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Components  
Including
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  - BEST VIDEOCARD**
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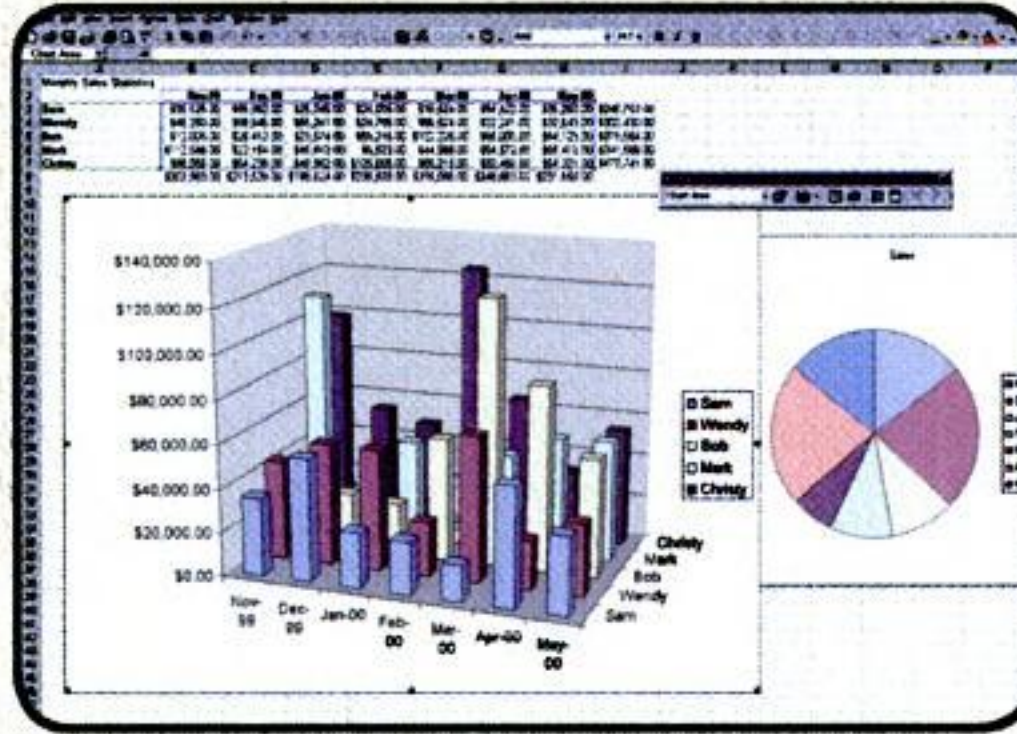
This One



4ZJQ-AJP-68DW

Draw a line from the application to the

1.



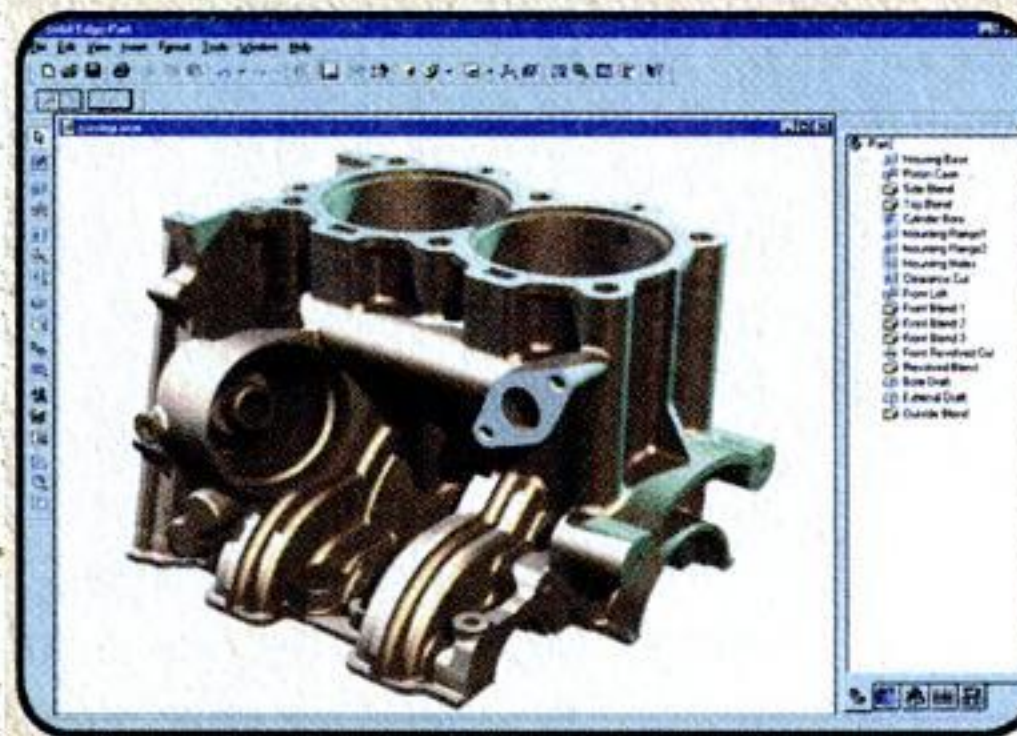
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2.



