credibility or audacity of classic Quake speed runners. We're still amazed every time we watch a video of someone beating all of Quake in less than 15 minutes. It's not just the brevity of the run that impresses us; it's how gracefully these players navigate through levels, capitalizing on every perfectly aimed rocket jump and timed bunny hop to shave seconds off their run time. Watch and learn from these masters (http://tinyurl.com/cqczhf).

CALCULATE A PITCHER'S EARNED RUN AVERAGE

If you think that geeks and sports don't mix, you're dead wrong. Take baseball: The game involves more statistics than you can shake a spreadsheet at. And if you're a true geek, you know how to make heads and tails of all that data. A pitcher's ERA, for instance, is nine times the number of earned runs he allows in a season, divided by the number of innings he's pitched in that season.

KNOW THE 14 BASIC HTML TAGS

Dreamweaver is for sissies; real geeks prove their skills by going old-school and coding web pages by hand in Notepad. But even if you can't keep up with the newest iterations of hypertext markup language, you should still be able to at least edit website code to make minor adjustments. Remember, with the exception of <br /> and <img>, these tags should enclose the text you want to modify, for example <h1>This is a Big Headline</h1>. By putting a / into the tag, you tell the browser where to stop rendering text using the selected tag. So in case you've forgotten, here are the 14 most basic HTML tags:

`<h1> to <h6>` – Heading styles from large to small
`<p>` – Start a new paragraph.
`<br />` – Create a single line break
`<!--Your Comment Here-->` – Make a hidden comment
`<hr>` – Mark the page with a horizontal rule line
`<table>, <tr>, and <td>` – Create tables, rows, and cells, respectively
`<ul> and <li>` – Start a new unordered list, then denote bullet points within it
`<em>` – Emphasize text (usually with italics)
`<strong>` – Strong emphasis (usually bolded)
`<a href="URL">` – Creat a link
`<img src="URL" alt="description">` – Insert an image

BYPASS THE CONTENT FILTER ON PUBLIC COMPUTERS

Are the content restrictions on public computers cramping your style? Don't worry about it; there are two easy ways to bypass those filters completely.

If you're just doing some normal web browsing, and aren't planning to send any passwords or sensitive information, you can try using a simple web proxy. Proxy.org maintains a list of free anonymous proxies. If you're worried about privacy, using Tor is a more secure option. If you install Tor (www.tor.com) on a copy of the portable edition of Firefox (see below), and keep it with you on a USB drive, you can surf the web anonymously from any computer that allows you to run your own software.

RUN ALL YOUR ESSENTIAL APPS ON A USB STICK

Any real geek is sure to have a USB thumb drive in his pocket at all times. After all, USB flash storage is pretty much the best way to keep data conveniently at hand. What the average geek might not know, however, is that you can use your USB stick as a mobile platform for your browser, email and instant message client, office suite, and more, and access these programs, settings intact, from any computer with a spare USB slot.

It's all made possible with PortableApps (www.portableapps.com), an open source platform for portable software. Download whichever version of the portable suite meets your needs. Run the installer, and choose to install to the root of your USB drive. If you want to add more portable applications just download the app, then select "Add a new app" from PortableApps's options menu and browse to the paf.exe file you downloaded.

Right now, there are portable versions of heavyweights like Firefox, Thunderbird, and OpenOffice, as well as a bunch of other awesome programs.

PICK A LOCK

Picking locks in videogames has always been pretty easy; you make a skill check, break a pick or two, maybe even play a little mini-game, and the door swings right open. In the real world, picking a lock is a lot tougher, but it's still a skill you can acquire with a little practice. You can find a great article about how to pick a lock here: http://tinyurl.com/2d9cc2, complete with video, diagrams, and information on how to make your own picks.

Once you've mastered the basic pick-and-tension-wrench method, check out how to bump a lock (http://tinyurl.com/yukl5f). This is an even more sophisticated and efficient method for picking a lock, and is sure to impress your friends.

REPAIR

Straighten the Pins on An Older CPU

There are two quick ways to realign the bent pins on an older CPU. The first, quickest way is to take a credit card and run it through the rows of pins in each direction, which will straighten slightly bent pins.

If a pin is bent too far for the credit card trick, use the barrel of a mechanical pencil to sheath the pin and gently straighten its orientation.

Indentification Answers: 1-c, 2-b, 3-a

GET THROUGH TO EXECUTIVE CUSTOMER SERVICE

When hardware breaks, you have to hit up the customer service line, which can often be an excruciating process involving a seemingly infinite loop of robotic menus, interminable hold times, and patronizing, outsourced technicians. There are a couple ways to make the process easier.

If you're stuck dealing with a robot phone menu, there's usually a way to get through to a human. Generally, ignoring the prompts and repeatedly mashing the 0, 9, *, or # key will confuse the system enough to send you to an operator. Or try www.gethuman.com, where there's an enormous list of customer service numbers, and the way to get through to a human at each one.

If you're not having any luck with the "tier 1" tech support and they won't elevate you when you ask, search for the phone number of the offending company's corporate office (the Consumerist has a whole bunch available here: http://tinyurl.com/55yyg7, or you can search for a public traded company's corporate info on Yahoo! Finance) and try your luck there.

USE PHOTOSHOP OR GIMP TO IMPERCEPTIBLY DOCTOR A PHOTO

No, adding humorously misspelled text to a picture of a cat doesn't count.

It's been said that a picture is worth a thousand words. Now, thanks to the power and ubiquity of Photoshop (or GIMP, for the open source fans and the extra-thrifty), everyone knows that many photos are chockfull of lies and deception. But this power can also be used for good. Learn to correct basic exposure problems, retouch blemishes, and remove flaws from your photos yourself; you'll be better equipped to see through other people's photo trickery.

WIRE YOUR HOME WITH ETHERNET

The future may be wireless, but in the present it's still very handy to have your house outfitted with old-school CAT5 or CAT6 Ethernet. Unfortunately, if carpentry isn't really your strong suit, the job of running hundreds of feet of cable through your walls, floors, and ceilings might seem a bit daunting. You can take heart in the fact that *Maximum PC* EIC Will Smith didn't get scared when faced with the same challenge, and everything worked out fine. Read more at: http://tinyurl.com/bstn7m.

SAY NO TO EXTENDED WARRANTIES

Yeah, it sucks when one of your favorite doodads breaks down just one week after the manufacturer's warranty expires, but in the long run you're doing yourself and your wallet a disservice if you shell out for extended warranties.

Instead, read user reviews and consumer reports about electronics before you make a purchase, and make sure you buy brands with a good reputation for reliability. Also, compare the warranties offered by the different device makers; some companies offer much longer coverage than others.

Furthermore, most major credit cards offer extended warranty protection. This means that if you use a credit card to buy something that comes with a manufacturer warranty, the credit card company will automatically provide some amount of warranty coverage after the manufacturer's warranty expires. Visa cards, for instance, will match the term of the original warranty in extended coverage, up to an additional year.

Tell Dr Pepper from Mr. Pibb

Ah, the age-old question: Which reigns supreme, Dr Pepper or Mr. Pibb? Well, actually it's not much of a contest. After all, there's a reason that Pepper got his PhD and Pibb is still stuck slaving away in the world of blue-collar sodas. Hell, the kids these days don't even call Mr. Pibb "Mr." anymore; he's just "Pibb" now.

But just knowing which is superior isn't enough. A true nerd can distinguish between the two in a double-blind taste test and can reverse-engineer each into its secret ingredients. The rumor that Dr Pepper is made with prune juice is rubbish. We could tell you what the secret flavoring is, but where's the fun in that?

Install a Hard Drive In a Laptop

Some people get nervous about opening up their laptops. After all, everything in there is so small and delicate-looking. But a real geek knows that a laptop hard drive is just about as easy to replace as a desktop disk, and thus won't be afraid to dig into his notebook's innards.

Removing a hard drive from a notebook generally involves unscrewing the bottom panel of the laptop, unplugging the hard disk, then unscrewing and removing the drive's bracket from the computer. Extricate the old drive from the bracket, then replace it with a new drive and slide it back into the notebook. Close the cover, reboot the machine, and be ready to reinstall Windows or restore your last backup.

PROTECT YOUR WI-FI

There are just a few things you need to do to keep your brand-new wireless router secure. All of these changes can be made from the router's setting page, which you get to by entering its IP address into a browser.

1 **Change the router's name.** Using the default name is an invitation to hackers.

2 **Change the admin password.** As mentioned in the Freeloading section below, the default admin passwords for every router are easily available to every hacker with two brain cells to rub together.

3 **Activate the router's encryption.** Use WPA encryption rather than WEP, as long as all machines on the network can use it, since it's much more secure. Obviously, pick a strong passphrase.

REPLACE THE CONTROLLER BOARD ON A HARD DRIVE

Hard drive failure is more common than you think, but the culprit isn't always a mechanical failure. If your hard disk dies and you didn't hear any screeching death rattles, one thing you can always try is replacing the drive's controller board. It's a long shot, but an essential skill nonetheless, and it occasionally works.

Replacing a hard drive's controller board is as simple as unscrewing the PCB from the bottom of the drive and detaching the ribbon connector. DO NOT open the drive's case and expose the internals to air. You also have to make sure the new board comes from EXACTLY the same hard drive model as your defective unit—the make, model, and even firmware have to match. Mount the new board using the same screws and connect the ribbon cable. If you did everything right and the problem was indeed the controller board, you should be able to retrieve your data.

USE A DSLR IN FULL MANUAL MODE

Modern digital cameras are pretty user-friendly. You just turn them on—maybe adjust a setting or two, depending on the type of photo you'll be shooting—then simply point and click. However, if you ever want to take photos at more than an Ashton Kutcher level, you're going to have to learn to use an SLR.

And sure, modern DSLRs can do most of the focusing and aperture adjustments for you, but if you really want to shoot like a pro you'll need to be able to operate the camera in full manual. It's not just for bragging rights, either; manually operating your DSLR will result in a better understanding of the operation and physical underpinnings of your camera, and will ultimately make you a better photographer. Lifehacker has a kick-ass how-to explaining everything you need to know about manually controlling your SLR (http://tinyurl.com/2jqbk7).

FREELOADING

Mooch Wi-Fi Pretty Much Anywhere

Even without getting into the complexities of cracking passwords, there are a couple of things you can do to snag some connectivity off of nearby wireless networks. First, check the list of in-range routers for those using the factory-default router name, such as "linksys" or "belkin," as these are the most likely to be unencrypted or poorly protected. If they are encrypted, try common default passwords like "admin," "password," or the name of the router. If that doesn't work, use this enormous list of router-specific defaults to find some others to try: http://tinyurl.com/39teob.

PULL OFF AN ELABORATE PRANK

It takes a lot of smarts to pull off a truly exceptional prank, so it makes sense that most of the all-time great pranks have been pulled off by the nerds at super-brainy institutions like MIT. Of course, you don't have to be able to come up with pranks as involved as Caltech's (http://tinyurl.com/beml2u), but you should keep a trick (http://tinyurl.com/2f5j4t) or two (http://tinyurl.com/ypqkw7) in your repertoire. After all, you never know when the next great prank war is going to break out.

DECORATE YOUR ROOM USING ONLY PRINTER PAPER

Some people might think that decorating a room requires a trip to Crate and Barrel and an open line of credit, but if you're a real nerd, you know better. You know that you can get all your decorating done with nothing more than a printer and some paper.

To cover your walls, you don't need fancy stuff like "artwork," or even real posters; all you need is the Rasterbator (http://tinyurl.com/2egvf). Find a reasonably high-res image, and the Rasterbator will blow it up and split it into single-page-size chunks for you to tape together. However, if you want your poster to be one contiguous image, be prepared to spend some time with a ruler and razor blade trimming off the white borders.

If your shelves are feeling a little barren, it might be time to fill them up with a little papercraft. If you've been on the Internet over the last couple years, you're probably aware of the general idea behind papercraft—you print out a template and fold it, origami-style, into a little paper model. What you might not have known is that it's easy to create your own papercraft templates (www.tamasoft.co.jp/pepakura-en/). So get to it!

Set Up a RAID

What kind of self-respecting geek would be satisfied with one measly hard drive acting alone? With the prices of enormous drives hitting comically low levels, this is the perfect time to set up a big ol' RAID. If, somehow, you're not already familiar with the different types of arrays and their relative strengths, check out our article here: http://tinyurl.com/ajw9f3.

PROGRAM AND BUILD A SIMPLE MICRO CONTROLLER CIRCUIT

This goes hand-in-hand with learning to solder, but assembling a basic microcontroller circuit is a definite geek must-know. For $150, ThinkGeek sells an experimentation kit (it's designed for kids, but we won't tell if you won't) that will walk you through the basics of analog circuits, digital circuits, and programming in BASIC (http://tinyurl.com/6j3de4).

SOLDER LIKE YOU MEAN IT

The basics of soldering are simple: Take a hot soldering iron, heat a bit of solder, and then use the molten metal to fuse the two bits of electronics you want to connect. However, there's a big difference between soldering that gets the job done and soldering that gets noticed. To move beyond the basics, you'll need to master using the minimum amount of solder necessary, you'll need to spend some time practicing, and you'll want a soldering iron that gives you precise control over the temperature of your tip. For more info, see http://tinyurl.com/hswfo.

SECURELY ERASE YOUR DATA

When you format your disk, most of the data it contains is not actually deleted. Rather, the disk space that it occupies is marked inaccessible and overwriteable by the file system. Until it is actually overwritten, the data on the formatted disk is still recoverable by anyone with the right tools. If you want to more thoroughly destroy your data (without destroying your hard disk), you'll want to perform a data wipe—an operation that overwrites a pattern of 0s and 1s over all the bits on the hard disk.

Most hard disk manufacturers offer some sort of app on their website that will allow you to wipe your drive. These utilities are the most reliable option, but if you can't find them, there are also free apps such as Active@KillDisk (http://tinyurl.com/fcpt), which should do the job on any hard disk.

There is some theoretical chance that magnetic remanence could allow someone to recover data from a wiped drive, but it's such a long shot that you're better off not wasting money on software that promises to overwrite your drive some ridiculous number of times.

Image credit: Flickr user Mykl Roventine: http://tinyurl.com/cldh6f

Recite Pi to 23 Decimal Places

You may have gotten away with 3.14 in 10th grade geometry, but it's just not going to win you the respect of the geek community. We consider 23 places the bare minimum for pi memorization.

If you're having trouble dealing with all those digits, try "chunking" your memory. That is to say, instead of simply trying to remember each number in sequence (a task that humans tend not to be very good at), try to remember the numbers in groups, or chunks, that have more significance for you. If that's not doing the trick, consider piems—stories and poems structured around digits of pi.

For the record, pi is: 3.14159265358979323846264....

RIP YOUR CDS TO FLAC

Everyone knows how to rip a CD to MP3 using iTunes, but if that's the way you convert your tunes to a portable-friendly format, you're doing your ears a disservice. While MP3 and other lossy formats sound OK on tinny earbuds and portable players, hook them up to a true audiophile rig, and you'll be disappointed. Ripping your CDs using a lossless codec, like FLAC, using EAC's secure mode gives you a bit-for-bit identical audio file at a fraction of the size of an uncompressed CD. Of course, if you still insist on ripping to MP3, you can use EAC and LAME to do that, too (http://tinyurl.com/2w536a).

STREAM YOUR MOVIES, MUSIC, AND PHOTOS TO ANY TV IN YOUR HOUSE

You've taken the time to rip and transcode hundreds of DVDs for playback on your iPhone, PSP, or other digital media player. You also have a current-gen gaming console—an Xbox 360 or PS3—hooked up to a giant TV in your living room. Right now, you have everything you need to stream your high-quality DVD rips from your computer into your living room using TVersity and our handy how-to guide (http://tinyurl.com/7pk3ur).

DUAL-BOOT YOUR PC

Dual-booting two versions of Windows or running Linux on a separate partition can be a life-saver when your main OS takes a dive. Plus, it's a good idea to be at least moderately familiar with all the common OSes—after all, you're bound to encounter a relative with a Linux-powered netbook who needs some free tech support.

It's not difficult to install a second OS on a second hard drive or empty partition—you just boot from an installation disc and choose the appropriate partition of your hard drive. But how about getting Linux to install without formatting or repartitioning your hard drive? Our guide explains how you can try out all the features of the Ubuntu Linux distribution without screwing up your existing data. Check it out at http://tinyurl.com/5uthre.

RECOVERY

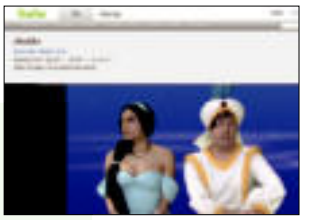
Get into a Windows Computer if You Forgot Your Password

So, you managed to lose the password to your Windows account. How screwed are you? If you're a true geek, not very. There are a couple of things you can do to try to recover your password.

First, if you haven't changed the default settings on your Windows install (which you should have), you may be able to log into an unprotected administrator account by starting the PC in safe mode. To do this, press F8 as the computer boots. If you can get into the system in this mode, you can reset other users' passwords by clicking the "User Accounts" icon in the control panel.

If that doesn't work, your best bet is to attempt to crack the password using a cracker like Ophcrack (http://tinyurl.com/7jmzu) loaded onto a bootable CD, floppy, or USB drive.

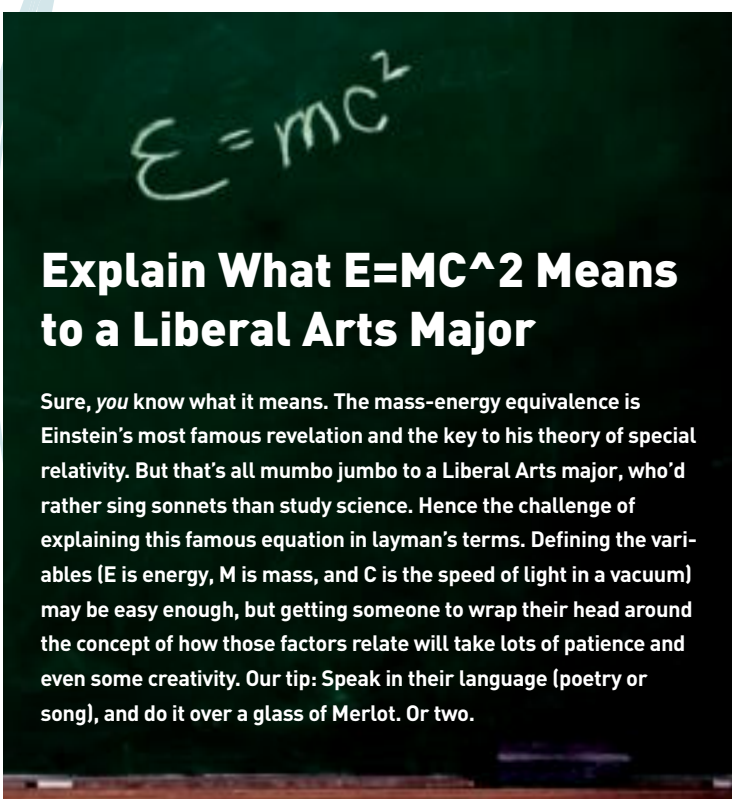
WATCH TV SHOWS ON THE INTERNET (LEGALLY!)



For quite a while, watching streaming TV on the Internet meant suffering through tiny, poorly encoded video on YouTube, 10 minutes at a time, hoping that whatever you were watching didn't get removed before you were done. But those times are behind us now, with a host of corporate-sponsored sites offering legal, ad-supported shows and movies in (comparatively) luxurious resolution.

So what are the options available? Hulu's (www.hulu.com) still pretty much the best site out there, offering a huge array of full-length shows from NBC, Fox, Comedy Central, FX, and others. Veoh.com hosts ABC's programs, as well as others, and YouTube has recently reached an agreement with CBS to host its shows. One of our favorite video services is Southparkstudios.com, which hosts every potty-mouthed episode of South Park for viewing on demand.

Streaming movies are just now becoming available from several sources. Hulu has a modest selection of free flicks, Netflix offers streaming movies to subscribers, and Amazon, Blockbuster.com, and others allow you to stream videos for a per-movie fee.



Explain What E=MC^2 Means to a Liberal Arts Major

Sure, *you* know what it means. The mass-energy equivalence is Einstein's most famous revelation and the key to his theory of special relativity. But that's all mumbo jumbo to a Liberal Arts major, who'd rather sing sonnets than study science. Hence the challenge of explaining this famous equation in layman's terms. Defining the variables (E is energy, M is mass, and C is the speed of light in a vacuum) may be easy enough, but getting someone to wrap their head around the concept of how those factors relate will take lots of patience and even some creativity. Our tip: Speak in their language (poetry or song), and do it over a glass of Merlot. Or two.

INSTALL AND CONFIGURE A VIRTUAL MACHINE

Using virtual machine software you can install multiple OSes on one machine and switch between them, without rebooting or repartitioning! You can use VMs to do everything from running servers to setting up a sandbox for testing potentially infected files and applications. Getting started is as easy as downloading virtual machine software, installing it and creating your first machine, then installing Windows, Linux, BSD, or pretty much any other OS on it. Want to move your VM to another machine? That's easy too, just copy the file that contains your VM to your other machine, install the virtual machine software, and you're ready to go. There are a number of good free virtual machine apps available, but we prefer VMWare (http://vmware.com/) and VirtualBox (www.virtualbox.org).