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Musical staff with treble and bass clefs, key signature of two sharps (F# and C#), and a 4/4 time signature. The melody consists of five quarter notes: D4, E4, F#4, G4, and A4. The lyrics "Dash - ing through the snow," are written below the staff. A red oval highlights the words "Dash - ing through the snow,". A red arrow points from this oval to the text "MVP.com" below the staff.

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Do you like watching old movies, taking long walks in the rain, and cuddling up by a fire with a bottle of champagne? Well, you probably won't find your soul mate through the Daily Glitch Personals.



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# EDWORD

## It's December—So Let's Dismember!

December in the *Maximum PC* Lab—it's a time of merriment, good will, and the methodical dismem-

berment of holiday season hardware. The process goes something like this:

1) Vendor releases "hot new product" in anticipation of increased holiday sales. 2) *Maximum PC* editor receives product for evaluation. 3) Editor benchmarks product, rips it apart to see what makes it tick, and writes review. 4) Three months later, vendor

receives from editor a box full of random parts—some broken, some that were originally attached to *other* companies' products, and some from rusted gardening appliances sitting in the *Maximum PC* shed. 5) Wait nine months; repeat.

You can see the results of our Lab experiments in this year's Gear of the Year cover story.

\* \* \*

December is also a time of reflection, a chance to take stock of what works and what doesn't. Let's start with SeeMeBuyMe.com, a web site we partnered with in April. SeeMeBuyMe's mission was to connect readers to online retailers: You'd read a product review in the magazine, jot down the SeeMeBuyMe code at the bottom of the review, then plug the code into the SeeMeBuyMe web site. From there, you'd get a list of the cheapest prices for the product to be found online.

SeeMeBuyMe made sense in theory, but not in practice. It turns out that magazine readers don't need such a high level of hand-holding when shopping Internet-style. Or perhaps SeeMeBuyMe was just ahead of its time. Regardless, the

web site has departed to the dot-com afterlife—which means our partnership is over.

Next up, Intel. In the November issue, Fast Forward columnist Tom Halfhill stated that a report on the Pentium 4's performance would appear in the issue you're now holding. The fact is, while we have indeed benchmarked a number of P4 systems, we're not releasing the numbers yet because Intel has pushed back the P4's release date. We originally promised Intel (and its OEM partners) that we wouldn't divulge P4 test results before the CPU's release date, so we're withholding the numbers for one more month. We'd certainly extend the same level of cooperation to AMD and other product vendors, but we're not happy with Intel's 11th-hour delay.

Intel says nothing is wrong with its new processor, and that the P4 systems we've received so far should be in perfect working order. Intel says the CPU is actually being delayed for "infrastructure reasons," and the company just wants to make sure that P4 systems work with "everything that might be

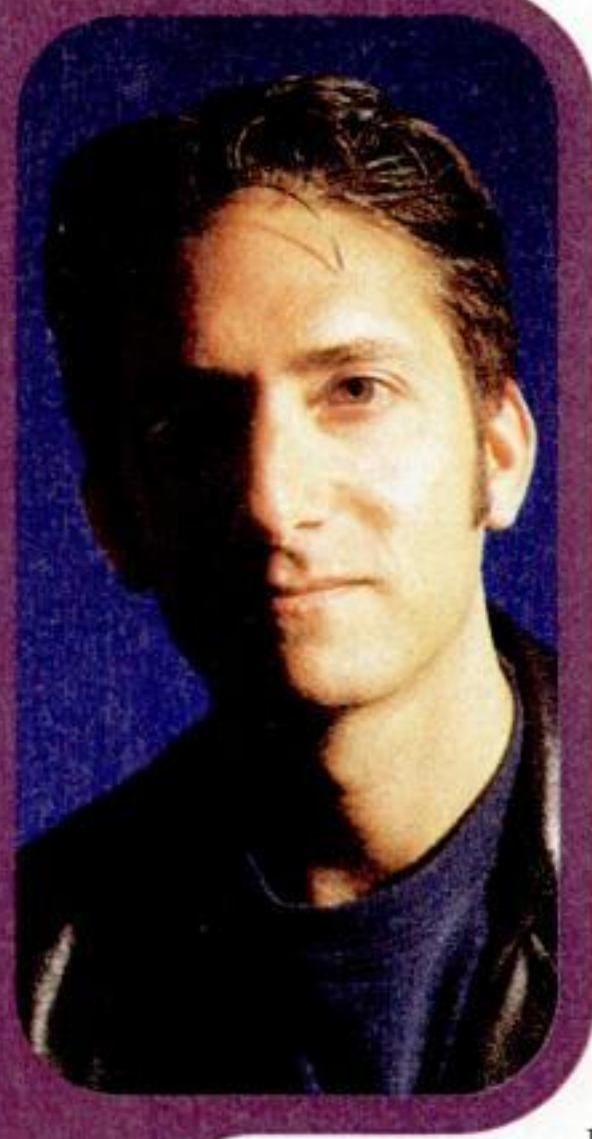
plugged into them." The scuttlebutt has it that P4 mobos don't play nice with PCI videocards. Question: Who in the world would mate the world's most expensive consumer-grade CPU with such ancient video technology? Regardless, maybe we should give Intel credit for being extra careful with its latest technology launch. Recalled products such as the 1.13GHz P-III, original i820 chipset, and Memory Translator Hub still leave a very bad taste in our mouths.

Finally, December 2000 marks the recall of our own system benchmarking chart. The original chart was designed with good intentions, but even the keenest cryptographers had trouble deciphering the information hidden within. The new benchmark chart is explained on page 61.

Thanks, readers, for an awesome 2000!