RUN MULTIPLE MONITORS LIKE A PRO

There's no better way to assert your geek ascendancy than to load your desk to the buckling point with two, three, four, or even more monitors. But any old layman can plug an extra monitor into the back of his box and extend his desktop onto it in the display options menu, a power user knows that to unlock the full potential of his many displays, he needs a software solution like UltraMon (http://tinyurl.com/8c5e). If you're unsure about shelling out the 40 bucks for UltraMon, check out our guide to UltraMon alternatives (http://tinyurl.com/6d7nsx).

If you want to take multiple displays to the next level, consider using multiple computers connected across the network using a virtual KVM switch like Synergy (http://tinyurl.com/5jlgvh). Now that's sure to impress the kiddies.

PROTECT YOUR BROWSING HISTORY FROM SNOOPS

Want to keep your forays into the Internet's seedier spots unnoticed by your spouse? No problem. For most users, enabling the "private browsing" in Google Chrome or Internet Explorer 8 will do the trick. This feature stops recording your browsing history temporarily, which will prevent any unfortunate surprises the next day when Google autocompletes a tawdry search request. If you absolutely must store files to your computer that you don't want anyone else to know about, use a thumb drive (they're dirt cheap these days) and hide it in your sock drawer or something.

If you're dating an FBI agent, or are just absurdly paranoid, there are more secure solutions. You could just encrypt all the illicit data, but then you might have to face questions like, "Honey, why is there a password-protected .rar file sitting on the desktop?"

To get around this, hide your data steganographically. That is to say, hide it inside another file. You might have seen this technique used on the Internet (say, as part of an ARG) to hide a picture inside of an audio clip, but it can also be used to hide larger amounts of data. Using the open source app TrueCrypt (http://tinyurl.com/997bz), you can create an encrypted virtual drive of any size to hold your data, and give it an inconspicuous-looking filename.

KNOW THE MOST IMPORTANT LINUX COMMANDS

Want to use Linux? While it's not strictly necessary anymore, knowing these six Linux commands will help you in your quest to attain ultimate geekiness.

Bonus points if you learn how to use grep, an incredibly powerful command-line search utility (http://tinyurl.com/ox6fh).

`cd` – Used to navigate to different directories on your system, cd .. takes you up one directory, while cd / takes you to the root of the drive, and cd with no arguments takes you to your home directory

`ls` – Like dir on DOS, ls lists the contents of the directory you're currently in

`cp` – Used to copy files to a new location on your hard drive cp /home/wsmith/test.txt /home/bjones/text.txt

`mv` – Used to copy a file to a new destination, then demolish the old one. Uses the same syntax as cp

`mkdir` – Makes a new directory at your current location

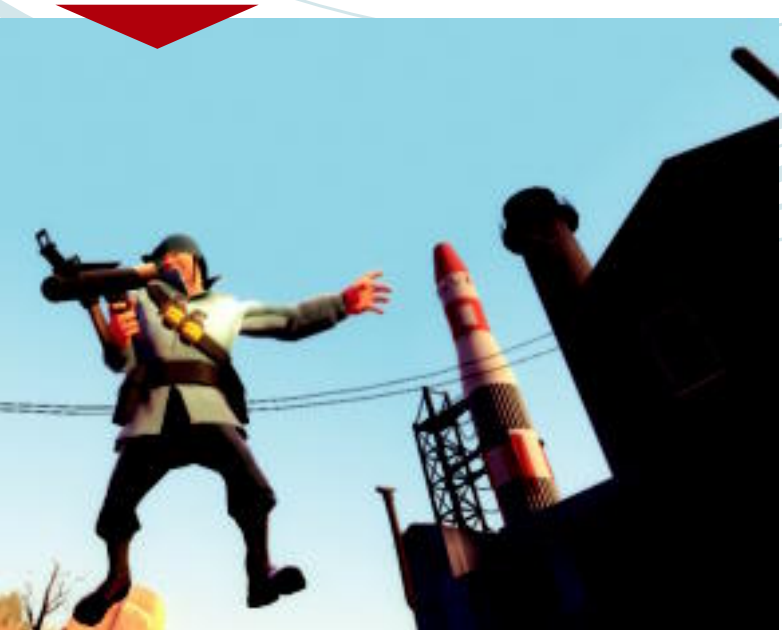
`rm` – Deletes the files specified. With the -r option, it also deletes subdirectories

ROCKET JUMP WITHOUT USING A MACRO

1 Run forward
2 Quickly aim down
3 Press fire and jump at the same time
4 Touch the sky!

That's it. Rocket jumping—the art of propelling yourself high in the air with the help of explosives—is actually easier than it looks. Whether you want to launch yourself to the roof above a control point or sail across a wide ditch, the only thing you need to remember is that you have to fire your rocket at the exact moment you jump. Also keep in mind that momentum matters, so if you want to fly forward, you have to be running in that direction as you rocket jump. Expert players will also be able to master the Rocket Crouch Jump, which gets you even higher (in some games, at least) if you press the crouch key immediately after you jump and fire.

This age-old tactic comes with a price. In Team Fortress 2, for example, a perfectly executed rocket jump costs 51 health points. On top of splash damage from your rocket, you also lose health from falling after a skyscraping jump (another 25 health in TF2). Avoid this extra penalty by landing above your starting position.



CREATE A CUSTOM ANIMATED SPRAY FOR SOURCE ENGINE GAMES

Expressing your individuality online can be difficult, especially if you're a gamer. It's easy to get lost in the crowd when you're running and gunning your way through games like Counter-Strike: Source and Team Fortress 2, but it's still possible to leave your mark on the world. Animated sprays are a great way for you to tell your enemy that, not only have they been pwned, but that you're the one responsible.

Custom animated sprays were limited to the most elite players in the days of Counter-Strike 1.6, but now that Source is here, that's all changed. You just need one simple tool and about a half-hour (http://tinyurl.com/39zmel).

AVOID DRM WHEREVER POSSIBLE

DRM is certainly a hot-button issue these days, and there's no better way to register your opinions than with your pocketbook. It would be nearly impossible to avoid DRM completely without resorting to piracy or giving up on a lot of fun things, but there are steps you can take to reward companies that release their IP without DRM. For instance, you can try awesome, DRM-free games such as Sins of a Solar Empire and World of Goo.

Most digital music stores these days are DRM-free, including Amazon and Walmart's stores, and now even iTunes's music, so you're in the clear there. Unfortunately, if you want DRM-free video, you're going to have to buy physical media and remove the DRM yourself.

DOWNLOAD FLASH VIDEO & BEND IT TO YOUR WILL

Any old schmuck can watch streaming video on sites like YouTube, but a real nerd's nerd can save the video to disk, convert it to run on his PSP and his modded DS, and save it to DVD, all before you can say "copyright infringement." If you can't do all that, educate yourself here: http://tinyurl.com/arvv7e.

CONFRONTATION

Debate the Relative Merits of an Imperial Star Destroyer vs. the USS Enterprise

It's the debate to end all debates. The quintessential battle between two breeds of geek: the hypothetical confrontation between *Star Trek's* USS Enterprise (say, the 1701-D from *The Next Generation*) and an Imperial Star Destroyer from *Star Wars*. The dispute will probably never be resolved, but satisfaction doesn't come from a resolution, it stems from the details of the discussion. Do lasers have any effect on the Enterprise's shields? (No, according to the *TNG* episode "The Outrageous Okona.") Should you take into account TIE fighters? What about the Force? We could go on and on.

To adequately prepare for the debate, you should watch all 176 episodes of *The Next Generation* along with the three original *Star Wars* films. In addition, you can familiarize yourself with the various technical manuals released detailing the specifications for each ship, though these might not be considered "canon." Pointing out technical inconsistencies and plot loopholes is also a reliable way to get on your opponent's nerves.

INSTALL THIRD-PARTY FIRMWARE ON YOUR ROUTER

Navigating through a router's multitude of menus and configuration settings can be confusing, especially given the obtuse documentation typically bundled with the device. That's why we prefer third-party open source firmware, which not only streamlines a router's graphical user interface but also adds robust functionality. For Linksys routers, our firmware of choice is Tomato (www.polarcloud.com/tomato). As with all third-party firmware upgrades, installing Tomato does come with a slight risk of damaging the router. While we've never had any problems with this software, it'll definitely void your router's original warranty. Read our guide (http://tinyurl.com/aqhl6k).

BUILD YOUR OWN COMPUTER

We're a little hesitant to say too much about this item on the list, since we don't want to insult our readers' PC IQ too much— surely, if you read *Maximum PC*, you've probably built at least one PC. However, the bottom line is that if you've never built your own computer from parts, you might as well just turn in your pocket protector right now, because you're not a real geek.

If you've somehow made it this far without putting together a PC and want to start now, or just want our advice on a powerful machine you can make without breaking the bank, check out our $800 Gaming PC build-it guide (http://tinyurl.com/6rlfpl).

OVERCLOCK YOUR PC AND TUNE YOUR BIOS

If you're still running your computer's components at their factory default settings, you're missing out on a lot of potential power. You can check out our guide for overclocking your CPU and RAM at http://tinyurl.com/ch59wd, but if that's not enough, you can learn to overclock your videocard here: http://tinyurl.com/6nm5sq.

Find Everything You Need to Know Online

There's a big difference between using Google and being a Google wizard. Sure, there are some basic syntax rules that will help you hone your searches, but you also need to carefully consider the keywords you search for, ruling out common words or words that have multiple meanings to get to the definitive page for your query. Just in case you didn't already know, here are three vital Google query tricks.

`"query terms go here"` – returns only pages that contain the exact phrase in quotations

`-searchterm` – excludes pages that include the term preceded by a -

`site:www.maximumpc.com` – displays only results from that URL

Use Remote Desktop

One of the most powerful mobile computing tools available to Windows XP and Vista users is Remote Desktop. It's pretty easy to set up and it allows you to securely access and control your home or office computer from anywhere. To use Remote Desktop, follow these steps:

1. On the host computer, enable Remote Desktop. On an XP computer this is done by clicking the System icon in the control panel, and then navigating to the Remote tab. Once there, check the box marked "Allow users to connect remotely to this computer" and click the "Select Remote Users…" button to select which users can connect remotely, bearing in mind that any users with administrator access can connect automatically.
2. Assuming your host computer is connected to the Internet through a router, you'll need to enable port forwarding for port 3389. If you do not know how to do this, simply head to http://tinyurl.com/clr3mf, select your router model from the list, and follow the instructions.
3. In order for other computers to connect to the host computer, you'll need to either get a static IP address from your ISP or use a service such as DynDNS.com, which will allow you to have a subdomain that always points to your computer, even if you have a dynamic IP. Also, make sure Remote Desktop is configured as an exception in Windows Firewall.
4. On the client computer, click the Start button, then Accessories, then Communications. Click the Remote Desktop Connection in that menu. In the menu that pops up, specify your host computer's IP address and click Connect. Then enter your login information just like you normally would, and you're all set.

GET AROUND IN DOS

With every passing year, the percentage of geeks who came of age after DOS gets larger. So listen up, young'ns, because even if it's not something you have to use very much anymore, if you don't know how to at least get around in DOS, you're going to look like a real PC lightweight.

Commit these seven commands to heart, and you'll never find yourself stranded in DOS:

`cd` – Change directory; essential for getting around
`dir` – List the contents of the current directory
`copy` – Copy a file, obviously. The syntax is "copy [filename] [destination filepath and filename]"
`mkdir` – Create a directory. The syntax is "mkdir [directory name]"
`move` – Move a file. Used with the same syntax as copy
`del` – Delete a specified file
`rd` – Delete a specified empty directory. If you want to delete a directory with contents, use rd /s /q which will delete the entire directory tree

RIP A DVD TO H.264

With hard drives getting bigger and cheaper than ever before, it makes more and more sense to rip your movies and TV shows to your hard disk. Video transcoding can be kind a tricky process, but last month's cover story was about doing just that. Missed it? You can check it out online (http://tinyurl.com/5rwwtu) or download it from our PDF magazine archive (www.maximumpc.com/articles/pdf_archives). It's time to clean off your DVD shelf.

WRITE AND C

Yeah, you're not
world" app in at
this is? It's tradi
when you learn
is print the phra

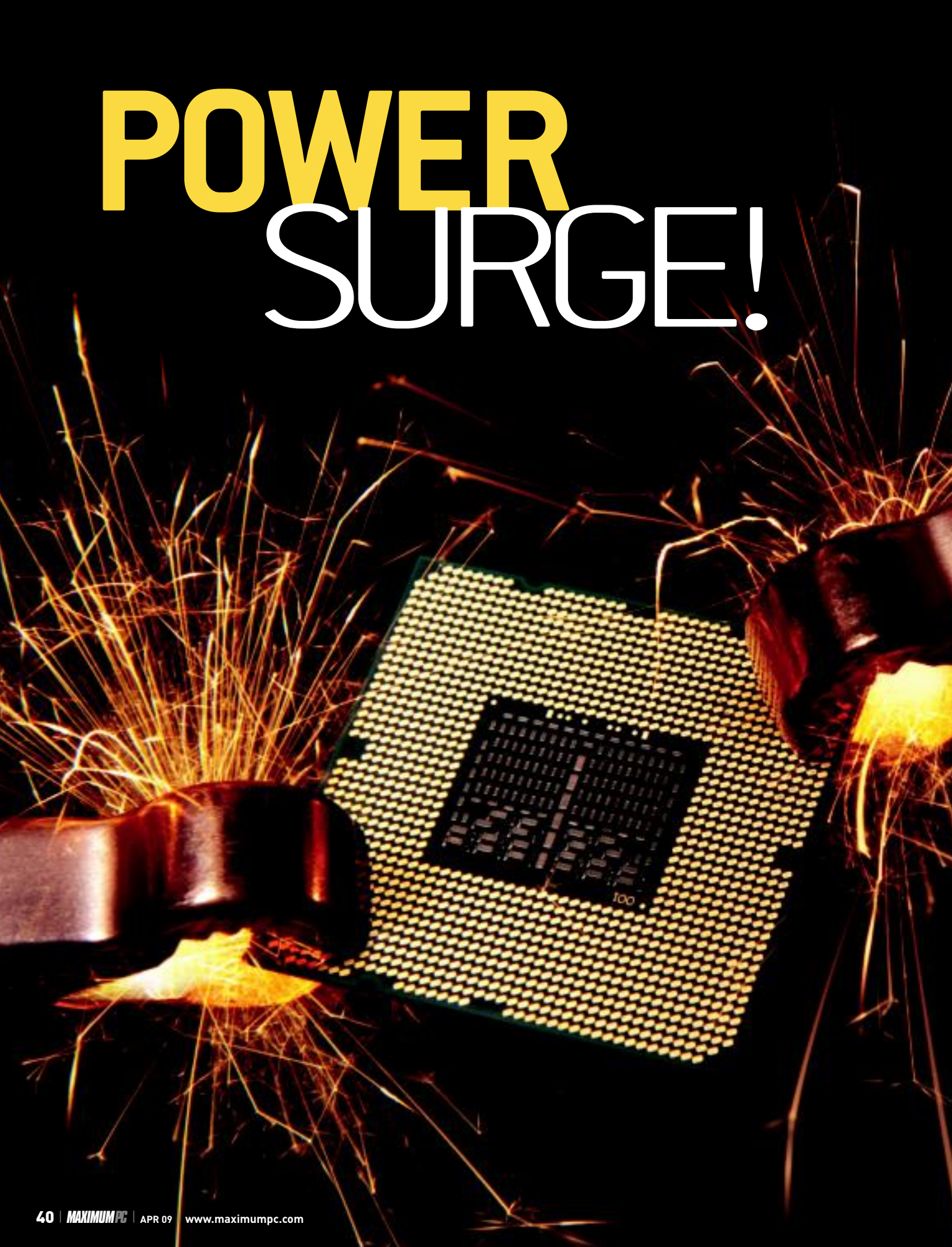
BONUS THING!

Be P
of th

It's import
ters. That
plies and
disaster s
may inclu

- A roboti
- The zon
- An alier
- An eart

POWER SURGE!



EVERYTHING YOU NEED TO KNOW ABOUT OVERCLOCKING INTEL'S NEW CORE I7

Overclocking can kill your CPU. It can corrupt your OS, melt your motherboard, and cause you to lose a month's work, or more. Despite those dire orange-alert warnings, though, overclocking has moved on from the Nerd's-Only Club to become practically a mainstream hobby in the last few years.

So why overclock if the risks are so great? For some folks, it's about bragging rights. Like drag-strip racers who burn up an engine just to set a quarter-mile record, there's a small community who will overclock a CPU to the brink of destruction just to run a benchmark and take a screen shot of the result.

The bulk of overclockers, however, are more concerned with the cost dividends. If you can take a $300 CPU and make it as fast or faster than one that costs $1,000, the money you save can go toward other components in your system. For these folks, it's like getting a free high-end videocard.

Whether you're a cheapskate or a drag racer, you'll find that Intel's new Core i7 CPU is unlike any previous Intel CPU, and overclocking this beast requires more tinkering than you might expect. Follow along as we explore what it takes to push this chip to its limits.

BY GORDON MAH UNG

PHOTOGRAPHY BY MARK MADEO

A Brave New World

The crumbling of the front-side-bus wall means a wholesale change in how you overclock Intel's top parts

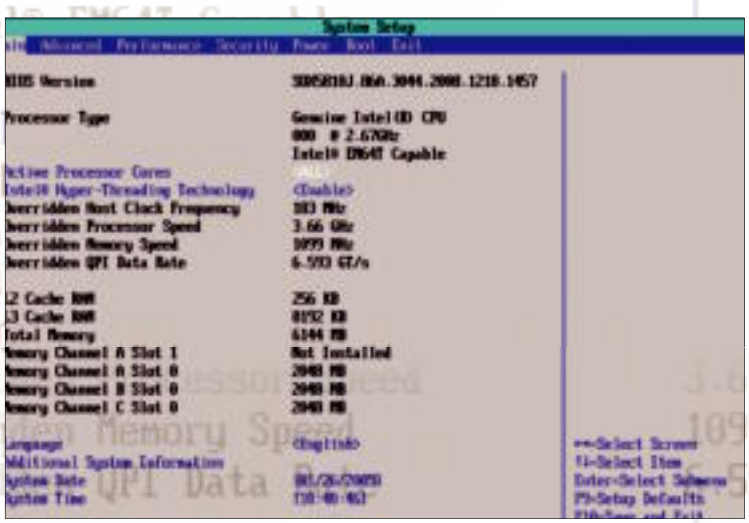
Veteran Intel overclockers have followed essentially the same process since the beginning. Like the basics of flying (stick, rudder, ball), all you had to worry about with an Intel processor was the front-side bus, clock multiplier, and core voltage.

Not so with Core i7. With Intel retiring the front-side bus, you'll need to brush up on your overclocking skills and concepts if you want to get the highest-performing overclock out of the Godzilla of CPUs.

THE BASE CLOCK

If you haven't kept up on current events, you need to know that Intel eliminated the front-side-bus architecture that has connected the CPU to the core-logic chipset since 1978. The memory controller, which used to sit in the chipset, is now integrated directly into the CPU.

Go into the BIOS on a Core i7 and you won't see any reference to the front-side bus. Instead, it's now the base clock, or bclock. Some BIOSes also refer to this as the host clock or reference clock. On the current i7 procs, the base clock is 133MHz. While it's not a front-side bus, most overclocking methods will require that you tweak the base clock just as you did with older FSB-based Intel chips and push it beyond 133MHz. An important thing to remember about the base clock is that it's the main reference clock for other components in the CPU—goosing this one setting will also overclock the RAM as well as the "uncore" (i.e., the L3 cache, memory controller, and Quick Path Interconnect, or QPI). We'll get to more on this shortly.



Our engineering sample Core i7-920 gave us results in line with what others have achieved with engineering sample parts as well as retail parts.

Application-based overclocking tools, such as Intel's Desktop Control Center, can save time in your initial overclocking setup.

DOING THE MATH

One thing that has not changed at all is the multiplier. The Core i7-965 Extreme Edition features a multiplier of 24 and is unlocked so you can move it up or down. The budget Core i7-920 features a multiplier of 20 and is upwardly locked so it will not move past 20. Experienced overclockers can grab a hall pass and skip to the next section, while those who have never done this before will need to stay in the classroom. As it was with the Core 2 and Pentium 4, the overall clock speed of the CPU is derived by multiplying the base clock (formerly the FSB) by the multiplier. For the 965, take 24 and multiply it by 133 to get 3,200MHz, or 3.2GHz. For the 920, take your multiplier of 20 and multiply by 133 to get 2,667MHz, or 2.66GHz.