—Jon Phillips

**December is a time to take stock of what works and what doesn't.**



# MAXIMUM PC

DEC 00 vol 5 Issue 12

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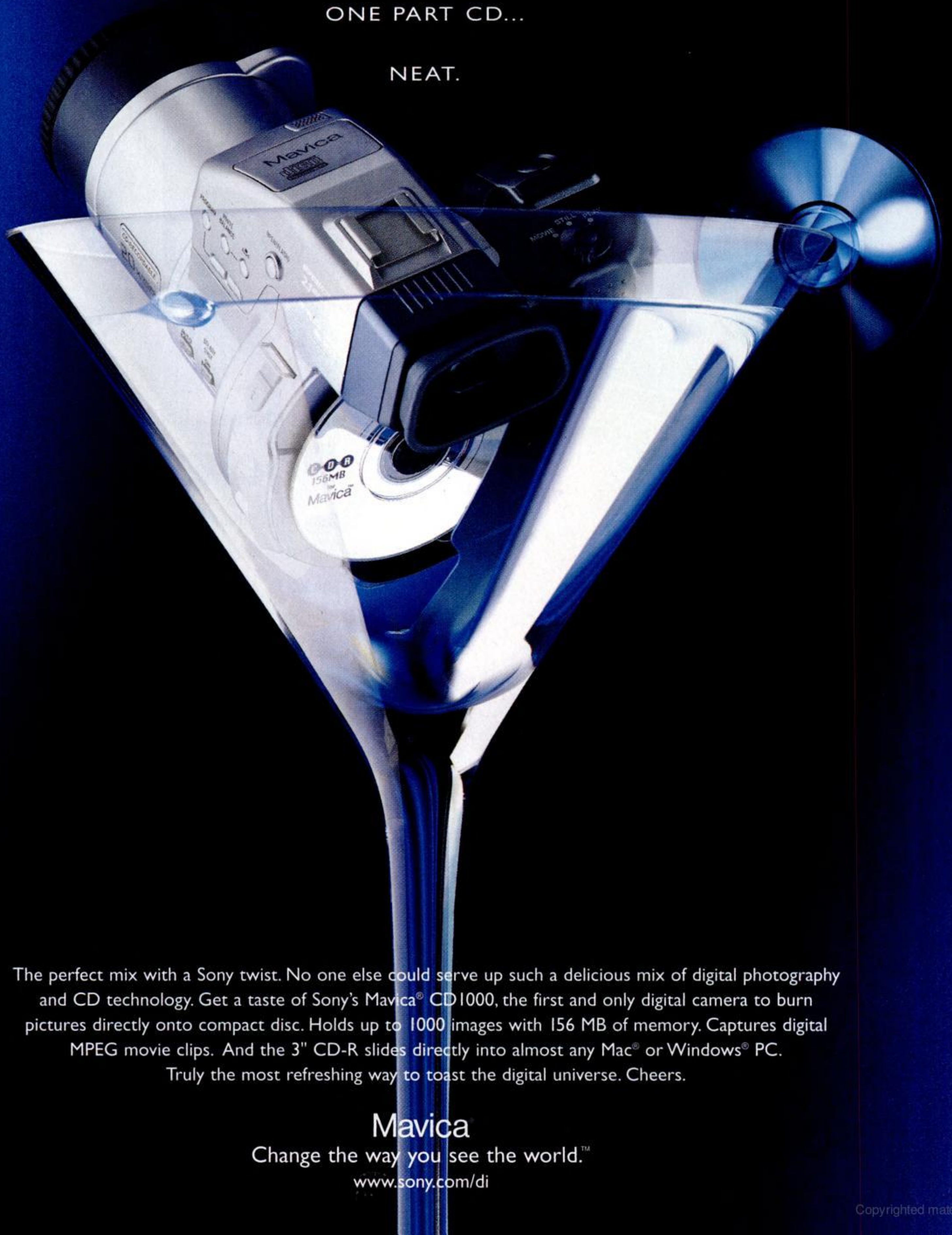
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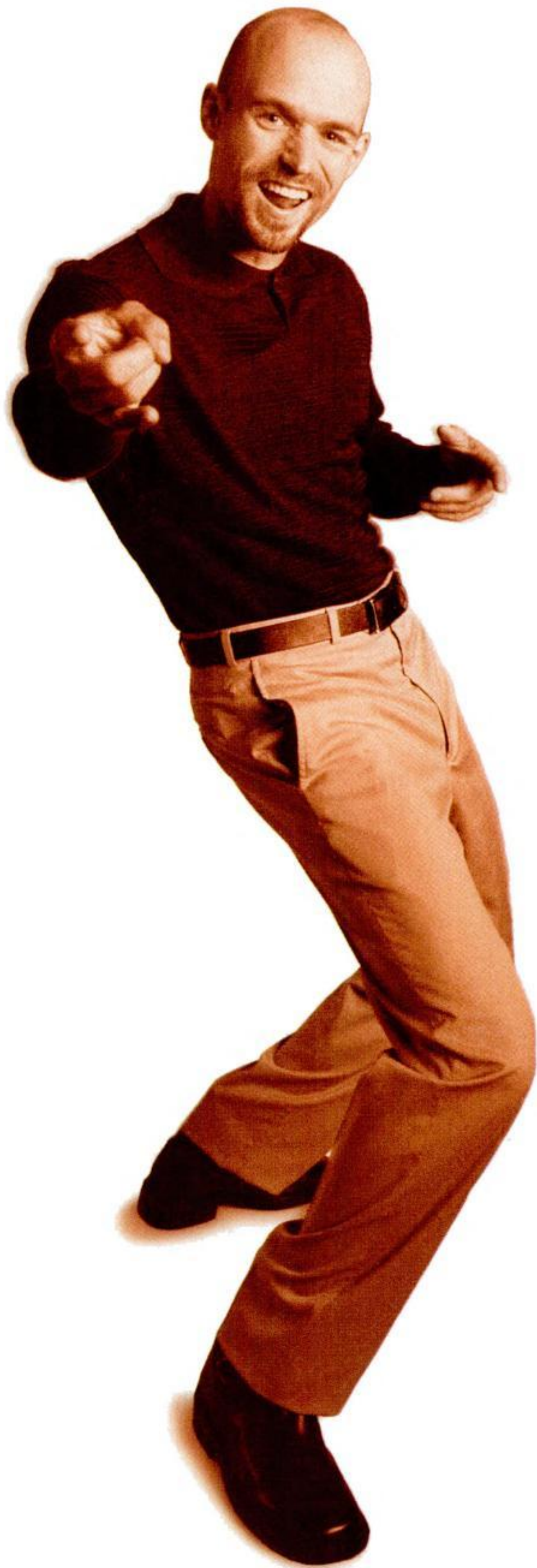
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# Can your palm do that?



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# Alienware Still Deserves Our Respect

In the time since the November issue was published, we've come to realize that some of the points included in our review of Mark Miller's "Chamsalot P-III 1GHz" should have been more strongly emphasized, and some additional points should have been included in the review for clarity. Alienware, the company that assembled Miller's dream config, feels it was unfairly taken to task for the buggy system, and we want to help Alienware set the record straight.

The "Chamsalot" was not a machine engineered or branded by Alienware. In fact, it was assembled with parts that Alienware doesn't even stock. Mark Miller chose all of the parts himself and asked Alienware to assemble the machine as a favor. Alienware agreed to assemble the machine only because Miller is a "valued customer" who had previously purchased numerous Alienware-branded systems.

Despite being advised by Alienware that his configuration's DPT RAID controller card wasn't working as expected, Miller insisted on the component, and Alienware obliged. The DPT controller was functional inasmuch as the system booted and ran reliably, but, in our Lab, it didn't benchmark as expected in either *HD Tach* or real-world testing. We have since learned

that the *HD Tach* developers have not unconditionally qualified their benchmark for testing RAID arrays.

We unfairly slammed Alienware for running out of fan screws. The fact is, Alienware doesn't stock the fans that Miller included in the configuration, and when the third-party fans were shipped to Alienware, they didn't come with the custom screws needed for installation. Alienware shipped the fans uninstalled because it had no other choice.

For the record, *Maximum PC* has also had trouble with the DPT RAID controller, most famously in our intended configuration of Dream Machine 2000. It is our opinion that the DPT/Seagate combo would have let *anyone* down, so we should have never written that Miller picked "sweet components" but "chose the wrong company to put them together." The fact is, Alienware should be complimented for working with Miller to assemble his "dream" system as a special favor. We regret that we painted Alienware—a vendor with a proven track record—as the bad guy when we should have simply slapped it on the wrist for accommodating the request for the DPT RAID controller against its own better judgement.

## Entertainment Center Meltdown?

I have a few questions about the "Ultimate PC Entertainment Center" that you built for the November issue.

1) I spoke to a Cambridge Soundworks store representative about these new plasma HDTVs, and asked him why they don't have any on display or for sale. His answer was that the TVs burn a certain kind of gas that creates the picture you see, and after a while the gas dissipates and leaks out of the system. Is this true? If so, why would anyone spend \$20,000 for a TV that's going to burn out in a year or so?

2) I would like to know the exact specs of the computer you used as the main brain for the entertainment system. Also, I was always told that in order for a PC to run, you need a floppy drive, but you guys don't have one on this system. How does the system boot without a bootable drive?



We regret that we painted Alienware—a vendor with a proven track record—as the bad guy.

—John E.