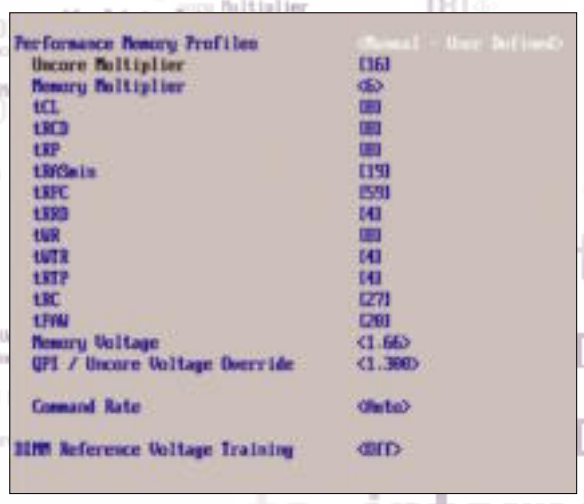
TURBO TALK

One wrinkle to the multiplier is the new Turbo Mode. This mode essentially automatically overclocks a single core of the CPU under certain loads. If you have overclocked a Core i7-920 to 3.66GHz and then you switch on Turbo Mode, the CPU will actually run at 4.03GHz in single-threaded apps. Is it worth it? Frankly, we're not sure. We are getting to the point where it's pretty rare to be running performance-intensive single-threaded applications. It's possible to get a 1x multiplier boost in dual-threaded apps, as well, allowing most games to run at 3.83GHz. Unfortunately, you can't set your individual Turbo Mode settings on the cheap chips. Intel limits fine-grain Turbo Mode control to the Core i7-965 Extreme Edition. The pedestrian Core i7-920 and Core i7-940 are limited to a single multiplier increase for single-threaded apps, which is of marginal usefulness. It's also clear that not all motherboard vendors think Turbo Mode is worthwhile. We've tested two different Asus boards that don't implement Turbo Mode the same way Intel does. Instead of letting the user set the individual Turbo Mode settings on an Extreme Edition chip, your only option is to overclock all cores simultaneously. Turbo Mode is something that should be evaluated based on your needs and the specifics of your overclock. For example, our case study actually found that a [redacted]rbo Mode gave us better benchmark [redacted]overclock without Turbo Mode.

UNCORE: SEPARATE BUT CONNECTED

The Core i7 is a modular design with two main areas, the core and the uncore. Inside the chip, the actual execution cores that do the heavy lifting are treated as the core. The other parts, such as the integrated memory controller, L3 cache, and the Quick Path Interconnect are treated as the uncore. Since they're separate entities, you can overclock the execution cores without overclocking the uncore to the same degree, in theory. This should let you hit higher speeds, since you wouldn't be running the QPI, memory controller, or L3 quite as hard. In reality, however, it doesn't work that way. Intel's non-Extreme Edition Core i7 CPUs offer limited control over the uncore multiplier, so a boost to the base clock boosts the uncore speeds as well.

One thing to remember as you fumble around the BIOS is that the uncore must run at twice the speed of the system RAM. Here's where it gets a little confusing. The speed of the uncore is determined by multiplying the uncore multiplier by the base clock. On a Core i7-920 chip, for example, this makes the uncore 16 times 133 for a total uncore speed of 2,133 MHz, or 2.1GHz. To figure out the RAM speed, you have to take the memory multiplier and multiply it by the base clock. In the case of a Core i7-920 chip, the default memory multiplier is 8. So to determine the main memory speed, multiply 8 by 133 for 1,066MHz. Why aren't higher DDR3 speeds available? The highest official memory speed of the Core i7 is DDR3/1,066. You can overclock your RAM to higher speeds, but depending on the motherboard, the only way to accomplish a memory overclock will be to crank up the base clock for the CPU—unless you own an Extreme Edition CPU. The take-away here is to remember to keep the uncore speed at twice the speed the RAM runs. If you plan to run DDR3/1,600, you'll need to run the uncore at 3,200MHz. On a Core i7-965, you can run that speed without overclocking. On a Core i7-920, you'll have to overclock the base clock to get the RAM at that speed.



You need to set your uncore multiplier to at least twice the multiplier for the system RAM. Also pay attention to the memory voltage. We had to run 1.66 volts for stable performance even at low RAM clock speeds. QPI also needed to be nudged up to 1.3 volts.

MORE ABOUT QPI

Another new element to the Core i7 is the Quick Path Interconnect that we mentioned earlier. This high-speed interface connects the processor (or processors, in a multi-proc machine) to the chipset. Intel currently has two QPI speed iterations. The Core i7-965 Extreme Edition runs at 6.4 gigatransfers per second and the non-Extreme chips, such as the Core i7-920 and Core-i7-940, run at 4.8GT/s.

The QPI is important to watch because ramping it up too far can kill your overclock. For example, pushing the base clock from its stock 133MHz to 200MHz on a Core i7-920 means that the QPI will default to 7.2GT/s. That's quite a bit more speed than the stock 4.8GT/s; however, we successfully tested a Core i7-920 running at 7.2GT/s and believe that's still within the realm of viability.

The QPI speed of the Core i7-920 and Core i7-940 is derived by multiplying the base clock (133) by 36, which equals 4,788, or

TORTURE TEST

How Reliable is Your Overclock?

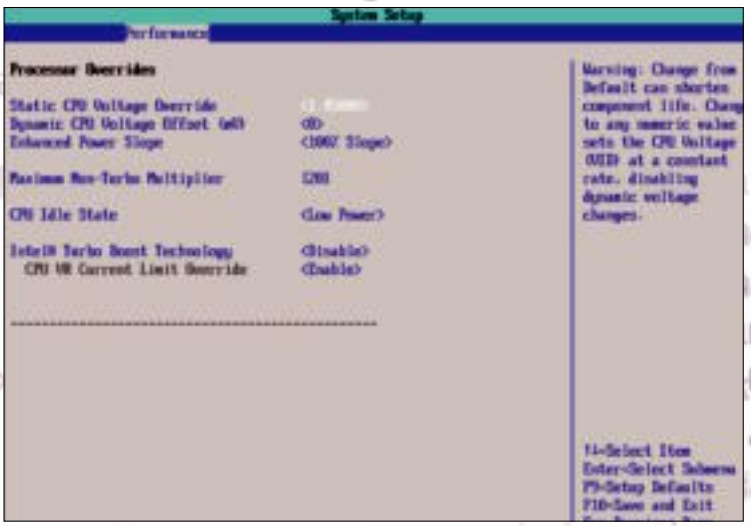
If you're ever in an online game where some dude brags that he's running his blah, blah rig at blah, blah speed using special blah, blah tricks, take it with a pound of salt. Like the great fish that got away, people tend to inflate their overclocking achievements.

Sometimes they don't even know they're exaggerating. If you think pushing a machine to 5GHz and running a game marks an overclocked rig as bulletproof, think again. The majority of today's games barely push two threads, and even when they do, the CPU doesn't do much. The truth is that much of the heavy lifting in games is done on the GPU, so you can't use gaming as a true judge of a stable overclock.

Instead, try a multi-hour encode or transcode of a video using a multithreaded encoder like HandBrake. Even better, try a serious ballbuster like Prime95. This math-heavy prime-number hunter features a built-in torture test that truly is torturous. For the majority of our tests here, we used a custom-blend of Prime95 that we've found puts the heaviest load on overclocked CPUs. In our experience, the benchmark manages to properly put our overclocking hopes in their place by blue-screening an unstable machine in mere minutes.

If your machine will withstand a couple hours of Prime95, you're doing well. If it'll run overnight, it's bullet-resistant. If it'll run overnight in the middle of the summer, in an 80 degree room, well, you really have something to brag about.

4.8GT/s. The Core i7-965 uses a default QPI multiplier of 48, but unlike the non-Extreme chips, the 965's multiplier is not locked. If you believe your overclock is failing because you've cranked the QPI too far, you can try dropping the speed by changing the QPI multiplier. On some overclocking runs with a Core i7-965 Extreme Edition, we had to drop the QPI back from 7.68GT/s to 7.04GT/s to increase reliability. The bad news is that you can't do this with the budget chips.



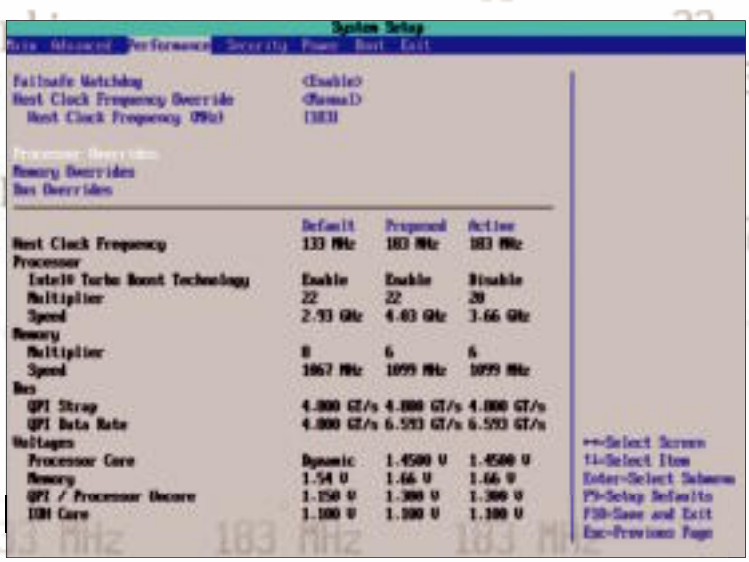
Turning off the CPU VR Current Limit Override in the BIOS prevents the CPU from throttling back the multipliers under the Turbo Mode. Notice the lack of Turbo Mode tuning versus that with an Extreme Edition installed (see screen on left).

VA VA VOLTAGE

You probably learned as a three-year-old not to mess with electricity after that incident with the wall socket. The dangers of electricity haven't changed, but to wring the greatest clock speed out of your CPU, you're going to need to overvolt the suckah. Actually, it won't be just the CPU—our highest reliable overclock was achieved only by upping voltage to the CPU and parts of the chipset.

How much is too much? The default core voltage of the three current Core i7's is 1.2 volts. We were able to push voltage to 1.5 on a budget Core i7-920 and successfully make it through some torture testing, but in our opinion, that's probably too much juice (at least with air cooling). Sure, it ran our stress tests for a reasonable amount of time, but we don't think the chip will live for long. A more reasonable voltage is probably 1.4 volts (just slightly more than the maximum spec of 1.375), but take that with a grain of salt, too. Because your CPU, motherboard, cooling, and PSU will be different, the amount of voltage you can add will likely vary from our scenario.

Another area you'll have to overvolt is the QPI interface. You'll likely have to increase the voltage from its stock 1.1 to 1.3 to get a reliable overclock. Some folks recommend running QPI voltage at or above the CPU's core voltage, but we didn't have to on our budget chip as it was happy with 1.3 volts. Our Extreme Edition, however, needed 1.5 volts to the QPI, which was equal to the CPU voltage. Finally, you'll have to add voltage to your RAM to get it to higher speeds. There has been chatter that a RAM voltage exceeding 1.65 can destroy a CPU— fortunately, most of the high-performance DDR3 binned for Core i7 doesn't seem to need more than 1.66 volts to run, which is certainly within reasonably safe limits.



the excess heat and voltage.

COOL RUNNING

Overclocking and cooling go hand in hand. If you can keep the CPU cool, you'll increase your overclocking limit. For the majority of our testing, we used a beefy ThermalRight 120. As good a reputation as this cooler has, it's still just an air cooler. Water cooling is an even better choice for overclocking, as it's more efficient at removing heat from the core. Better still would be an exotic phase-change or Peltier unit that could bring the CPU temps far below zero degrees Celsius.

What's a safe temperature for Core i7? That's also open to debate. We had to dig around the Internet to find that all three Core i7s have a maximum recommended temp of 67.9 Celsius. That, however, is the maximum temperature taken on the outside of the heat spreader with a calibrated thermistor. In English, that means that if you're being told that all four cores are running 82 C under full load, you're probably OK for the short term—but your chip probably won't last five years. It would be wise to aim for 80 C or lower, and even better to run in the 70 C range. Just remember that you may have to crank it all back in the summer.

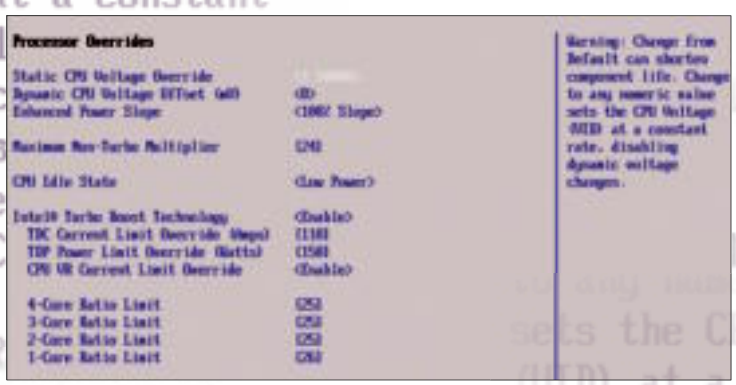
BREAKING IT DOWN

If your head isn't spinning by now, you're in good shape, but most people, even somewhat seasoned overclockers, will want a stiff drink after trying to absorb this information. So let's review.

You buy a new 2.66GHz Core i7-920—you just couldn't splurge on the Core i7-965 Extreme Edition. You've got a reasonably chunky air cooler, a good-quality PSU, and you want to

overclock that proc. What should you do? First, you need to start goosing up the base clock until you get a clock speed that seems reasonable for the CPU. So, let's say you want to aim for a nice conservative 3.5GHz. Start by setting your base clock to a speed that will get your CPU in the region. Take it from 133MHz to, say, 160MHz. The target clock speed you'll want is actually 175MHz for 3.5GHz, but we'll start with 160MHz.

We've read posts on the Internet of some people being able to reach a high clock speed without the need for additional voltage to the CPU, so you'll want to see if your CPU is capable of it. If you want a good real-world test, run your favorite multithreaded encoder, such as HandBrake. Nero's Recode is also multithreaded and will put a reasonable load on the CPU. If you want to really torture it, download Prime95 from www.mersenne.org. Unzip



Extreme Edition CPUs feature unlocked QPI and memory override the individual Turbo Mode settings and change how the CPU throttles under power loads—to either run higher overclocks or r

it and run Prime95.exe. Select In-place FFTs and make sure the number of threads is set to eight. (By default, it should be eight for a Core i7.) If it runs for, say, half an hour, you can aim higher. Add 5MHz to your overclock and try again. Go until it fails. Now it's time to add voltage. A good starting point is 1.35 or 1.375 volts. Since 1.375 is the maximum allowable voltage under spec, you're actually still playing it very safe. While you're there, you may want to add voltage to the QPI. Nudge it up from 1.1 volts to 1.3 volts. Some say that the QPI voltage should at least equal the core voltage, but that's up to you. You should also add voltage to the RAM to get it to spec. If you're using RAM rated for higher speeds, give the RAM the amount the maker suggests. The safe limit seems to be 1.66 volts.

Intel says it locked the QPI and memory multipliers on its budget chips but some motherboards appear to circumvent this. If your board does this or you're running an Extreme Edition, which has unlocked QPI and memory multipliers, you can try backing down your uncore and RAM multiplier. Most BIOSes should correct the ratios for you, but remember that the uncore multiplier should be twice that of the RAM. So if the RAM multiplier is set to 10, set the uncore multiplier to 20. If you back the RAM multiplier down to six, you can set your uncore multiplier to 12.

Now reboot and rerun your stress tests. Keep repeating the steps we've outlined until you hit your target or hit a wall. Once you're at your target, do a longer stress test with Prime95 to see if it i ou may have to add cooling or voltage to get it to run for several hours.

ooling and quality power matter. If you think yo s with a cheap power supply and straw heat- Want to know how far can you get Intel's cheap- clock with air cooling? Read on.

WEIGHING YOUR OPTIONS

Core i7 Budget Buyers, Beware

It's gotten to be so easy to overclock Intel's Core 2 line that a Mac user can one-mouse-button the cheapest Core 2 chip to 12GHz. This pretty much killed demand for Intel's 3.2GHz Core 2 Extreme QX9770 CPU, since the only difference was an unlocked multiplier and higher front-side bus (Intel's insane pricing didn't help, either.)

With the Core i7, Intel is being far more aggressive in differentiating the Extreme chip. No longer is it just a multiplier lock. With the Core i7-920 and Core i7-940, you cannot set the individual Turbo Mode ratios. The thermal override switch and amperage override are also disabled. Finally, QPI ratios and memory ratios are similarly limited.

Does this make the Extreme Edition a chip that you must have? It depends. Swapping the Core i7-920 with a Core i7-965 Extreme Edition is like moving from a budget car to a luxury car built on the same platform. You'll find that a knob you used in the luxury car isn't present in the budget car.

In our experience, it was easier to get the Core i7-965 to the limits imposed by our air cooling than it was with the budget CPU. While it took us an afternoon to get the Core i7-920 to a reliable 3.80GHz, we had the Core i7-965 Extreme Edition at 3.83GHz in a few minutes. By adding the Turbo Mode, we had the latter chip effectively running at 4GHz, and we're certain higher speeds were attainable with better cooling. One thing to keep in mind, though: While the Core i7-965 will likely reach higher speeds than the Core i7-920, it won't give you the same amount of headroom. That is, you can get a 1GHz overclock with the Core i7-920 on air but you won't be able to do the same with the Core i7-965 without water or something more exotic.

Is the 965 Extreme Edition a better overclocker? Certainly. Is it worth the extra $700? That's a tough call and ultimately something only you and your bank account can answer.

Case Study: Core i7-920

Can you make Intel's cheapest i7 outperform the vaunted Core i7-965 Extreme Edition? Yes, siree

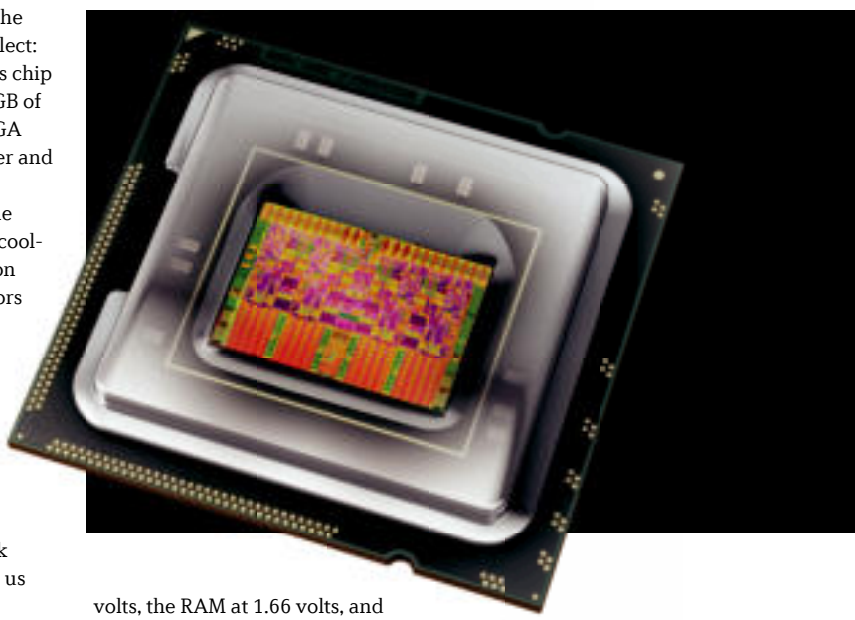
For our case study, we decided to stick with the CPU the overwhelming majority of overclockers will select: Intel's cheapo $285 2.66GHz Core i7-920. We paired this chip with an Intel DX58SO "Smackover" board, 6GB of Corsair Dominator DDR3/1,600 RAM, an EVGA GTX 280 videocard, a WD 150GB Raptor, and a PC Power and Cooling Turbo-Cool 1200.

For cooling, we used a ThermalRight 120 and ran the board on a lab bench with three small fans for auxiliary cooling: an 8cm on the hard drive, an 8cm USB fan blowing on the RAM, and a 12cm fan directed at the voltage regulators and the heatsink.

We used Windows Vista Home Premium in 64-bit and ran a few benchmarks at the CPU's stock 2.66GHz clock speed with the default Turbo Mode on. We then used the board's OS-based overclocking tool for the majority of our overclocking attempts. Why? Normally we prefer the BIOS as we don't want to deal with yet another app starting in Windows, but the Intel Desktop Control Center let us turn knobs and tweak settings without having to boot into the BIOS. This saved us invaluable time.

For stress-testing, we used a custom blend of Prime95 that Velocity Micro developed for overclock testing. We've long used the utility and have found it to push machines harder than any other test.

We know from previous experience that the Core i7 seems to need a minimum QPI voltage of 1.3 volts, so that's where we started. We intentionally kept our RAM clock speeds down, since we just wanted to see how far we could push the CPU, but we were surprised that we had to move the voltage to 1.66 volts to reach stability. After a day of testing and one OS reinstall, we decided that the best performance we could squeeze out of the Core i7-920 was 3.66GHz with Turbo Mode on. This was done with a base clock of 183MHz, the core voltage at 1.4 volts, the RAM at 1.66 volts, and the QPI at 1.3 volts for a QPI speed of 6.59GT/s. With Turbo Mode, the default 20 multiplier occasionally reached 21 or 22 for an effective clock of 3.83GHz to 4.03GHz, which allowed us to achieve benchmark results on par with our higher overclock attempt: We topped our chip out at 3.8GHz with 1.5 volts, but the CPU's thermals were unacceptable, running into the mid-80s C. In our Lab in the winter, that's fine, but we knew this overclock would never survive a real summer in a real home.



Our take-away is that it should be very easy to push the 2.66GHz Core i7-920 by 1GHz, and more conservative overclocks of 3.5GHz or 3.4GHz should be extremely easy. But to expect a truly reliable overclock greater than 3.6GHz will require good-quality water cooling.

CORE I7-920 BENCHMARKS

	2.66GHz (Turbo On)	3.66 (Turbo On)	3.66 (Turbo Off)	3.8GHz (Turbo Off)
Cinebench 64-bit 10 w/ 8-threads	16,097	21,474	21,013	**21,640**
Cinebench 64-bit 10 w/ thread	3,869	**5,251**	4,973	5204
ProShow Producer	11:43	**8:05**	9:40	8:45
3DMark Vantage Overall	14,720	15,010	14,963	14,984
3DMark Vantage GPU	12,099	12,133	12,133	12,129
3DMark Vantage CPU	42,042	**51,987**	49,860	51,012
Valve Particle Simulation	140	**190**	180	186
Main Concept Reference AVC Pro	11:57	9:13	9:16	**8:57**

Best scores are bolded.

TOWERS OF POWER

Ah, spring: when a young man's fancy lightly turns to thoughts of upgrading. But, alas! Your fancy new videocard is too big for your tiny case, and you're running out of hard drive bays for your RAID. Fear not! A classy full-tower chassis can be just the solution.

In this roundup we've collected five full-tower cases—big and tall enclosures with all the bells and whistles: new looks, toolless expansion slots, intake filters, drive bays aplenty, and more. Space-saving isn't a priority here: The focus is on features, with room for as much hardware as you need to cram in. If you want a portable rig or something to nestle under your desk, these aren't the cases for you. But if you're looking to make the most of your computer, portability be damned, one of these beauts could be your huckleberry.

In evaluating these cases, we focused on a few key points: overall build quality, aesthetics, ease of installation, cooling options, convenience, and features like front-panel connectors. We kept price in mind, too, but only to a degree: After all, we're *Maximum PC*. We don't mind paying for excellence; we just object when gear is offensively overpriced.

Let's get on with it, then!

Cooler Master ATCS 840

The latest hit from an old favorite

We loved the features of Cooler Master's HAF case (http://tinyurl.com/mpchaf) but weren't thrilled with its looks. Now comes the ATCS 840, billed as a "classic" model by Cooler Master. It combines the useful amenities we've come to expect from Cooler Master with a sexy brushed-metal, no-window, no-nonsense exterior, and nary an LED to be seen.

The roomy (22.8x24.8x9.8 inches) ATCS 840 is packed: removable dust filters on its intake ports, the sturdy slide-out motherboard tray with CPU-backplate cutout (so you don't have to remove the motherboard to switch CPU coolers, even those that require a backplate). The tray even includes the full rear I/O area, so your PCI cards can come too! There's even space for a second PSU or water-cooling reservoir up top. Three 23cm, 700rpm fans—one in front, two on the top—provide big airflow with little noise. There's a 12cm output fan in the back, too.

The five 5.25-inch drive bays use the same toolless locking mechanisms as the HAF case and Cooler Master's Cosmos line, and the six hard drive bays use the same sliding trays as the HAF. Overall build quality is superb, with no flimsy parts in the whole case. Even the PCI slot covers are sturdy black mesh, and the front bezels clip in from the inside.

Our one gripe with the ATCS regards the plate in front of the front-panel fan filter. It's ostensibly removable, although we found the locking mechanism frustratingly obtuse.

Still, the ATCS 840 is another well-engineered triumph for Cooler Master. If your tastes run more to brushed metal than to blingy windows and lighting, we highly recommend it.

Oh, just look at those toolless drive bays, that cutout panel, and the oh-so-roomy interior. It's enough to make us melt.

No case windows or fancy LEDs in the Cooler Master ATCS 840; just sleek brushed metal.

The hideaway front-panel connectors: a whopping four USB 2.0 ports as well as eSATA, FireWire, and headphone/mic jacks.

Removing the panel that guards the front intake fan wasn't the hard part. Putting it back on once we busted the fasteners was.

MAXIMUM PC KICK ASS!

VERDICT **9**

COOLER MASTER ATCS 840
$280, www.coolermaster.com

ABS Canyon 695

A supertower at a stupid price

At 26x17x9 inches, the ABS Canyon 695 is a tall and svelte aluminum "supertower," and its design is certainly striking. Remove the smooth front-panel cover and you'll find the entire front of the case taken up by three 14cm intake fans, with a sliding lint-trap-like dust filter in front of them. This means the optical drive bays are rotated 90 degrees to accommodate the fans; they actually open into holes in the case's side panels, giving the exterior an unusual look.

Inside, the case is separated into three "thermal zones"—the PSU, two 5.25-inch bays, and one external 3.5-inch bay reside at the top; the middle section holds the motherboard, PCI cards, etc.; the bottom can accommodate six SATA drives and even includes a hot-swappable backplate. Airflow is great, thanks to a generous array of fans—six in all.

We like the motherboard tray, which removes fairly easily, although it doesn't include the expansion slots like the Cooler Master ATCS 840. We appreciate the full complement of front-panel connectors: four USB, eSATA, and FireWire.

Overall build quality is great, and we like the little touches like hot-swap drive bays (with RAID support), intake filters, and the innovative 90-degree turn on the optical drives.

Unfortunately, the hard drive rails require special screws to fit and installation of the optical drives is extremely frustrating—you have to hold the drives in place while screwing them in, lest they fall. And the Canyon 695 is $600, which dulls its luster somewhat in our eyes. For that price, we expect gold plating. Or at least more than two 5.25-inch bays.

The ABS Canyon 695 won't fit under your desk, but you wouldn't want to hide it away, anyway.

You gotta keep 'em separated: This case keeps its hard drives far from the power supply.

The front panel shrouds the intake filter and three variable-speed fans.

The hinges are a little flimsy, and installation is frustrating, but the Canyon 695's optical drive bays look great and defy convention.

VERDICT **7**

ABS CANYON 695
$600, www.abs.com

Silverstone Raven RV01

A new twist on mobo orientation

We thought it was just a gimmick at first, but the Silverstone Raven RV01 delivers.

While most Silverstone cases tend toward polished metal and (if you're lucky) a side window, the Raven's hard plastic exterior takes its stylistic cues from a stealth bomber. Appropriately, everything on this 24.3x26x11-inch beaut is hidden behind panels: the front connectors (two USB, audio, FireWire) behind a flip-up, and the five 5.25-inch drives behind a garage door–like sliding panel.

The most striking thing about the Raven, besides its appearance, is that its motherboard mount is rotated 90 degrees clockwise—the I/O ports and PCI expansion slots, normally situated on the back of a case, are on the top and covered by a shroud that allows cables to be routed neatly to the back. This improves airflow (allowing air drawn in by two 18cm fans to rise from the bottom of the case to the top) and takes the stress of weighty PCI-E cards (like, say, dual-GPU offerings from Nvidia and ATI) off of the motherboard.

Unlike the ABS Canyon or Cooler Master 840, the Raven's motherboard tray is not removable, but installation is still pretty easy. And we dig the screwless retention mechanism for the optical drives and the cable-routing clips on the back of the mobo tray. Hard drive trays are nice, though hot-swapping requires buying additional components. And as is becoming standard in high-end cases, the intake vents are covered with removable dust screens.

We like the Raven's looks, and we actually hope the rotated motherboard thing will catch on. We just wish the outer shell felt a bit more solid. And eSATA on top would be nice, too.

The Raven has plenty of slots and tabs for cable management.

No more scrabbling around behind the case for cables! The Raven routes all I/O cables from the top of the case.

The Raven stealths its front-panel connectors and 5.25-inch drive bays behind clever paneling.

VERDICT

SILVERSTONE RAVEN RV01

$215, www.silverstone-tek.com

8

NZXT Zero II

A strange mixture of big talk and budget pricing

Installing a system in the NZXT Zero II is like taking a trip back to the first half of this decade. Although the front panel cover is nice—all smooth, curved lines and blue lighting, with a handy magnetic clasp—the interior of this 21x21.1x8.2-inch case seems downright primitive and unfinished compared to the other cases in this roundup. The five 5.25-inch drive bays as well as the two external and six internal 3.5-inch HDD bays are toolless, albeit utilizing old-fashioned clip-in rails rather than an in-case mechanism or fancier bracket.

The case comes with three fans and slots for six more—four on the door, one on the bottom, and one on the top—but the net effect is that it looks incomplete. The Zero II is built of flimsier metal than the rest of the cases covered here, although the Zero is roughly a third of the price of Cooler Master's offering, and less than a sixth the price of the ABS Canyon.

They say that the devil is in the details, and we found the Zero's generally lacking. The front (technically top, in this case) panel features a measly two USB ports, audio in/out, and eSATA. At least we get eSATA! PCI expansion slots are covered with dinky bits of metal that are, without an extra-long, skinny screwdriver, very hard to remove. The front bezels are stamped in and need to be pried off manually. Even the thumbscrews manage to look cheap.

The Zero is decent for a budget case, and not bad looking. Modders and folks who bring their own fans will appreciate the mounts waiting for them. But compared to the level of detail and build quality of the other cases in this roundup, the Zero doesn't measure up.

The NZXT Zero II is much more spartan than the rest of this roundup.

The NZXT Zero II's got a pretty face, but the body ain't much.

The hard-drive mounting system is a blast from the past. At least it's screwless.

If you're a modder or you provide your own fans, you might not mind the slip-shod paint job or the lack of fans here.

VERDICT

NZXT ZERO II
$100, www.nzxt.com

6

Thermaltake Spedo

Funny name. Good deal. Wonderful enclosure

The Thermaltake Spedo is big and bold, with gray plastic trim and black honeycomb mesh running up the front of the case and the top plate. It sounds awkward, but it mostly works, just like the mishmash of features inside.

The 21.1x24x9.1-inch Spedo starts strong with seven external 5.25-inch slots and two removable hard drive bays with three slots each, all completely screwless. Add in two low-rpm 23cm fans (one on top and one on the side), and six smaller, faster fans, including a red LED fan in front of one of the hard drive bays, and airflow is great.

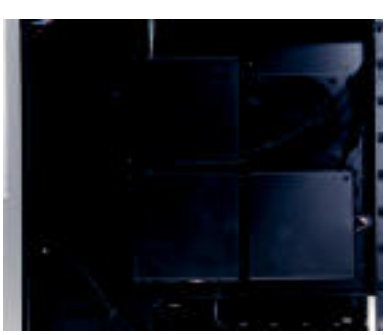
The Spedo ships with an array of flimsy plastic panels billed as the "Advanced Thermal Chamber 3," which separate the PSU area from the PCI cards from the CPU cooler. In our experience, removing and installing the panels is more trouble than it's worth; after our initial install we just left them outside the case.

We do like the cable-management system behind the motherboard tray—it consists of a series of plastic plates that clip into the backplane. And we like the screwless PCI slots, too.

The Spedo is a good case with great build quality, but the chunky plastic-and-metal-mesh aesthetic isn't for everyone.

Chunky plastic-and-mesh motif notwithstanding, Thermaltake's Spedo is full of great features: Look at all those 5.25-inch bezels!

If the "Advanced Thermal Chamber 3," were really advanced, it wouldn't feel so flimsy and frustrating to install.



We like the Spedo's cable-management panels. They even double as cable-hiding panels.

The Spedo packs a plethora of toolless HDD and optical drive bays.

VERDICT

THERMALTAKE SPEDO
$185, www.thermaltake.com

8

FINAL THOUGHTS

The Cooler Master 840's killer combo of good looks and useful features wins the day, but every case has something to offer

At *Maximum PC*, we go through a lot of components. We build a lot of computers. We know what we like. So when we test a case, we ask a few important questions: How easy is installation? Does this case make our lives easier? Is this case likely to protect our precious components? And while we're at it, does it look good?

The answers, for the Cooler Master ATCS 840, are yes, yes, yes, and yes. We were won over by the ease of installation, but more importantly the ease of swapping out parts. We love its style and the attention to detail—we can't say enough good things about its removable motherboard tray and the CPU-cooler cutout.

But other cases here also deserve accolades: We love the Silverstone Raven's looks, amenities, and innovative motherboard placement, the ABS Canyon 695's design and SATA backplate, and the Thermaltake Spedo's cable management features. And the NZXT Zero II is decent if you're a modder looking for a good starting point.

Each case in this roundup had its drawbacks, too. The Canyon 695 is *stupid* expensive, while the Zero II is cheap in both senses of the word. We weren't thrilled by the Spedo's looks or the flimsiness of its thermal chamber panels. We could have used eSATA in the Raven. And we wish we hadn't snapped the front-intake cover off of the ATCS 840 (oops).

If you can spare the $280, we'd say go for the Cooler Master ATCS 840. The CPU-cooler backplate cutout and sliding motherboard tray/rear panel alone are worth it for us; we plan on rebuilding our CPU-cooling test rig around it. But even if you're not in the habit of swapping out CPU coolers regularly, the 840 brings more than enough to the table. Easy install, roomy interior, great looks, screwless drive bays (and plenty of 'em), and scrupulous attention to detail: The 840 reminds us why we've liked so many Cooler Master full-towers in the past.

WISH LIST

Case Features We Long For

Man, do we love cases with thoughtful amenities. The NZXT Zero II is no slouch of a case, but it's a Neanderthal compared to the Cooler Master ATCS 840, our favorite case in this roundup. But even the mighty 840 doesn't have everything we want in a case. Here are a few features we've seen in some cases that should really be in *all* of them.

2.5-INCH DRIVE BAYS

With solid state drives making big strides, we see lots of system builders starting to include them as OS volumes. But few cases have dedicated 2.5-inch bays. Our last rig from Velocity Micro solved the problem by mounting its Intel X-25M on the IcePak from a WD Velociraptor. But an actual 2.5-inch bay (or at least an adapter, like that found in the NZXT Whisper), would be better.

MID-CASE AIR DUCT

A mid-case air duct, like that found in the Silverstone Temjin TJ10, brings cool air from outside into the case to cool the GPUs before exiting out the back. This helps keep other hot components from warming the air before it gets to the GPUs—a literal breath of fresh air for your videocards.

SATA BACKPLANES

The ABS Canyon 695 and the HP Blackbird are two of many cases that have started featuring SATA backplanes in their drive bays. Forget rails; forget cable routing. Just slap in a couple of hard drives and go. Bonus: Many of these backplanes support RAID and hot-swapping.

ETC.

While we're at it, let's make the following things mandatory: Intake fan dust filters, variable-speed fan controllers, a cable routing mechanism, toolless PCI slots, and quality thumbscrews.


LG
SONY
LG
PLEXTOR

A MAXIMUM PC CHALLENGE

Which DVD Drive is the Fastest Disc Ripper?

Our test of 12 popular drives proves you can't predict performance based on the specs

BY KATHERINE STEVENSON

Whether you're copying your movie discs to your hard drive for archival purposes or queuing them up in HandBrake for a batch transcode, your optical drive's performance can make a big difference in time spent on this menial chore. The trouble is, there's no obvious way of knowing which optical drive will do the job fastest.

The optical drive spec that gets the most attention is the DVD+/-R write speed. It's the spec that's prominently featured on the packaging and often even integrated into the drive's name. But if you assume that the newest drive with the fastest-rated write speed will also kick butt at copying the contents of your movie discs to your hard drive, you're mistaken.

For this task, read speed is what matters. But even knowing that, you can't judge a drive's real-world performance at copying video files simply by looking at its read specs. Not only do the specs indicate maximum capability as opposed to average speed, but a drive's read time with video files can differ from its read time with data files. To find out which is the fastest drive for DVD copiers, we grabbed a bunch of DVD drives, a copy of *Batman Begins*, and got ripping.

Which DVD Drive is the Fastest Disc Ripper?

THE TEST

We gathered up the most popular DVD burners on Newegg.com, including Samsung's SH-S223 (our current Best of the Best pick), Plextor's 850SA, LG's GH22LS30 (reviewed on page 86), and Lite-On's iHAS422—all brand-new 22x drives from those vendors. We also tossed in a couple Blu-ray burners and even added a couple ancient DVD drives to the mix for good measure. Our objective was to test each drive's speed at copying a commercial video DVD's VOB files to hard disk. We didn't want OS or application clutter on the hard drive to have any bearing on the optical drives' performance, nor did we want the speed of the hard drive to be an issue, so we copied the video files to a clean 10,000rpm Western Digital 300GB Velociraptor.

In each instance, we reformatted the Velociraptor drive, rebooted, then used AnyDVD's disc ripping tool to copy the contents of a pristine double-layer DVD movie disc to the hard drive, and timed the operation. We then checked that the resulting file matched the size of the original disc. We recorded the average time of three runs.

AnyDVD first removes the CSS encryption from a movie disc so you can easily copy the contents to your hard drive.

THE RESULTS

The results were enlightening. Pioneer's DVR-116DBK drive took the prize with an out-of-the-box rip average of 10:03 (min:sec). A number of the other DVD burners performed comparably, with rip times of less than 11 minutes. But we observed some notable variance. LG's new GH22LS30 drive, for instance, was one of the slowest drives at the task, taking twice as long as many of the others to copy the movie to hard disk. Interestingly, LG's GBW-H20L Blu-ray drive was speedier than its standard DVD kin. In general, Blu-ray drives don't feature the best DVD specs, so we expected those drives to lag behind the others in DVD reads—only Sony's Blu-ray drive did.

Another surprise our testing uncovered was the lackluster performance of the Samsung's SH-S223, which performed superbly in our standard optical drive benchmarks when we reviewed the drive in February. It all just goes to show you that you can't judge a drive's ability at copying discs based on its specs or performance in other areas.

TEST RESULTS

DRIVE	Average Copy Time of 7.18GB DL Movie Disc (min:sec)
Samsung SH-S223	15:26/8:13*
Plextor PX-850SA	10:43
Lite-On iHAS422	10:16
Lite-On DH-20A4P	10:22
Sony-NEC AD-7200A	10:38
Pioneer DVR-116DBK	10:03
LG GH22LS30	20:24
Asus DRW-2014	15:14
LG GBW-H20L (Blu-ray drive)	15:19
Sony BWU-300S (Blu-ray drive)	20:23
Sony DDU1612 DVD-ROM (2003)	15:28/ 15:37*
Pioneer DVD-106S (1999)	16:19

**Time after firmware patch.*

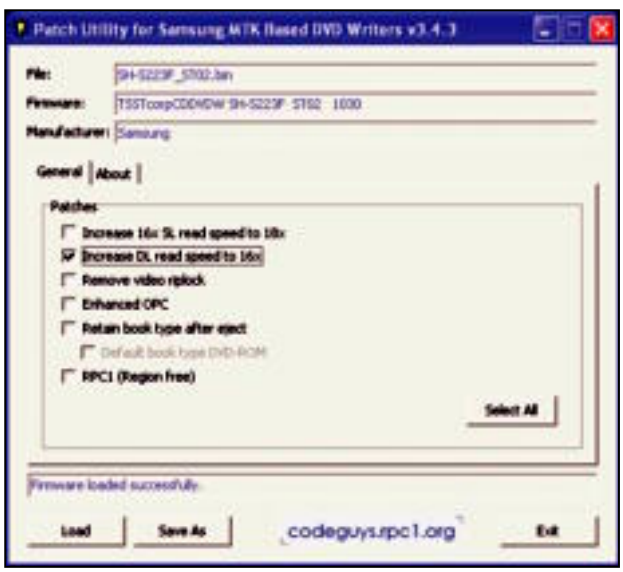
HACKING THE FIRMWARE

One way to get improved performance from an optical drive is to hack its firmware—assuming a hack for your model exists. For instance, we caught wind of a firmware hack for Samsung's SH-S223 drive on the CD Freaks forum (http://tinyurl.com/a39l8l). The forum discussion blamed a feature called Riplock for the drive's relatively pokey read speed. According to the posts, Riplock is a concession to the movie studios in that it slows down disc rips in order to make the practice less appealing to consumers. (As of this writing, Samsung would not comment on Riplock.)

The forum thread included a link to Codeguys.rpc1.org, a repository of firmware patches for numerous LiteOn and Samsung optical drives, including the SH-S223. Often a firmware patch is a simple executable that, when launched, identifies your optical drive and updates it. The patch for the SH-S223 is actually a utility that lets you modify Samsung's own latest firmware by offering a list of third-party features you can pick and choose from. One option was to remove Riplock from the firmware, so we tried that. But our drive performed exactly as before, taking more than 15 minutes to rip the movie disc. Next we tried patching the firmware with the option to increase the SH-S223's dual-layer DVD read speed to 16x (from the official speed of 12x). This patch made a huge difference. Our movie disc copying time was cut almost in half to 8:13, surpassing all the other drives in this roundup.

Of course, we checked to verify that the file produced after the hack contained the same data as the file produced by the unhacked drive. (It did.) We also went a step further and tested the hacked Samsung with a well-worn Netflix DVD replete with minor nicks, smudges, and scratches, and the drive's speedy performance held up. Again, it copied the disc in just a little over eight minutes and the file it produced was the same size as the file produced by the slowest DVD drive in the bunch. Still, it's important to note that hacking a drive's firmware does void the warranty.

Codeguys.rpc1.org also has a firmware patch for the Sony DDU1612 DVD-ROM in this roundup that purportedly increases the drive's read speed, although in our tests, the patch did nothing to change the drive's performance. We are unaware of any third-party firmware hacks for the other drives we tested.



A firmware hack helped the Samsung SH-S223 save face, although it voids the drive's warranty.

FOLLOW-UP

The Data Difference

We got to wondering if there was any difference in a drive's performance when copying video files to a hard drive versus transferring data files. After querying drive vendors and also running our own tests, we found that there's no pat answer. Plextor reps, for example, said video transfers would take longer due to processes involved with codecs, region restriction removal, CSS matters, etc., but when we tested the Plextor drive using a data disc made from the same video files of our earlier test, there was virtually no difference in transfer times. On the other hand, LG's GH22LS30, which was woefully slow at video rips, took half the time (10:52) to copy the data. And yet LG's Blu-ray offering, the GBW-H20L, took slightly longer to copy data (16:24).

Asus reps told us there's no difference between data and video reads and our experience with the Asus drive bore that out. Samsung reps wouldn't comment on the matter, but our hacked SH-S223 was just as speedy with data as it was with video copying.

In the end, we decided that the only way to know for sure how fast a drive is at copying movies or data is to test it. Going forward, all of our optical drive reviews will include benchmarks for both.

WHITE PAPER

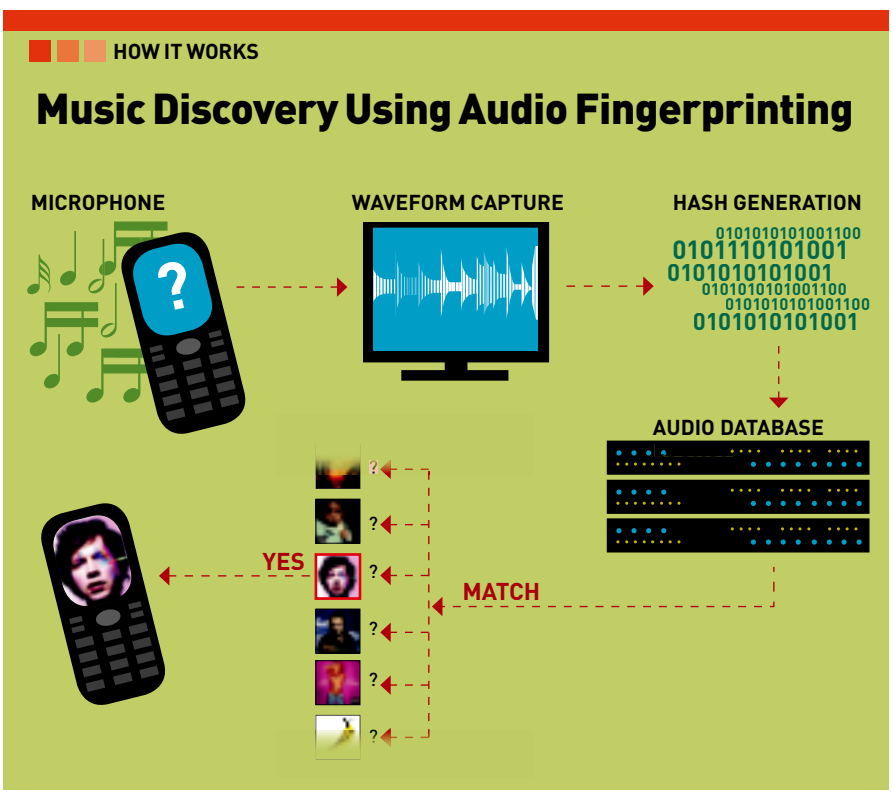
Audio Fingerprinting

Your phone can name that tune in three seconds! —MICHAEL BROWN

You're twiddling your thumbs while waiting in the check-out line at your favorite retailer and you hear a great new song over the PA system. You could turn to the next person in line and ask if they know it—engaging in an impromptu but probably fruitless game of Name That Tune—or you could whip out your smartphone, record a snippet of it, and send it to a music-discovery service. It will report back with the name of the song and that of the artist who recorded it, which album it appears on, what year it was released—heck, with a couple of button presses, you can buy the song right then and there.

What technology magic makes such a thing possible? It's called audio fingerprinting, and it's gaining significant traction with both music lovers and rights holders looking to protect their assets. There are two basic components to an audio-fingerprinting system: A database containing the unique audio fingerprints of millions of songs, and a tool that can analyze a song and search the database for a match.

Creating an audio fingerprint is a lot trickier than it sounds. The human ear will perceive the CD version of the Beatle's "Eleanor Rigby," for instance, to be identical to the version that's ripped and encoded as an MP3 at a bit rate of 128Kb—audio quality aside, they're both "Eleanor Rigby." A computer examining the code used to store those two files, on the other hand, will perceive them to be completely different.



Your phone or other device captures the sound of a new song that you'd like to know more about and sends the waveform to a music-discovery service. The service analyzes the song, looks for a match in its database, and sends the result back to your phone.

MOST AUDIO-FINGERPRINTING SYSTEMS RELY ON TWO TYPES OF PERCEPTUAL CHARACTERISTICS IN MUSIC.

And the same goes for a third version encoded using FLAC and a fourth encoded using AAC.

To get around this problem, a software algorithm—a precise sequence of instructions adhering to a specific set of rules—must analyze the actual sound of a song to determine its perceptual characteristics instead of simply relying on the way bits are arranged to store it. Most audio-finger-printing systems rely on two types of perceptual characteristics in music: semantic features, such as beats per minute, genre, and mood; and non-semantic features, such as pitch detection, amplitude, and spectral flatness (a measurement used to describe the power levels of each band in a waveform). Semantic features are inherently more difficult to compute than non-semantic features, because they don't always have clear and unambiguous meanings and they can evolve over time. Hard rock, for instance, classified a completely different type of music 30 years ago than it does today, while hip-hop didn't exist at all back then.

DIVIDE AND CONQUER

Most audio-fingerprinting systems divide an audio signal into a series of frames. They then use some form of a fast Fourier transform algorithm to track changes in the semantic and non-semantic features described above. Finally, a classification algorithm examines

each frame and then organizes the frames into sub-fingerprints. The basic unit that contains enough data to identify an audio clip consists of a series of sub-fingerprints and is known as a fingerprint block. These audio fingerprints are then stored in a database.

An unidentified song is analyzed by software running on a PC, smartphone, or similar device in the same way that the songs in the database were. The software generates a hash table that serves as an index to the fingerprint database, compares the unidentified song's fingerprint to those in the database, and searches for a match. The software doesn't need to analyze the entire song to derive a fingerprint; typically, just three or four seconds are enough. The algorithm needs only to find points of similarity between the unknown song and an entry in the database to make a match. In this respect, identifying songs based on their musical fingerprint is very similar to the way that a forensic expert matches a suspect's fingerprint to one found at a crime scene.

REAL-WORLD APPLICATIONS

Consumers can already choose from a number of software applications that make good use of audio fingerprinting. The free, open-source Picard program, for instance, can help identify mystery tracks in your music library by analyzing songs and comparing their characteristics to audio fingerprints stored in the free, user-maintained MusicBrainz metadata database. When a match is found, Picard can update the tracks' ID3 tags with the correct song title, artist name, album title, genre, and more.

Shazam Entertainment offers software that you can install on an iPod Touch, iPhone, or Android smartphone that will record a snippet of music (creating a file about 20KB in size). The software sends this file to Shazam over the Internet (the recording is not retained on your phone), which will attempt to match the audio fingerprint with one in its database. If it's successful, it will send back a message informing you of the track title, artist name, album title, and other information. From there, you can search for related videos on YouTube or buy the track from iTunes (if you're using the iPod Touch or iPhone) or the Amazon MP3 store (if you're using the Android).

Several companies offer commercial software that uses audio fingerprinting to help identify and track copyrighted music and video. Audible Magic, for instance, operates a fingerprint database containing more than five million works. Its customers use this data not only to identify copyrighted content moving over the Internet, but also from radio

Razor Tarantula Gaming Keyboard

Gaming keyboards come with all the bells and whistles: programmable macro keys, LED backlighting, even USB ports and custom profiles. Let's take a closer look.

DOME-SWITCH MEMBRANE
A rubber membrane sits between the keyboard keys and the underlying circuit board. When a key is depressed, the rubber dome collapses, and completes a circuit on the board, registering a keystroke. Dome-switch keyboards are quieter than scissor- or mechanical-switch boards.

USB/AUDIO PORTS
The Tarantula includes two USB 2.0 jacks for peripherals such as headsets and mice, as well as audio in/out ports. These USB ports do not provide enough power to run flash memory or portable hard drives.

MACRO/MEDIA KEYS
Programmable macro keys enable sequences of keystrokes to be triggered with a single key press, while media keys control playback, volume, etc. On the Tarantula, macro keys are backlit by LEDs and labeled L1-L5 and R1-R5. Both media and macro keys use their own dome-switch membranes.

VARIABLE LED
This LED illuminates the Razer logo on the keyboard's wrist rest. A dimmer switch cycles the brightness, giving the logo a pulsating glow.

SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO

Step-by-Step Guides to Improving Your PC

THIS MONTH

THE POWER USER'S DESKTOP SEARCH

WILL SMITH
EDITOR-IN-CHIEF

For a long time, I resisted the allure of desktop search. I wondered why I needed it, since my hard drive was exquisitely organized, with layer after layer of nested folders, categorized by topic, time, and relative priority. Then, I installed Google Desktop Search, and I realized that I'd been wasting my time.

Want to be a desktop search power user? It's easy. First, make sure all the folders where your content lives are indexed. This can be tricky if you store your data on the network. However, even if your desktop search app won't let you index UNC network paths, it will usually index mapped folders.

We also love to pull reference documents into our indexed files. For example, we keep all the PDF Archives of *Maximum PC* (http://tinyurl.com/5qhn2d) on our desktop. You can also download the entire Wikipedia (http://tinyurl.com/6pnp4r). Add the contents of the folder to your index, and you've got a massive index of everything you need to know about… well… pretty much everything. **–ws**

SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.

WINDOWS TIP OF THE MONTH

Keyboard Shortcuts Rule

You can save loads of time using these six common keyboard shortcuts in Windows: ctrl+c: copy to clipboard, ctrl+x: cut to clipboard, ctrl+v: paste from clipboard, ctrl+s: save your file, ctrl+p: print your file, alt+tab: switch between applications. Got more? Send your favorite keyboard shortcut to comments@maximumpc.com.

Download, Save, and Convert Flash Video

There's no denying that Flash video has changed the world of entertainment in some pretty profound ways. Sure, some might argue that we could have done without the Flash-enabled advent of floating ads, gaudy movie websites, and cheaply animated stoner cartoons, but we think that the good outweighs the bad. After all, without Flash, we'd be missing out on a whole slew of rad Flash games, clever web interfaces, and cheaply animated stoner cartoons. And let's not forget YouTube and its ilk, which have truly revolutionized the way we waste time.

However, there's a problem with streaming video: You don't get to keep it on your computer when you're done. So, if you want to watch something again or show it to your friends, you have to go back online to find it. But it's pretty easy to rip streaming video to your hard drive, and in this article we'll show you how, as well as how to convert that video to other formats so that you can play it on your device of choice. It will take less than 20 minutes to download a video, and you'll need Moyea FLV Downloader (www.flvsoft.com) and SUPER (www.erightsoft.net/SUPER.html#Dnload). —ALEX CASTLE

1 FINDING FLASH VIDEO

Nobody can beat the sheer, monolithic number of videos hosted on YouTube, but that doesn't mean you can't find gems at other video-sharing sites. Most of YouTube's competitors offer a higher signal-to-noise ratio than the video giant, as well as better-quality streams. We recommend that you check out some of these excellent streaming video sites:

BREAK.COM One of the more popular non-YouTube video sharing sites, Break.com hosts a large selection of mostly entertaining clips, and is always good for a couple of time-wasting tidbits. Break is frequently not work-safe.

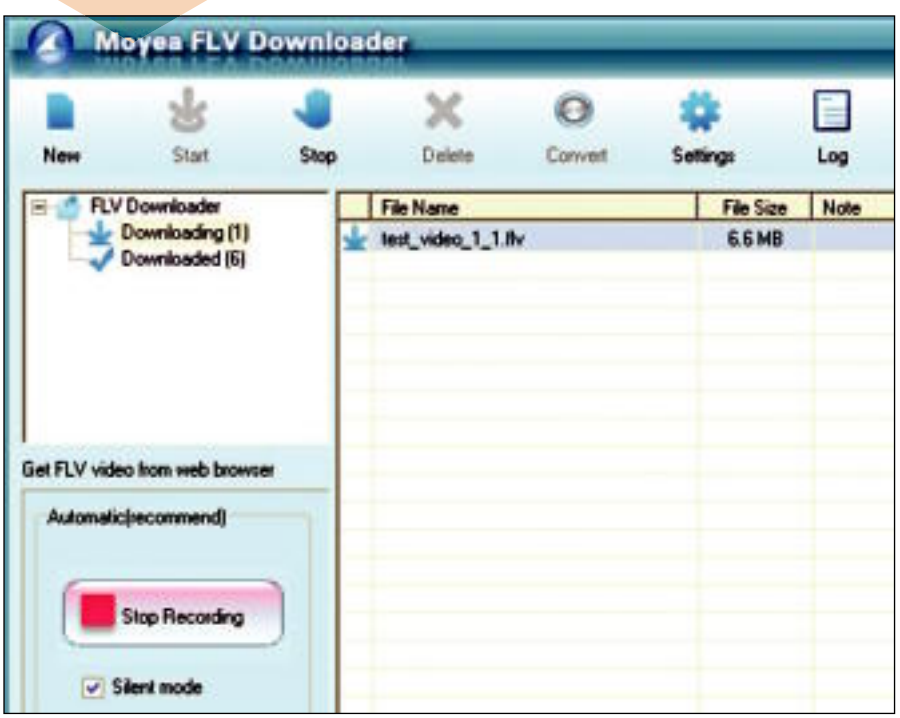
BLIP.TV A video site that hosts only user-submitted content, largely composed of TV show–style amateur programming, without YouTube's 10-minute length cap. Blip.tv stands out as having some of the best video quality of any of the streaming video sites, featuring widescreen video at a high resolution.

VIMEO.COM Offers a wide selection of user-created video in (relatively) high definition. It also integrates a more comprehensive social networking element than most other video-sharing sites, allowing users to create and subscribe to channels, and to control who can and cannot view their uploads.

2 DOWNLOADING A FILE WITH MOYEA FLV DOWNLOADER

Once you've found some streaming video that you want to save, it's time to fire up Moyea. When you first open the program you'll be presented with a screen that features a prominent Start Recording button. This controls Moyea's coolest feature: the ability to run in the background and automatically download any videos you stream to your computer. But before we click it, let's configure how Moyea will save the videos. To do this, click on the Settings button.

If you navigate to the Auto Recording tab, you can change where Moyea saves downloaded movies, and what it calls them. If you check the "Use default name prior" box, the program will attempt to save the videos using their original names. There's a very tempting "Auto convert" checkbox in this window, but don't be fooled; that feature is only available in



the full, paid version. Instead, we'll use another free program to convert our files later. The General tab has some additional options for fine-tuning Moyea's behavior, but that can wait. For now, let's try downloading a video.

First, put Moyea into recording mode by clicking the big Start Recording button in the middle-left of the client, then use your browser to play a streaming video. You don't need to watch the whole thing; once you open the stream, Moyea will automatically snag the entire video, even if you close the browser or start viewing another video. The little box floating on the top right-hand corner of your screen (which you can make go away by right-clicking it and choosing "hide") will display your download's progress.

You can now view the downloaded video with the .flv player that comes with Moyea (if you don't already have your own).

Note that Moyea doesn't work for every source of streaming video. For instance, if your plan is to snag episodes of TV shows from Hulu, you'll need to think again. Some sites simply won't work, and others require lots of fiddling. Typically, a little time spent on Google will produce a workaround for all but the most recalcitrant sites.

3 CONVERTING DOWNLOADED VIDEO

Now you've got a big library of downloaded video on your hard drive, but what can you actually do with those .flv files? You can convert them to more open formats, which will work with your phone, portable media player, and streaming devices.

There are a lot of apps out there that allow you to convert video formats, but we think that SUPER is the best, based on both the breadth of encoding options it gives you as well as its large number of preset configurations. When you first open SUPER, you may be a little overwhelmed by the sheer number of options presented to you, but don't worry; we'll show you how to do the conversions you need without having to become an expert in digital video formats.

The most important option SUPER offers is in the top left. It's the dropdown that lets you select what container the output video will be packaged in. You can select any of the standard containers, such as avi, mp4, wmv, or even flv, or you can select a device preset. For instance, if you want to create a video file that your iPod or iPhone can play, you can simply select "Apple – iPod / iPhone (mp4)" from the dropdown list, and SUPER will automatically select the appropriate container, audio and video codecs, and aspect ratio.

There are presets for Apple's players, the PSP, the PS3, the Zune, and phones from Sony Ericsson, Nokia, NEC, and Siemens. If you're hoping to play your video on one of these, you're in luck. You can just select your device from the list and you're almost done. If you're using a device not on the list, you'll have to do a little homework to find out what settings to use. As usual, Google's your friend on this one; a search like "G1 video encoding" will usually turn up what kind of containers and codecs your device can play.

Once you've specified the kind of file you want SUPER to output, you can either drag and drop the flash video files you want to convert onto the box at the bottom of the window, or you can browse to them by right clicking in SUPER and selecting "Add multimedia file(s)."

Once you've queued up all the files you want converted, press the Encode (Active Files) button. Encoding is a processor-intensive chore, and can take a while on slower computers. When it's done, SUPER will by default place the converted files in a folder called Output in its install directory. If you want to change the output location, you can do so by right-clicking and selecting Output File Saving Management from near the middle of the list.

Enjoy your videos!

Diagnose Your PC with a Clean Boot

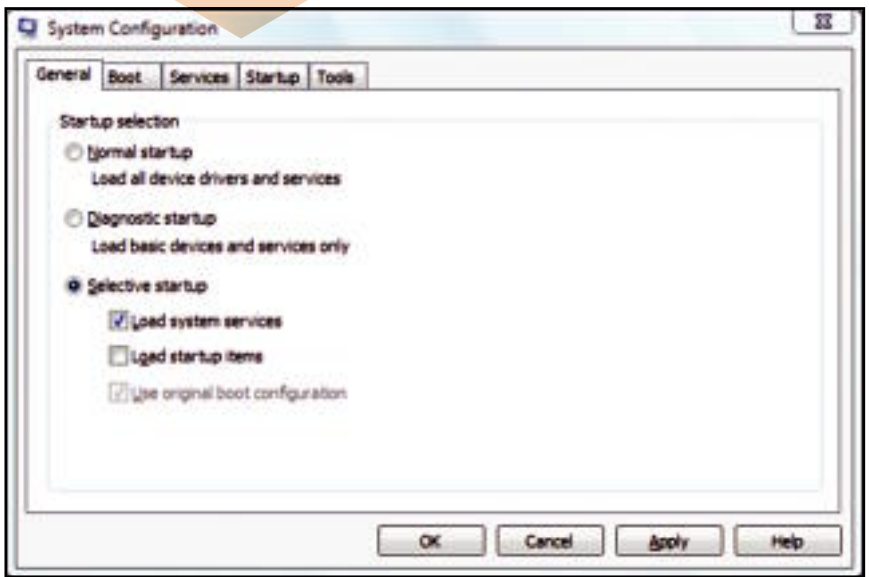
One of the most frustrating experiences you can have as a PC user is when something just won't work. Maybe it's a game that blacks out after the title screen, or an app that refuses to launch when you tell it to. When you don't get any clues as to what's going wrong, it can be enough to make you pull your hair out.

One common cause of mysterious crashes is interference with one of your computer's background processes. Unfortunately, a whole host of them start with Windows, so it can be tricky to figure out if one of them is causing a problem, and if so, which one.

The best way to troubleshoot this type of problem is to boot your PC clean. A clean boot is one where no unnecessary background processes launch at startup. Some functionality of the computer may be lost while performing a clean boot, but it's a powerful diagnostic technique and any disabled apps are simple to restore. –ALEX CASTLE

1 PERFORMING THE CLEAN BOOT

To perform a clean boot on a system running XP, you'll need to start by clicking the Run option in the start menu, which will open a dialogue. In the Open: field, type msconfig. In Vista, simply type



msconfig in the search bar on the Start Menu.

The System Configuration Utility will launch, which will allow you to modify which services start up with Windows. Click the Selective Startup radial button, then uncheck all the boxes except "Load System Services".

Next, you'll navigate to the Services tab, which contains a list of all services that launch on startup. We don't want to screw with anything vital to the computer, so check the box that says "Hide All Microsoft Services." Then click the Disable All button, which will uncheck all the boxes, and click OK.

On both XP and Vista, you'll be prompted to reboot. When your PC reboots, it will be running clean. Try running the program you've been having trouble with. If the problem persists, then it's likely not due to interference by another program. If this is the case, you can return your startup settings to normal simply by launching the System Configuration Utility and selecting the radial marked "Normal Startup – load all device drivers and services."

If the problem's gone, it's a fair bet that you've hit some sort of app conflict, so read on to find out what to do.

2 ISOLATING THE PROBLEM

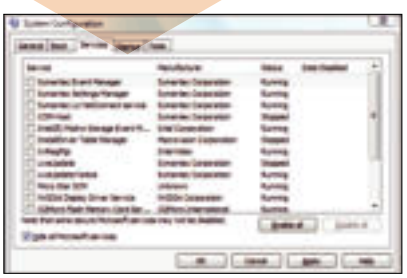
So, now you know that one of the programs you disabled is the cause of your problem. That's cool, but you probably disabled a whole fistful of services, and most of those are likely doing something worthwhile, so now we'll need to narrow the field down to just one culprit. First, we'll divide the field by manually re-enabling half the services in the System Configuration Utility and rebooting.

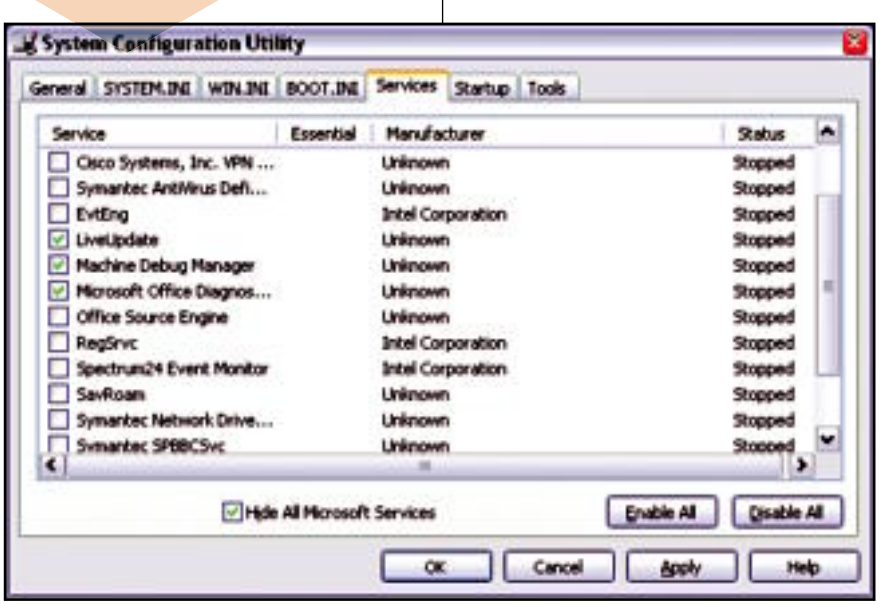
Run the software that you're having trouble with. If the problem still occurs, then one of the programs you just enabled is the perpetrator. Otherwise, it's one of the other half of the programs. Either way, you've eliminated 50 percent of the services as potential trouble makers. Now, change the list so that only half of the suspect services are enabled and repeat the process.

After a few rounds of this halving process, you should be able to pinpoint the program that's causing your problem. You'll have to decide how you want to resolve the issue. If the interfering service is something you know you can live without, you can go ahead and disable it from the System Configuration Utility's Services or Startup tab, depending on the program.

If it's something you want to keep, you'll need to figure out some way to resolve the conflict. This can be easier said than done, but a good place to start is with a Google search for the interaction, or by visiting the conflicting programs' forums, if they exist, or contacting the respective support departments.

Good luck!





This month the Doctor tackles...

OEM Angst
Analog Hole
A Grinding Noise

Am I An OEM?

I'm in the middle of building the Pro Gaming PC from your website (www.maximumpc.com/tags/parts+guide) and I have a question about the operating system you recommend. The Vista 64-bit Home Premium on your parts list is the system builder pack, intended for system builders only. I am a home user.

I went to Microsoft's website and looked up the OPK preinstallation information. I have to register with my business information, of which I have none.

Should I send it back and purchase the end-user's version? Please respond... I am on pins and needles waiting for the reply.

—Debra Hodge

Debra, you don't have to install your OEM version of Vista using the preinstalled environment, as Microsoft suggests. Instead, you can just insert the DVD and install it as normal. The OPK method is useful for system builders who are setting up multiple PCs at once, but you don't *have* to use it.

The reason OEM licenses for Vista are cheaper than retail versions is that they are tied to your specific motherboard—if you replace the motherboard, you may have to get a new Vista license. A call to Microsoft might reactivate your OS in the event of a mobo swap, but it's by no means guaranteed.

The Neverending Memtest

I downloaded memtest86+ 1.65 (on the recommendation of your magazine) and tried it out on one of my systems. I cannot get past the "auto" running memtest86+ to finish booting to Windows XP Pro. My system is an AMD 2.2GB dual core with 2GB of RAM on a TForce 550 SE mobo. How can I stop memtest86+ from automatically starting every time I boot? I assume there is an autoexec.bat file that is running. Memtest86+ ran for nearly 48 hours non-stop without ever finishing the tests. Is this normal? Should I have let it run to completion?

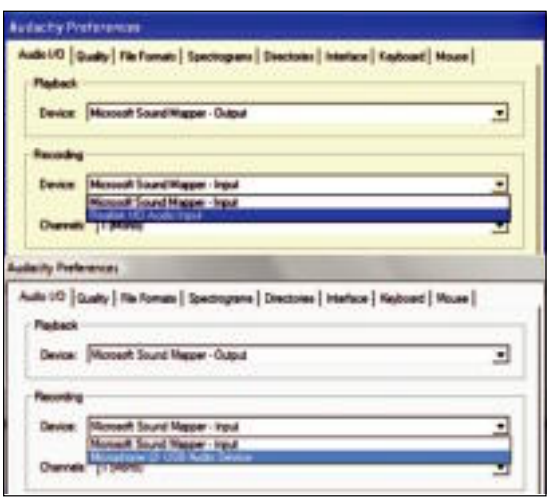
—Dave

Dave, memtest86+ runs from a boot CD, USB, or floppy drive. Just remove that media before you start your computer, and you should boot normally. The test will actually run forever in the default burn-in mode; if you are seeing 48-hour runs without problems, your memory's in pretty good shape! The current version of memtest86+, by the way, is version 2.11, which you can get at www.memtest.org.

Pluggin' the Analog Hole

On my old Windows XP PC, I used Audacity to record music, etc., from the Internet with great results.

Recently I bought a Dell XPS 420 with Windows Vista 64-bit and now Audacity (or even the PC's Creative Sound recording software) can't record any audio. I came across some related forums and tried a couple of suggestions (check disabled items on the Sound properties, etc.), which haven't worked.



In Windows XP (top), Audacity can record directly from the soundcard, but in Vista (below), the feature has been disabled by Microsoft.

In XP I used the Stereo Mix setting in Audacity but in Vista I don't have that option. And recording from the mic isn't an option, either. Is this a Vista "feature"? If so, how can I record audio from the Internet? Vista has grown on me so I'd rather not downgrade to XP.

—Suleman

You've got it, Suleman. Recording from the soundcard is disabled in Vista to prevent people from gettin' music for free by taking advantage of the "analog hole"—that is, recording real-time sound output rather than actually duplicating files.

Sounds like you've already tried enabling disabled devices, the usual fix, so we don't have any further advice. On the bright side, music subscription services like Rhapsody let you download from a selection of millions of songs for a small monthly fee (and keep them as long as you have your subscription), while Internet radio stations like Pandora, last.fm, and Slacker.com let you listen for free.

RAM Timing Again

I'm building a new system consisting of an Intel Q9650 processor, an EVGA 790i Ultra SLI mobo, an EVGA GTX 280 videocard, 2GB of Corsair Twin 3X2048-1600C7DHXG memory, a SoundBlaster X-Fi XtremeGamer PCI soundcard, three SATA 500GB 5000AAKS Western Digital hard drives, and a retail version of Windows XP Pro with SP2. My BIOS is Phoenix Award. I

have all default settings for everything in the BIOS except I disabled HD Audio.

When I try to load Windows, I get a generic blue screen that tells me to run a system diagnostic, do a memory check, and remove any mismatched memory or newly installed hardware. I'm wondering if I might have a conflict with the Corsair memory. The motherboard's spec sheet states that it supports dual-channel DDR3 800/1,066/1,333, and SLI-ready memory up to 2,000MHz.

In a recent review of the 790i Ultra, you used 2GB of Crucial 1,333MHz on the mobo. Was this memory EPP 2.0, or do you need EPP 2.0 at slower speeds? My RAM is rated at 1,600MHz, but the BIOS tells me that EPP 2.0 is not detected. I have the latest BIOS version, but there is no listing for enabling SLI memory under the Advanced Chipset section in the FSB & Memory Config subsection. Does this appear if EPP 2.0 memory is detected? Can I run higher-speed non-EPP 2.0 memory, or would this create a conflict with Windows?

I also read in the "BIOS Tweaks" article (November 2008) that not addressing the AHCI issue could cause Windows to not load. I would like to eventually set up a RAID, but can I disable AHCI to load Windows or do I need to load AHCI drivers at the F6 point?

—Thomas DeKalb

The Doctor's gut feeling is that you have a RAM timing issue. To eliminate any problems, you should make sure you are running default timings and speeds for the RAM and front-side bus. Go into the BIOS and set the RAM at DDR3/1333 and set the timing at default values and make sure that SLI memory is disabled. You should now be able to install XP without issues.

Once you're up and running, you can increase your clocks. Remember that to get the higher speeds out of DDR3 (at least with Core 2 machines), you'll need to increase the voltage to the modules. For the 1600C7DHXG, you'll need to run it at 1.80 volts, with a timing of 7-7-7-20.

As far as RAID support goes, Nvidia does not support AHCI with its chipsets. But one of the pluses of the nForce chipset is that you can configure the SATA ports as RAID after the fact.

WHEN I SHUT DOWN MY PC, IT MAKES A METALLIC GRINDING-TYPE NOISE. ANY ADVICE?

Play It All

Doc, I need some help! Using what I learned from your mag, I built a small home theater PC. Everything is good, except when I want to watch a movie I have ripped (I use SlySoft AnyDVD). I don't know how to get the movie to run in one piece. I have to play the movie in sections. I have Nero 7 and PowerDVD but it happens the same way with either.

—Denny Morris

Provided you ripped the movie correctly, all you have to do is select the correct source. In PowerDVD, open the video_ts.ifo file, which should let you play the whole movie straight through, or skip between chapters, even turn subtitles on, just like a physical DVD. We also recommend the VLC player (http://www.videolan.org.vlc/), a free media player which has no trouble playing ripped DVDs (just point it at the containing folder). Check out Will Smith's DVD-ripping feature in the March 2009 issue for more! (http://tinyurl.com/5rwwtu).

Daily Grind

I recently upgraded my computer. When I shut down my PC, it makes a metallic grinding-type noise. It also happens when my computer is running at full load. Any advice?

—Frank Pavey

That's not a good sign, Frank. The way the Doctor sees it, this could be one of two things. First, check to make sure none of your case fans are hitting anything: errant wires, the sides of their enclosures, etc. Same goes for your CPU fan—if one of its cooling fins is bent it could be hitting against a fan.

Otherwise, that could be the sound of a hard drive head grinding against a platter, which is exactly as bad as it sounds, because it means that the drive is going to crash soon. If you have more than one hard drive, try to isolate which one of them is making the sound. Then back up the data on it and start looking for a replacement. The (somewhat) good news is that new drives are cheap as hell these days, and you can get a 1TB drive for less than a hundred bucks that will probably be faster than what you're running.

SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

REVIEWS

Tested. Reviewed. Verdictized

INSIDE

ONLINE

PLUS **Best of the Best, Editors' Blogs, and the No BS Podcast**

Gateway FX6800

Who says a gaming PC has to break the bank?

Trick or treat, Penryn: An affordable Core i7 machine takes on power rigs.

Gateway's trademark cow is long dead, but that doesn't mean the company can't be its quirky old self—something the FX6800 gaming rig illustrates perfectly. With its itsy-bitsy, microATX board, "I don't care about appearances" wiring, and moderate price, you'd think the box would be easily outclassed by the custom, hand-built PCs we see every month. Well, think again.

The FX6800's secret is under the hood. While the majority of the machines we've tested lately are still running overclocked Core 2 Extreme CPUs, Gateway reached for the midrange Core i7-940. The top-end CPU may be the speed king, but we seriously wondered if a stock-clocked, 2.93GHz Core i7-940 could even hang with those 4GHz Core 2 Extreme rigs.

The results were surprisin. While the FX6800 didn't clean anyone's clock, the Core 2 Quad boxes didn't exactly blow the lowly $3,000 Gateway out of the water, either. For example, the radical, oil-cooled, nearly $11,000, Hardcore Reactor that we reviewed in March was only six percent faster in our Premiere Pro CS3 test and 10 percent faster in Photoshop CS3. Perhaps even more embarrassing is the Reactor's score in our ProShow Producer and MainConcept tests. Both benchmarks are multithreaded and thus we saw the eight-core (four real, four Hyper-Threaded) FX6800 acing the Reactor by 31 percent in ProShow Producer and achieving near dead-even scores in Main Concept. The performance gap was shocking considering the 1GHz clock gap and massive price difference between the two machines.

In gaming, the FX6800's single ATI HD Radeon 4870 X2 card couldn't compete with the competition's CrossFire and SLI configurations, though. In Crysis, the 4870 X2 saw frame rates in the 34fps range. The tri-SLI Reactor ran in the 53fps range.

Just because the FX6800 comes with only one videocard doesn't mean the machine can't run CrossFire. It's true that you lose two slots going from ATX to microATX, but the board in the FX6800 features two x16 physical slots, so a second X2 card could be mounted. The Delta PSU in the rig even features a harness to support a second graphics card, but we don't know if it can deliver the needed juice.

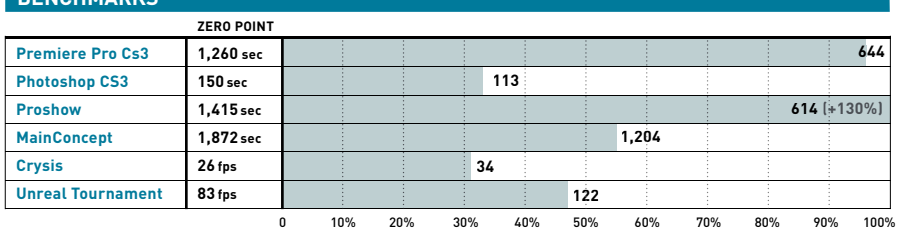
There are some other nice touches in the FX6800. The top-mounted media reader features a copy button that automatically copies files to the PC. We like the FX6800's storage config, which features Intel's speedy 64GB X-25M SSD drive and a 1TB Seagate Barracuda. Not great, but not bad. We particularly like the two additional, easy-to-access drive bays in front. Slide open a door, and you can insert two 3.5-inch SATA drives to act as backup. Further adding to the convenience, Gateway has a backup button that activates Vista's built-in backup application.

There's a lot to like about the FX6800. It's not Kick Ass–worthy, but it's pretty affordable, and it won't leave you embarrassed, even if you compare it to last month's fire-breather. The FX6800 is a little like driving your dad's AMC AMX against an exotic car in a street race. The other car may be louder and flashier, but it still can't pull away from your funky '70s ride. **—GORDON MAH UNG**

SPECIFICATIONS

PROCESSOR	Intel Core i7-940 (2.93GHz)
MOBO	Custom microATX using Intel X58 chipset
RAM	6GB DDR3/1333
VIDEOCARD	ATI Radeon HD 4870 X2
SOUNDCARD	Integrated
STORAGE	Intel 80GB X25-M, 1TB Seagate Barracuda 7200.11
OPTICAL	HL-DT-ST GH15F DVD burner
CASE/PSU	Custom / Delta 1000 Watt

BENCHMARKS



Our current desktop test bed consists of a quad-core 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard. We are running two EVGA GeForce 8800GTX cards in SLI mode, Western Digital 150GB Raptor and 500GB Caviar hard drives, LG GGC-H20L, Sound Blaster X-Fi and PC Power and Cooling Silencer 750 Quad. OS is Windows Vista Home Premium 64-bit.

VERDICT 8

GATEWAY FX6800

+ MULTITHREADING	− SINGLE THREADING
Quieter and faster than many far more expensive PCs.	MicroATX board limits your expansion capabilities.

$3,000, www.gateway.com

BFG GeForce GTX 295

With speed to burn, this dual-GPU videocard delivers SLI in a single PCI-E slot

Just in case you missed our review of the new GTX 295 reference board last month, we'll revisit the high points. To make a GeForce GTX 295, Nvidia sandwiched a fairly large heatsink between a pair of boards—that's one kick-ass sandwich!

The GTX 295's GPUs are basically modified GTX 280 GPUs. They've got the same shader core configuration as the GTX 280, but Nvidia shrunk the chip's die from 65nm to 55nm, and lowered the core clock speed to 576MHz (the same as the GTX 260). These two adjustments help keep power requirements and heat generation under control, while the full complement of 240 shader cores keeps the frame rate up in shader-limited benchmarks, such as Crysis and Far Cry 2.

The GTX 295's memory configuration is also similar to the GTX 260's. Each GPU is paired with 896MB of GDDR3 clocked at 999MHz, connected to the GPU by a 448-bit bus. Where ATI increases memory bandwidth on the 4870 family of cards by using quad-pumped GDDR5 memory, Nvidia is still using double-pumped RAM with a wider bus. The upshot is that the 4870 X2 has a tiny memory-bandwidth edge. In reality, it's probably not something you'd ever notice.

The performance story hasn't changed much from our last review, despite new driver revisions from both ATI and Nvidia. Even in shader-limited tests that typically favor ATI's massive array of 800 shader processors (Crysis and 3DMark Vantage), the GTX 295 managed to outpace ATI's fastest. Indeed, the BFG card laid down the smack in every single benchmark we test, a rare feat.

This card fits into a single PCI Express slot, but it will cover the adjoining slot, as well. It requires both 6-pin and 8-pin PCI-E power connectors and a decent 680W power supply to run. BFG equipped its board with a pair of dual-link DVI connectors and a single HDMI output.

It's fast, it's beautiful. 'Nuff said.

–WILL SMITH

MAXIMUM PC KICK ASS!

VERDICT 9

BFG GEFORCE GTX 295

+ MOBO	– MOFO
The fastest card you can put in a PCI-E slot. Two GPUs really are better than one	Only 896MB of effective frame buffer. Hot and doesn't exhaust well.

$500 (street), www.bfgtech.com

BENCHMARKS

	BFG GeForce GTX 295	ATI Radeon 4870 X2 (Diamond)
Driver Version	181.22	9.1
Crysis 4x AA/Very High (fps)	30.4	29.7
Crysis no AA/Very High (fps)	**37**	31.5
Call of Duty (fps)	**115.9**	105.5
Vantage Game 1 (fps)	**28.95**	23.91
Vantage Game 2 (fps)	**21.87**	19.36
Far Cry HQ, 1920x1200, no physics, no AI (fps)	**80.26**	69.14
Far Cry HQ, 1680x1050, no physics, no AI (fps)	**86.42**	73.1

Best scores are bolded. Benchmarks are run on an Intel Core 2 Quad Q9770 Extreme with 4GB of memory running Windows Vista. Crysis and 3DMark Vantage are run at 1920x1200 with 4x AA and 8x anisotropic filtering, unless otherwise noted. Call of Duty is run at 2560x1600 with 4x AA.

The GeForce GTX 295 delivers Kick Ass performance, but it can get a little hot under the collar.

DFI LAN Party UT X58

There's a party on this motherboard and you're invited!

Motherboards can't just sit quietly in your case and service your parts anymore. Today, motherboards also must advertise to the entire world that you have one badass system. Hoping to outdo all others, DFI's LAN Party UT X58 Core i7 motherboard features a massive heat pipe appendage, called the "Flame Chiller," that juts out the back of your case.

The idea is to transport heat from the heatsinks attached to the board's power regulators and chipset to outside the case, where it can be cooled by the exhaust from the case. Does it work? The concept makes sense, but we're a bit skeptical of the small contact patch the heat pipe makes with the board. The external heatsink never got hot in our tests, but we typically don't overclock test boards far enough to overheat voltage regulators. The Flame Chiller looks cool, though!

This board's not all about flash and panache, however. The board's tri-SLI implementation is certainly better than on other X58 boards we've tested. While other boards' x16 PCI-E slot arrangements force you to either buy a specific case enclosure or hack-saw off a portion of your videocard to get a tri-SLI configuration up and running, the LAN Party UT X58's tri-SLI will work in most cases.

With tri-SLI as one possible config, DFI also properly laid out the SATA ports. All eight of the SATA ports on the board are accessible even with three huge GPUs in place. Another two eSATA ports are available on the backplane, too.

DFI's audio implementation is also pretty interesting. Instead of an audio card riser that stabs into an x1 slot or some custom slot alternative, the riser board (with Realtek codecs on it to lower board electrical noise) connects to the mobo via a ribbon cable. This lets you place the board wherever it's convenient. Alas, while other enthusiast boards give you X-Fi compatibility through drivers or licensed hardware, the LAN Party UT X58 sticks to basic Realtek codecs and drivers, which aren't quite as good.

The LAN Party UT X58 has better tri-SLI support than other boards.

After spending some time overclocking Intel's threadbare DX58SO board (see page 40), we really appreciate how the LAN Party UT X58 offers far more switches and knobs to turn. One thing DFI needs to add, though, is a status page, so you can tell what your tweaks have changed. For example, you should be able to see what DRAM frequency you have selected instead of calculating it manually.

In our overclocking tests with the LAN Party UT X58, we didn't get our engineering sample Core i7-965 to the speeds that we did with the DX58SO (just shy of 4GHz), but we spent considerably more time with the Intel board than we can with any review board. Spending more time learning the intricacies of this board's BIOS could very well improve the overclocking performance.

Unfortunately, DFI's board doesn't distinguish itself on the benchmark performance beat, either—it clocks scores that are very similar to all the other X58 boards we've tested. DFI does set its Turbo Mode much higher than other boards, but that didn't seem to impact performance at all.

So what's the practical upshot? We still prefer the features and onboard X-Fi of the MSI Eclipse SLI that we reviewed in February, but the DFI LAN Party UT X58 comes in a close second. —GORDON MAH UNG

BENCHMARKS

	DFI LAN Party UT X58	Intel DX58SO
PC Mark Vantage x64	6,597	**7,082**
ProShow (min:sec)	10:01	**9:12**
MainConcept (min:sec)	18:10	18:00
3DMark Vantage CPU	**46,541**	45,424
HD Tach (MB/s)	**213**	185
Valve Particle test (fps)	156	155
Quake 4 (fps)	**234.9**	224
UE Mem Copy (MB/s)	18,768	**19,182**
UE Mem Latency (ns)	32.8	31.9
SiSoft Sandra RAM (GB/s)	26.7	26.3

Best scores are bolded. Our test bed consists of a Core i7-965 Extreme Edition CPU, 6GB of Corsair DDR3/1600, an EVGA GeForce GTX 280 videocard, a PC Power and Cooling Turbo Cooling 1200 power supply, a WD Raptor 150GB drive, and Vista Home Premium 64-bit. HD Tach scores were achieved using an Intel X25-M SSD.

VERDICT 9

DFI LAN PARTY UT X58

+ LAN PARTIES	− WAKES
True tri-SLI support; all SATA ports are forward-facing.	Minimal BIOS tweaking from inside Windows; no X-Fi mobo support.

$300, www.dfi.com

Nvidia GeForce 3D Vision

Explore the third dimension—without the use of hallucinogens

Finally, here's a 3D gaming solution that doesn't send us headfirst into a vomit bag. GeForce 3D Vision is Nvidia's attempt to revive stereoscopic 3D, a century-old technology that has never been implemented successfully in PC gaming (despite many headache-inducing efforts in the late '90s). Along with wireless shutter glasses and an IR emitter, this $200 kit comes with the promise that you'll be able to enhance your existing library of DirectX games by turning them into true 3D experiences—if you're running a GeForce 8800 GT or better videocard. And for the most part, the promise is delivered —but not without some serious issues.

After a surprisingly painless installation—you just need to plug the IR emitter into a USB port and install drivers—we loaded up several of our favorite games from the past year. Nvidia tests and certifies games to work with the 3D Vision—about 400 games have been approved and given ratings ranging from "Fair" to "Excellent" as of early February.

The 3D effect on the higher-rated games was stunning, transforming our monitor from a flat display to a window that let us peer into our games' worlds. This illusion was particularly impressive with first-person shooters—Left 4 Dead's zombies looked as if they were really clawing at our faces, and we felt like we were actually running through the towering cityscape of Mirror's Edge. Depth-of-field blurring effects, like Call of Duty's iron-sights and Far Cry 2's layered fields of grass, also benefitted greatly. And thankfully, none of our testers experienced the nausea that was typical of previous shutter glasses, even after extended play sessions—this was due to our use of a 120Hz monitor, a requirement of the goggles. The only complaints testers had were that they felt a slight cross-eyed sensation and increased eyestrain during use.

But even in games with an "Excellent" rating, the implementation is far from perfect. Self-shadowing and motion blur produced visual artifacts, and post-processed lighting effects didn't render correctly with stereoscopy enabled. Many games' crosshairs also needed to be replaced by Nvidia's reticule overlay, which omits some features of native in-game HUDs. The simulated depth goes into the screen by default; rendered objects don't actually fly out toward you unless developers have specifically coded the effect into the game (World of Warcraft is the only game so far that supports this feature).

VERDICT 6

NVIDIA GEFORCE 3D VISION

+ MAGIC EYE	− PINK EYE
Convincing 3D illusion works in many games; hassle-free installation and calibration.	Graphical artifacts; frame rate drop; limited compatible monitor options; expensive.

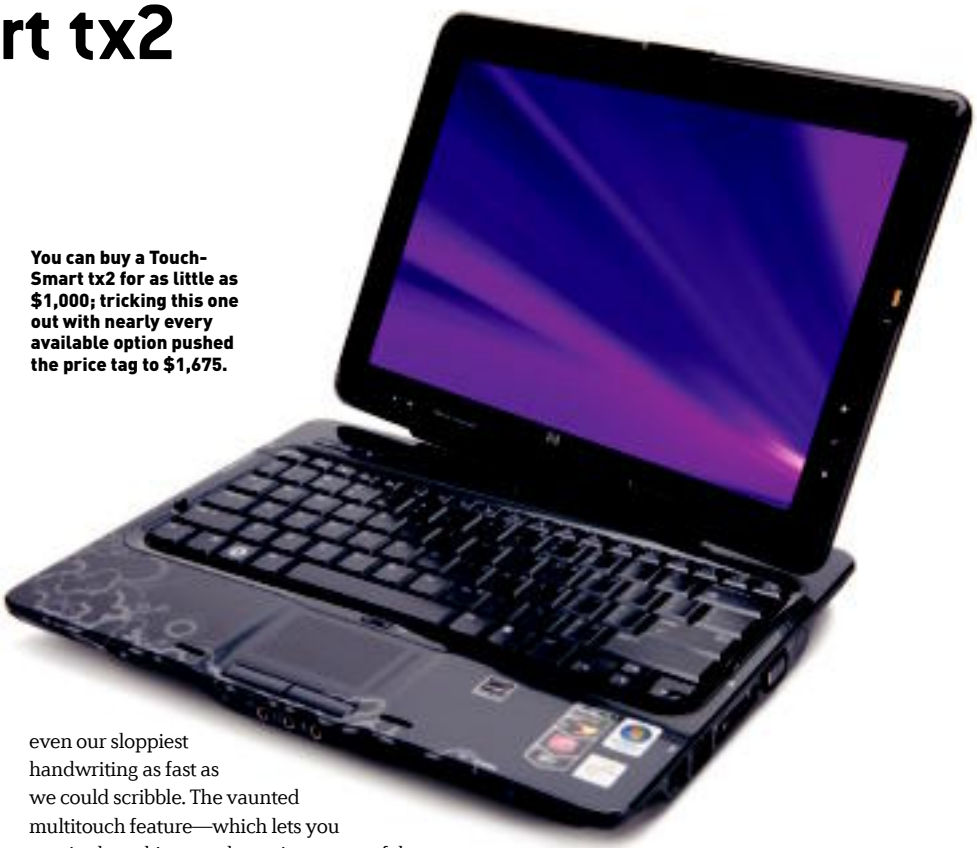
$200, www.nvidia.com

But our biggest problem with 3D Vision is the cost of the experience. The $200 price tag makes the kit really only suitable for enthusiasts, who'll also have to spend at least another $300 for one of the two available 120Hz LCDs that are compatible with the kit. Worse yet, these pricey LCDs are currently limited to entry-level 22-inch panels (1680x1050 max resolution). These compromises make it hard to justify the premium for 3D Vision, even if you're an early adopter with unlimited funds. Until the price drops and larger 120Hz displays become available, we're fine gaming in a mere two dimensions. –NORMAN CHAN

These shutter glasses work well, but lack the retro chic of anaglyph (red/blue) spectacles.

HP TouchSmart tx2

Don't touch me there



You can buy a TouchSmart tx2 for as little as $1,000; tricking this one out with nearly every available option pushed the price tag to $1,675.

We're unabashed fans of HP's TouchSmart desktop machines, so we were really looking forward to getting our digits on the new technology in a convertible touch-screen notebook PC. But our eager anticipation only made the reality of the TouchSmart tx2 all that more disappointing.

This is the first convertible touch-screen PC designed for the consumer market, and its underlying hardware—which in our review unit included AMD's best mobile CPU—delivered enough horsepower for this machine's touch-screen elements. Benchmark performance, on the other hand, was dismal (more on that later).

You can use the TouchSmart tx2 as a conventional notebook PC or rotate its 12.1-inch screen 180 degrees, lay it flat, and use the machine's tablet functionality. The 1280x800 touch screen uses active digitizing technology and supports the use of either a fingertip or a digital pen (as opposed to the simple stylus that HP shipped with its first-generation TouchSmart desktops). The digital pen delivers hover feedback (it doesn't have to touch the screen to activate user-interface elements, such as tooltips) and considerably more precision than a fingertip.

The pen is particularly useful for drawing diagrams and jotting notes, and HP's handwriting-recognition software is nothing short of excellent. It had no problem recognizing even our sloppiest handwriting as fast as we could scribble. The vaunted multitouch feature—which lets you manipulate objects and certain aspects of the user interface—is really only useful with HP's very basic MediaSmart applications. That could change once Windows 7 hits the market, since the new OS is slated to offer native support for multitouch screens. (This machine came with the 64-bit version of Windows Vista Home Premium).

If you don't have a work surface and don't need to type, you can put the machine in tablet mode and cradle it in one arm. But we found that our elbow and shoulder could tolerate this position for only about 20 minutes because the TouchSmart tx2 is so heavy for its size: five pounds, one ounce (with the optional eight-cell battery). Adding the power supply brings the weight up to five pounds, 13 ounces. Replacing the optical drive with the plastic "weightsaver" shell sheds five ounces, but renders the machine much less useful.

As you can see in the chart below, the TouchSmart tx2 is abysmally slow with hard-core applications. And while the machine was nearly silent when idle or playing a movie, it sounded like a hair dryer when given a heavy load. The battery delivered two hours and 51 seconds—long enough to watch both *Boogie Nights* and its supplemental disc—using HP's recommended settings (which balance battery life with performance).

We made many allowances for the performance of HP's touch-screen desktops, with the caveat that they shouldn't be a *Maximum PC* reader's *only* computer. We can't do the same for a notebook. And while we can ignore the TouchSmart tx2's crappy gaming performance—no one buys an ultra portable to play games—we can't ignore this machine's other shortcomings and high price tag. **–MICHAEL BROWN**

SPECIFICATIONS

CPU	AMD Turion X2 Ultra Dual Core ZM-86 (2.4GHz)
RAM	4GB DDR2 SDRAM (two DIMMs)
CHIPSET	AMD ATI RS780M
HARD DRIVE	400GB Toshiba MK4058GSX (5,400rpm)
OPTICAL	Optiarc DVD RW AD-7581 8x (w/Lightscribe)
GPU	AMD ATI Radeon HD 3200
BOOT/DOWN	148 sec/23 sec
LAP/CARRY	5 lbs, 1 oz/5 lbs, 13 oz

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3	1,860 sec	2,580 (-27.9%)
Photoshop CS3	237 sec	316 (-25%)
Proshow	2,416 sec	2,310
MainConcept	3,498 sec	4,643 (-24.7%)
Fear 1.07	14.0 fps	13.0 (-7.1%)
Quake 4	29.1 fps	13.2 (-54.6%)

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero point notebook uses a 2.6GHz Core 2 Duo E6700, 2GB of DDR2/667 RAM, an 80GB hard drive, GeForce Go 8600M and Windows Vista Home Premium (32-bit Edition).

VERDICT 6

HP TOUCHSMART TX2

+ SKIN	– SKINNED
Outstanding touch screen; excellent handwriting recognition.	Heavy for an ultra portable; loud under load; poor performance; expensive.

$1,675, www.hp.com

Cooler Master V10

Huge, mediocre, and difficult to install is no way to go through life, son

The Cooler Master V10 is a monster. It weighs two pounds, 10 ounces, stands 6.3x9.3x5.1 inches, and contains one thermoelectric cooler, two fans, and two heatsinks: one on the CPU and one on the TEC. The TEC, which needs to be powered by a 4-pin Molex on a dedicated power lead, activates only when needed.

The V10's installation is the worst we've ever experienced. Two retention clips attach to the cooler, which you then attach to a bracket you mount on the back side of the motherboard. This means removing your motherboard and balancing the cooler on your lap while you screw it in. Unfortunately, the V10 is so huge that it blocks the motherboard's top three ATX screws, making it difficult to mount the motherboard in even the roomiest cases. And the V10's bulk made it difficult to connect both the 8-pin and the 24-pin motherboard power cables on our test system's motherboard—impressive, since they're on opposite sides of the motherboard.

The V10's RAM fan means you have to remove the cooler to remount your memory, and DIMMs with cooling vanes, like Corsair's Dominators, are likely to be bumped by the V10's overhanging radiator. Indeed, the first few times we tried to install the V10, our machine wouldn't POST due to RAM seating issues. It wasn't until we replaced our tall DIMMs with shorter sticks, and removed the optional backplane bracket to mount the cooler (which can warp the motherboard), that we could even get our system to start.

Ultimately, the V10 offers nothing to recommend itself. It's a nightmare to install in most machines—the only exceptions are cases with motherboard tray cutouts behind the CPU. Plus, its performance is merely mediocre: Our favorite air cooler, the Zalman CNPS9900, outcools it easily in both idle and full burn (by three and five degrees, respectively). The Zalman cooler is also smaller, $60 cheaper, easier to install, and requires less power. –NATHAN EDWARDS

BENCHMARKS

	Cooler Master V10	Zalman CNPS9900	Stock Cooler
Idle (C)	30	**27**	32.25
100% Burn (C)	47.75	**42**	61

Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour's worth of CPU Burn-In (4 instances). Test system consists of a stock-clocked Q6700 processor on an EVGA 680i motherboard

COOLER MASTER V10

VERDICT 4

+ V8	- V1
Offers decent cooling. RAM fan is a bonus.	Outperformed in every way by cheaper, easier-to-install products.

$140, www.coolermaster.com

The Cooler Master V10 is two and a half pounds of frustration.

LG GH22LS30

Another 22x DVD burner enters the fray

If you read our disc-ripping challenge on page 62, then you already know that LG's GH22LS30 22x SATA drive is a slowpoke at copying video discs. But if that's not an activity that interests you, this drive offsets the shortcoming with other talents. For example, the GH22LS30 turned in the fastest time we've ever clocked at writing data to a single-layer DVD+R disc. Like Samsung's SH-S223 (reviewed February), LG's 22x burner isn't daunted by 16x media; the drive peaked at a 20.1x speed when filling the disc and achieved an impressive write-speed average of 16.31x. Thus the GH22LS30 was able to write 4.38GB of data in 4:29 (min:sec) compared with the SH-S223's time of 4:46. The GH22LS30 read the single-layer data disc in 4:58 to the SH-S223's 4:55.

The two drives were close performers when reading and writing dual-layer discs, as well—when the content was data, that is. The GH22LS30 wrote 7.96GB of data to disc in 13:54 versus the SH-S223's 13:13. And LG's drive took 11:46 to read the data disc we created, while Samsung's drive took 11:29. But as we mentioned earlier, the speed of the GH22LS30 ratchets way down when the drive is reading video files. Our new disc-ripping test involves copying the contents of a dual-layer movie disc to a hard drive (a read operation, as far as the optical drive is concerned). LG's GH22LS30 took 20:24 to rip our test DVD, while Samsung's SH-S223 finished in 15:26 in stock trim (and just 8:26 with a third-party firmware hack), and a host of other DVD drives took just a little over 10:00. (See page 62 for details). That kind of time can add up when you're archiving a movie collection.

The two drives evened out again in our DVD+RW tests, with the GH22LS30 writing 4.38GB of data to a rewriteable disc in 14:55, a second faster than Samsung's drive mustered.

Yes, the GH22LS30 is nearly equal to Samsung's SH-S223 in many respects, but we'll opt for the total package over a partial any day. —KATHERINE STEVENSON

BENCHMARKS

	LG GH22LS30	Samsung SH-S223
DVD+R Write Speed Average	**16.31x**	14.94x
DVD+R Read Speed Average	12.03x	**12.16x**
Access Times (random/full)	123/233ms	**117/204ms**
DVD+DL Write Speed Average	9.12x	9.12x
DVD Ripping (min:sec)	20:24	**15:26/8:13***

Best scores are bolded. Our test bed is a Windows XP SP2 machine using a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, one EVGA GeForce 8800 GTS card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU. All tests were conducted using Verbatim media and Nero CD DVD Speed, except the ripping test, whereby we time how long it takes to copy the contents of a double-layer DVD to a Velociraptor hard drive.
**Time after third-party firmware patch.*

LG GH22LS30 — **VERDICT 7**

+ GOING GREEN	− GANGRENE
Good overall performance with data reads and writes.	Bad performance ripping video discs.

$80, www.lge.com

The GH22LS30 comes with Nero Express for recording discs and Cyberlink's PowerProducer and PowerDVD for disc authoring and playback chores.

Optoma Pico PK101

Honey, I shrunk the video projector!

Optoma picked an appropriate moniker for its Lilliputian-size video projector. The Pico PK101 isn't just small, it's almost inconceivably tiny. It measures just 1.97 inches wide by 4.06 inches long by 0.59 inches thick, and it weighs only four ounces.

Texas Instruments' DLP (Digital Light Processor) technology deserves much of the credit for making such a product possible. DLP projectors create an image by bouncing light off microscopic mirrors arranged in a matrix on a semiconductor. Each mirror represents a pixel in the image and swivels to either reflect light through the lens or to an internal heatsink. Toggling these two states on and off creates a grayscale. Color pixels are created by using either a color wheel or a colored light source. Optoma uses a non-replaceable LED for its light source, which it claims should last for 20,000 hours. There's a tiny speaker and a 0.5-watt amp onboard, too.

In addition to its Li-Ion battery, the Pico PK101 can operate on AC or USB power (we used the USB port on a Metadot Das Keyboard). Optoma claims a fully charged battery should last 90 minutes, but ours delivered only 67 minutes while playing a silent, looping slide show at the brighter of the projector's two settings. Good thing it comes with a spare.

This projector is designed to be paired with a handheld media player and is outfitted with only an analog A/V input. You connect the projector to a source using either a special cable or an iPod docking-port adapter (both are included). If you want to connect the projector to a PC, the PC must be equipped with either a composite video output or a VGA output (connected to a VGA-to-composite adapter). That limitation pretty much rules out the device as a PowerPoint tool for the traveling businessperson, because a VGA signal converted to composite does a very poor job of displaying text.

We weren't surprised to discover that the Pico PK101 lacks adjustments for settings such as zoom, tilt, and keystone, but we found its focus wheel thumbwheel to be annoyingly stiff. And while it can throw an impressively large image (it produced a 60-inch diagonal picture from its maximum distance of 102 inches), the image was unsatisfactorily faded in daylight hours, even with heavy curtains covering the window. The Pico performs best in a very dark room or at distances much closer to the screen, where its light is concentrated on a smaller area. —MICHAEL BROWN

VERDICT 7

OPTOMA PICO PK101

+ THE TICK	− ATOM ANT
Crisp, bright display at distances up to about six feet; incredibly small, battery powered, built-in speaker.	Needs a very dark room for best results—and a battery swap to play a feature-length movie.

$400, www.optomausa.com

The Pico PK101 DLP projector is a miniature marvel—but it's not a miracle worker.

Premiere Elements 7.0

Our love affair with Premiere Elements is just about over

Get Robert Stack on the phone! In what could be the greatest tech unsolved mystery since the disappearance of Intel's Tejas, someone has kidnapped Premiere Elements 5.0 and 6.0!

Just kidding. There's no crime here unless you believe that it's flat-out wrong for Adobe to jump from version 4.0 to version 7.0 just to ensure that Premiere Elements matches version numbers with Photoshop Elements 7.0.

One thing we hoped for that's definitely not present: three full upgrades' worth of new features and improvements. Adobe continues to use its dumbed-down interface, which we initially viewed with disgust. Oddly enough, the more we've used it, the more forgiving we've become; we've grown quite fond of the newb-friendly front end, despite the fact that it's basically unchanged. The menus and titling in the consumer video editor continue to be top-notch, as well.

Changes to the program include AVCHD editing support, which we welcome, and the addition of wizard-like features, some good, some so-so. InstantMovie, for example, allows you to easily turn a bunch of clips into a movie, parsing the best clips and adding transitions and effects for you automatically. Similar features have been a big disappointment to us in the past and InstantMovie isn't a noticeable improvement. The pain of being forced to watch someone else's home video isn't lessened just because it's automatically dressed up with transitions, filters, and a soundtrack. On the other hand, SmartSound makes creating soundtracks a snap. It includes some free music, or you can add your own MP3s to create copyright-violating home movies. Our favorite wizard is the SmartTags feature, which mitigates the tedium of organizing your clips. After you import clips, it scans them for close-ups, crowds, small groups, blurry images, shaky shots, and even focus problems. It's not perfect and it lacks actual facial recognition, but it does help if you have a lot of footage to wade through.

Our biggest problem with Premiere Elements is that it suffers a host of problems (both minor and major). The first glitch occurred when we were trying to capture HDV footage via FireWire from a Canon HV10. The app's preview screen would simply stop showing the preview footage. The content would capture, but we could not watch it as it was captured. OK, not a show stopper. More serious was our inability to burn more than one hour of HD footage to a Blu-ray disc. The app would either hang or reboot Windows Vista 64-bit. And it's not like we didn't bring enough firepower. We tested using this month's Gateway FX6800 (page 76), which was equipped with a 2.93GHz Core i7-940, Radeon HD 4870 X2, and 6GB of RAM. We checked online and others have reported problems getting lengthy high-def video to Blu-ray disc, as well. Only by tweaking OS settings were others able to complete their projects. For the record, we had no problems burning the same project at DVD resolution.

Premiere Elements 7.0 is capable of analyzing your video for different types of content. You can even search for scenes where there's a close-up.

When we contacted Adobe, our rep initially said the app is limited to burning roughly an hour of high-def resolution video. Adobe then later claimed to successfully burn two hours of high-def with no problems. So what's the truth? All we know is that our project burned when we edited it to 17 minutes but choked at 59 minutes. As Madden says, "Boom!"

As a sanity check, we loaded Cyberlink's PowerDirector 7 on the same box, took the MPEG-2 HDV files and encoded and wrote a one hour, 15 minute Blu-ray disc without a hitch.

Our other issues with Premiere Elements go back to the roots of the program. Since it's based on the DNA of Premiere Pro, its main purpose is to make videos from traditional DV, HDV, or AVCHD cams. Try to feed it weird exotic video codecs and it chokes. The program, for example, can't do something as basic as handling MS-DVR files, which can be created by almost any Vista PC with a TV tuner. Given people's growing interest in consuming, editing, and "mashing up" video from dozens of sources, developers with stronger codec portfolios, such as Corel and Ulead, will likely win out.

With sub-par codec support and problems burning to Blu-ray discs, it's pretty hard to recommend Premiere Elements 7.0. Maybe version 11.0 will be better. **—GORDON MAH UNG**

VERDICT 5

ADOBE PREMIERE ELEMENTS 7.0

+ GODFATHER II	− CASINO
Top-notch menus and titling; SmartTags and SmartSound features.	Problems burning to Blu-ray; subpar encoding performance.

$140, www.adobe.com

Mirror's Edge

We love parkour, but next time, please forgo the combat

Mirror's Edge features stunning cityscapes filled with potential paths for the player to escape the 5-0.

Here's the thing about Mirror's Edge: It's 85 percent awesome, and we're as surprised as anyone that the part that's awesome is the first-person parkour. The running, jumping, and climbing bits are utterly engaging and even transcendent. There's something liberating about leaping fearlessly from rooftop to rooftop while fleeing from a nebulous anti-freedom force. Unfortunately, for every high you get while soaring through the sky, there's a painful low in the form of a combat sequence.

And therein lies the rub. The rooftop chases, where the designers were free to build many-pathed courses through the map, are sublime. By confronting the player with a constant stream of risk-vs.-reward decisions—do I take the risky jump to shave some seconds off my time, or the safe jump to avoid death?—and increasing your players speed as she successfully strings together long combos, the game is elevated from the run-along-a-path-on-the-rooftops experience it could have been into something emergent and amazing and wonderful.

And then you go inside. Moving into an office building or a sewer cuts down on the number of potential paths, but even that's not so bad. The game really falls apart when you stop running from the cops—as an early loading screen tip advises you—and have to start fighting them. Later in the game, you have to disarm and disable your ever-present pursuers in order to open the path forward. This wouldn't be so bad, except the combat system is maddening at best. While DICE managed to make a spectacular first-person jumping and climbing game, it hasn't broken the curse of first-person melee combat—we've never played a first-person game with good melee combat, and Mirror's Edge is no exception.

Were melee combat not required to progress in Mirror's Edge, the game would receive a much higher score. Were melee combat excised from the game entirely, Mirror's Edge would have undoubtedly received the Kick Ass award. **—WILL SMITH**

VERDICT 7

MIRROR'S EDGE

+ GUNS	− FISTS
Running, jumping, and climbing across rooftops is glorious! Awesome art direction!	We'd like the game much more without the sucky melee combat.

$50, www.mirrorsedge.com, ESRB: T

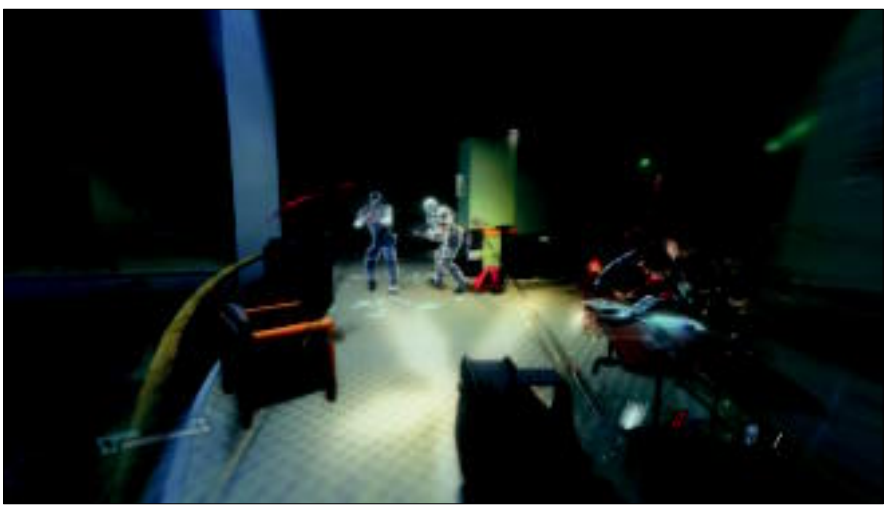
FEAR 2: Project Origin

Chilling, but not so thrilling

It's been a while since we've seen a proper FEAR game. After Monolith's 2005 original, there were a couple of very mediocre expansions made by a different studio. When Monolith got the franchise back, we expected great things from its second outing; sadly, FEAR 2: Project Origin never really comes into its own.

As a shooter, it brings nothing new to the table—it tries to excite us with the exact same slow-motion combat system that made the first game captivating four years ago, but is simply not enough this time. Even though the enemies are a little more lifelike than most shooter foes, in that they can realistically vault over obstacles and blind-fire at you from behind cover, fighting legions of mercenaries and clone troopers gets old after a few hours. A few sections with agile wall-crawling enemies are the only engaging moments, but everything else is typical shooter fare—that includes sections where you drive a giant mech and mow down enemy soldiers like cutting grass. It's been done before, and even though it looks pretty here, it's nothing out of the ordinary.

What is unique to the FEAR franchise is its main antagonist, Alma, the understandably upset ghost of a little girl exploited by an evil corporation that used her DNA to create psychically controlled clone soldiers. Alma's paranormal tantrum manifests as flashes of gruesome scenes, unsettling sound effects, eerie visions, and occasional physical confrontations that you have to melee-attack your way free of. Combined with some elaborate (though strictly linear) level design, FEAR 2's haunted house atmosphere is its strongest trait.



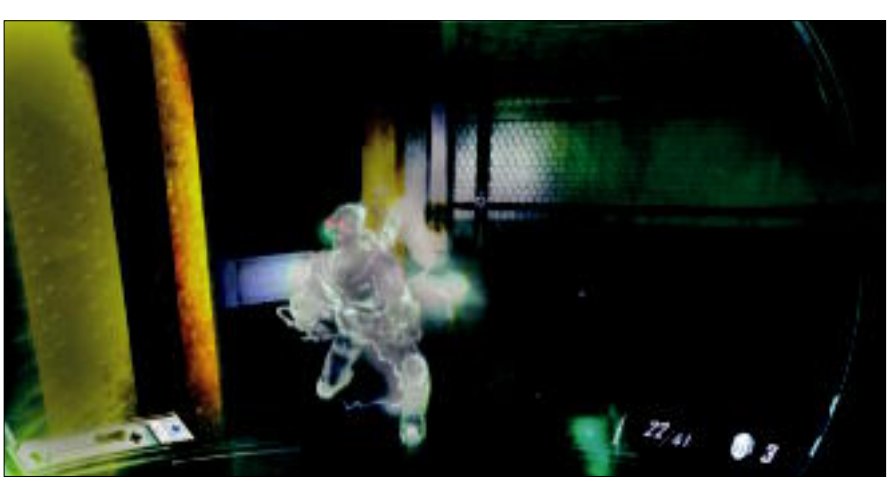
Slowing down time lets you enjoy every drop of the 10 gallons of blood ejected from a bullet-riddled soldier.

It gets creepier still if you delve into the deep and twisted backstory, which exposes more of evil corporation Armacham's experiments, revealed in files you find scattered around the levels. However, the actual characters you interact with are mostly two-dimensional, so you have to pay close attention and do a bit of hunting to get much out of the story.

Any respectable hardware will run FEAR 2 maxed out at a great frame rate, and it looks pretty good aside from the noticeably wooden facial animation. You might hit a few crashes to desktop (we had three), but you won't lose much progress thanks to the frequent auto-save. However, it's really annoying when games like this use a checkpoint save system without even giving us the courtesy of a quick-save.

When you're done with the single-player campaign, you'll be pretty much done with FEAR 2. There are several multiplayer modes, including deathmatches, Counter-Strike-style bombing missions, capture the flag, and control point capture games, but they're all played as the cookie-cutter soldiers from the single-player game, with no interesting paranormal twists or even slow-motion combat. This won't entice anybody away from their favorite online shooters.

FEAR 2 will be bought, played, mostly enjoyed, and thrown onto the shelf to be forgotten with the countless other pretty-good-but-not-great shooters. Like most horror film sequels, it's good for a few scares on a dark night with the surround sound turned up, but not a whole lot more. **—DAN STAPLETON**



That's not a green cigar—we just shot this assassin in the mouth with a giant depleted-uranium spike... and yet, he's not dead.

VERDICT 7

FEAR 2: PROJECT ORIGIN

+ FREDDY KREUGER	− FREDDY PRINZE JR.
Alma is genuinely creepy; wall-crawling enemies frighten.	There's nothing new to keep the shooting action interesting; multiplayer is very forgettable.

$50, www.whatisfear.com, ESRB: M

LAB NOTES

Ripping Blu-ray Movies, Re-Do

Files larger than 4GB are treated differently

WILL SMITH
EDITOR-IN-CHIEF

In last month's cover story ("Rip Your DVDs…"), I detailed the ripping process I use to convert Blu-ray discs to Xbox and PS3-friendly streamable files. But because I used TV shows to set up my test runs, I missed one absolutely crucial detail—the maximum MP4 file size that the PS3 and Xbox 360 support is 4GB. If you want to stream massive files, you'll need to use a container that works with large files (.ts on the PS3, WMV-HD on the Xbox). If you want to stick with MP4, you can resize the video to 720p (check the video properties section of Ripbot) or switch to two-pass encoding and cap the file size at 4GB. We prefer the convenience of using a ubiquitous container format to the less compatible alternatives. That said, we're adding 64-bit MP4 support from Microsoft and Sony to our streaming wish list. Already on the list? Support for subtitles, multiple audio tracks, and chapter markers.

NORMAN CHAN
ONLINE EDITOR

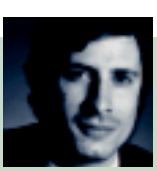
Both my work laptop and personal home desktop have been migrated to the Windows 7 beta. After a month of use, I can comfortably call this an upgrade. My only concern now is whether Microsoft will let beta testers transition to the full OS after the test period ends in August.

KATHERINE STEVENSON
DEPUTY EDITOR

This month I learned about a new optical disc-labeling technology called LabelTag. Like LightScribe, it uses a drive's laser to burn a label to your disc. However, unlike LS, LabelTag will work on any type or brand of disc media and you don't need to flip the disc for labeling. It will first appear in Lite-On drives in May.

ALEX CASTLE
ASSOC. ONLINE EDITOR

This month, two of my how-to guides for MaximumPC.com focus on the same idea: that keeping programs on your hard drive is so 2008. Here in the future, we keep all of our favorite apps in our pockets (http://tinyurl.com/cc2emq) or on the web (http://tinyurl.com/afogxj).



NATHAN EDWARDS
ASSOCIATE EDITOR

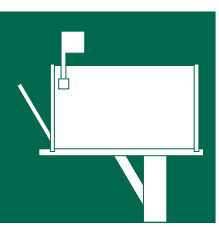
Between installing systems into five different cases and testing the hellish monstrosity that is the Cooler Master V10, I wonder which will take longer to heal: my now-crippling addiction to thermal paste, or the various bruises and lacerations that festoon my hands?

GORDON MAH UNG
SENIOR EDITOR

I've been fighting a battle over how to reset a hard drive host-protected area on drives that are cloned and then truncated from, say, 200GB to 100GB. If you're stuck like I was, besides trying the manufacturer's utility (such as Seagate's Sea Tools or Hitachi Feature Tool), try Lubomir Cabla's HDAT2 from HDAT2.com.

We tackle tough reader questions on...

In Defense of Windows 7
More on DTV
Clean Start for Notebook?



Why Bother with Windows 7?

Sadly, I have yet to see a good reason to upgrade to Windows 7 (like Vista). What exactly would be the motivation to upgrade, other than pretty little pictures and a new appearance? Does it stop spyware better than XP can? How about performance? What new security features does it have to prevent malware that an experienced XP user can't do already? I guess folks who are persuaded that they're "out of date" by using XP will feel pressured. I recall Will Smith stating basically the same idea in *Maximum PC* when Vista was about to be released. Well, Will, have you just decided to succumb?

–Joe

Editor in Chief Will Smith Responds: Wow, Joe, didn't your mom teach you it's not nice to throw people's words back at them? Joking aside, your question is legit. Unfortunately, it's too early to really say whether Windows 7 is going to be worth recommending. It definitely looks like a promising replacement for Windows XP to me, but I won't know until I test final code.

There are lots of reasons to upgrade your OS—the main reasons for me are new technology support, improved stability, and usability enhancements. Windows 7 improves things like boot time, overall OS footprint, and support for new tech, like SSDs; however, the usability enhancements are what I'm most fond of in Win7. Like the Expose feature in OS X, the new Taskbar leverages advanced rendering features that aren't available in XP to make managing a large number of open apps, each with a large number of open windows, much easier. After using Win7 at home, I really miss the new Taskbar in XP and Vista.

Dealing with DTV

I had the same poor DTV reception via an old rabbit ears antenna as Tom Halfhill ("Requiem for Analog TV," February 09).

Halfhill neglected to mention that the American DTV standard, unlike analog TV, is very sensitive to the "multipath problem," where the signal reflects off objects and arrives to the antenna at slightly different times. This shows up as a ghost in an analog TV picture, but it will often cause a DTV blue-screen-of-death. Digital bit transmission errors are probably not his problem.

My solution was to find my local DTV stations' physical and virtual channel numbers at www.antennaweb .org and determine the recommended antenna and exact angle to point it. I had to install an indoor directional VHF/UHF amplified antenna and manually tune the physical channel numbers because the auto-scan function failed to find all of them and map them to the virtual channel numbers used by the remote control. Halfhill may not need to install an attic or rooftop antenna because he is only 10 miles away.

I also found out that many of my local DTV channels will be switching from UHF to VHF channels after February 17, 2009, making them more powerful and easier to receive. However, this will require rescanning for new channels and possibly doing another manual tuner setup.

–Thomas Kraemer

Contributing Editor Tom Halfill Responds: Thomas, you're right that multipath reflection is a bigger problem for DTV than for analog TV. It's particularly bad in my urban neighborhood, which is crowded with multistory buildings. I'm sure the signals are bouncing all over

NOW ONLINE

Every Windows 7 Tweak and Tip Revealed

Have you finally mustered the courage to take the plunge into the Windows 7 beta? If so, you can maximize the return on your risk by directing your browser to our comprehensive list of undocumented Windows 7 features. We explain every new shortcut, hack, and secret to help you tame the new OS: http://tinyurl.com/bk69td

the place. But millions of people live in cities and have received analog TV with little trouble since the 1940s. If DTV can't match that penetration in urban environments, it's seriously flawed.

Before writing my column, I had already tried the remedies you suggest. I bought a VHF/UHF indoor antenna that is both directional and amplified. I looked up the locations of the transmitters for my local stations and their broadcast frequencies. My efforts bore little fruit. One problem is that aiming an antenna is hopeless when a weak DTV signal produces nothing but a blank screen. There's no visual feedback when adjusting the antenna one direction or another, as there is with analog TV. A signal-strength meter would help.

My last hope is that when the DTV transition is complete, my favorite stations will switch from UHF to VHF. As you point out, switching frequencies will require people to retune their receivers, but VHF provides a better signal.

WINDOWS 7 IMPROVES THINGS LIKE BOOT TIME, OVERALL OS FOOTPRINT, AND SUPPORT FOR NEW TECH, LIKE SSDS.

Router Review Revisited

I just read the DLink DLG-4500 Xtreme N Gaming Router review in your March 2009 issue. In it, you incorrectly assert that you cannot plug a USB drive into the router's USB port for NAS. Not sure when you actually reviewed the router, but this capability has been added since October 2008 with the addition of the SharePort utility that is readily available for download from the product website. Don't want to harp too much, but I would expect that the latest firmware would be loaded and hence you would have seen this utility, which also allows users to share their USB printers as well.

Perhaps a revised verdict is in order?

–Michael Briggs

Editor at Large Michael Brown Responds: Mea culpa. *Maximum PC*'s standard operating procedure when reviewing routers is to update the firmware before benchmarking, just as we install the latest drivers when benchmarking GPUs. But I obviously overlooked the addition of the SharePort feature, which is an admittedly sloppy omission on my part and I regret the error. The inclusion of the SharePort feature, however, wouldn't have changed my overall verdict—and a 7 verdict is a very respectable score on *Maximum PC*'s scale, by the way—because the DGL-4500 is not equipped with two radios that enable it to operate on both the 2.4- and the 5.0GHz frequency bands simultaneously. The appeal of a true dual-band router is that you can operate two independent networks at the same time: one for data and one for streaming media. The DGL-4500 can operate on one band or the other, but not both at the same time.

Clean Start Advice Not for Notebooks

I just purchased your February issue because of the "Give Windows a Clean Start" cover. I was wondering if this article is applicable to a laptop if I used two one-terabyte external hard drives? I would like to make my laptop have better performance and not get bogged down by technical difficulties, which have already arisen.

–John

Senior Editor Gordon Mah Ung Responds: I wouldn't advise doing this as it would essentially make your laptop a desktop. Our Clean Start is done with the assumption that you have a secondary drive of similar size inside the system. To run two 1TB drives, you would have to have a notebook that supports external boot devices and you would want to run ExpressCard, as USB would be too damned slow.

LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

COMING IN

MAXIMUM PC's More Absorbing Than a ShamWow!

MAY ISSUE

Cut the Cable Cord!

With the right hardware and software, you can build a small, low-cost entertainment PC capable of serving up all your favorite movies and TV shows—for a fraction of the cost of cable!

Experiments in Memory

What's the performance difference between DDR2 and DDR3; or DDR3/1,066 vs. DDR3/2,000; or 2GB vs. 3GB vs. 6GB of system memory? Tune in for this RAM-stravaganza!

The Ultimate Guide to OpenOffice

Find out how this free open-source alternative compares to Microsoft's Office suite.

Unleash your PC's Potential...

Try MAXIMUM PC

2 FREE Trial Issues

Each issue of Maximum PC features:

- **Brutally honest product reviews**
- **Hard-hitting editorials**
- **Tips to blast your machine's performance**
- **Insightful and innovative How-To's**
- **A CD loaded with new software, utility and game demos**

Reserve your 2 FREE Trial Issues today! There's no obligation.

To order, head to:
www.maximumpc.com/archive

STORAGE

Western Digital Velociraptor

Even though it has a puny 300GB capacity, this speedy, consumer-grade 10,000rpm hard drive won the performance storage title. It performed wondrously in our benchmarks and is one of the quickest drives we've ever tested, boasting burst reads of nearly 250MB/s and sustained reads of over 100MB/s. Make sure you get the latest revision with updated SATA port placement.

Why a traditional hard drive and not a solid state drive? Although some SSDs, like the Intel X-25M, offer better read speeds, they can't compete with the Velociraptor's write speeds or price/capacity ratio: We'd much rather pay $230 for 300GB than $400 for 80GB. We expect to see SSDs with better write speeds and more capacity later this year, but for now, the Velociraptor retains its crown.

THE REST OF THE BEST

High-End Processor
Intel Core i7-965 Extreme Edition
www.intel.com

Core i7 Motherboard
MSI Eclipse SLI
www.msicomputer.com

Socket 775 Motherboard
Asus Striker II Extreme
www.asus.com

Socket AM2 Motherboard
MSI K9A2 Platinum
www.msicomputer.com

High-End Videocard
Nvidia GeForce GTX 295
www.nvidia.com

Midrange Videocard
EVGA GeForce GTX 260 Core 216
www.evga.com

Capacity Storage
Seagate Barracuda 7200.11 1.5TB
www.seagate.com

DVD Burner
Samsung SH-S223
www.samsung.com

Blu-ray Burner
LG GBW-H20L
www.lge.com

Monitor
Gateway XHD3000
www.gateway.com

Full-Tower Case
Cooler Master ATCS 840
www.coolermaster.com

Mid-Tower Case
NZXT Tempest
www.nzxt.com

Air Cooler
Zalman CNPS 9900NT
www.zalman.com

Gaming Mouse
Logitech G5 Laser Mouse
www.logitech.com

Keyboard
Microsoft Natural Keyboard 4000
www.microsoft.com

Wi-Fi Router
Linksys WRT600N
www.linksys.com

Games We're Playing

Left 4 Dead
www.l4d.com

Grand Theft Auto IV
www.rockstargames.com/IV/

Mirror's Edge
www.mirrorsedge.com

Warhammer 40K: Dawn of War II
www.dawnofwar2.com

For even more Best of the Best entries, including speakers and budget components, go to www.maximumpc.com/best-of-the-best

MAXIMUM PC (ISSN 1522-4279) is published 13 times a year, monthly plus Holiday issue following December issue, Future US, Inc, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080, USA. Periodicals postage paid in South San Francisco, CA, and at additional mailing offices. Newsstand distribution is handled by Time Warner Retail. Basic subscription rates: one year (12 issues) US: $20; Canada: $26; Foreign: $42. Basic subscription rates "Deluxe" version (w/CD): one year (13 issues/13 CD-ROMs) U.S.: $30; Canada: $40; Foreign $56. US funds only. Canadian price includes postage and GST (GST#R128220688). Postmaster: Send changes of address to Maximum PC, P.O. Box 5159, Harlan, IA 51593-0659. Standard Mail enclosed in the following edition: None. Ride-Along enclosed in the following editions: B1, C1, C2, C3, C4. Int'l Pub Mail# 0781029. Canada Post Publications Mail Agreement #40043631. Returns: Bleuchip International, P.O. Box 25542 London, ON N6C 6B2. For customer service, write Maximum PC, P.O. Box 5159, Harlan, IA 51593-0659; Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080. Future Network USA also publishes PC Gamer, PlayStation: The Official Magazine, Mac|Life, Nintendo Power, Guitar World, Revolver, Official Xbox Magazine, and Pregnancy.