**Technical Editor Will Smith responds:** I'm prepared to go out on a limb and state that the Cambridge Soundworks rep has no friggin' idea what he's talking about. We've never heard of anyone having "gas leakage" problems with a plasma display TV, and neither have our contacts at Pioneer. The amount of inert gas sandwiched in the middle of a

plasma display could fit in a thimble (the gap is just a few microns wide). If any "leaked out," the display would stop working immediately—there would be no "dissipation" over time.

To answer your second question, we used an Intel D815EEA mobo, a Pentium III 700, and 128MB of RAM. We didn't include a floppy drive simply because we didn't see any use for one in a system designed to anchor an entertainment center. Floppies don't hold enough data to carry even the most miniscule MP3s, and we didn't want to break up the clean lines of our case by inserting a floppy drive. FYI, most modern optical drives are fully capable of booting from a CD, which

is how we installed Windows ME on our system. For day-to-day booting purposes, we use the hard drive.

## Front-Mounted USB

While I'm not into the "ultimate" home entertainment scene, I found your article interesting and quite creative. And while I applaud the ingenuity of your front-mounted USB ports, why reinvent the wheel? You can go to [www.tigerdirect.com](http://www.tigerdirect.com) and purchase an off-the-shelf, front-mounted USB hub for less money and hassle—and you get six USB ports instead of four.

—John E. Brady

# COMMENTS

Editorial Policy: Maximum PC invites letters to the editor; just send 'em to [commport@maximumpc.com](mailto:commport@maximumpc.com). Please include your full name, home town, and telephone number. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.

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## COMMPORT

**Technical Editor Will Smith responds:** John was the first person to respond to our November issue challenge to locate a front-mounted USB hub via retail channels. Other readers later sent us word that Appleseed Electronics ([www.appleseed-electronics.com](http://www.appleseed-electronics.com)) and Aten ([www.aten-usa.com](http://www.aten-usa.com)) also sell internal USB hubs designed for front-of-the-case access.

Two other readers offered novel approaches to mounting an *external* hub in a front drive bay. David Ellison has something of an adhesives fetish and recommends using epoxy to



The amount of inert gas sandwiched in the middle of a plasma display could fit in a thimble.

mount an external hub, fill in any gaps, and fix problems with one's personal life. John Tomkoski Jr., meanwhile, used the carcass of a dead CD-ROM drive to mount his USB hub.

## Your Entertainment PC—Why?

If one spends \$20,000 on an HTDV (a flat one at that!), why would one use a PC to control the multimedia? You also have a receiver shown in your config. Sure, the PC had a DVD-ROM drive, videocard, CPU, memory, the ability to capture video, etc., but a receiver, DVDR, and VCR would do just as well.

—Julian Data

**Technical Editor Will**

**Smith responds:** We had to make tough decisions while outfitting our home theater rig. We wanted a device that could time-shift TV (like TiVO), play DVDs, and serve as an MP3 jukebox. We chose the Pioneer plasma display because it's the best large computer monitor we've seen (it's so big that some people mistake it for a mere widescreen HDTV). Seriously, we like to watch our DVDs in their full anamorphic glory, but the chance to also do our day-to-day computing on a 50-inch monitor with a native resolution of 1280x720 was something we couldn't pass up.

We chose to go with a receiver for our home theater rig simply because we haven't yet found a PC speaker setup that's powerful enough for our tastes, although the VideoLogic system we listed as an alternate comes close. We also dispute your allegation that a DVD player and VCR would do the same things as our rig. We'd love for you to show us a VCR that will play MP3s or record one program while letting you view another, previously recorded program.

**Bit for Bit—  
What's That?**

You have often mentioned that you like the Plextor CD-ROM/CD-RW drive combination because it supports bit-by-bit accurate disk duplication and backing up copy-protected games and Playstation discs. Does this mean that I can use backup copies of Playstation games without needing a mod chip for my console? And how does duplication on a Plextor burner and CD-ROM drive differ from duplication on a Plextor burner and another vendor's CD-ROM drive?

—Max Cavallera

**Reviews Editor Josh Norem**

**responds:** When making copies with both a Plextor CD-ROM drive and CD-RW, it's possible to copy most software titles, including those with write-protection. But there are some caveats. First, in order to successfully copy and play Playstation games (which we're told is illegal, by the way), one must have the



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infamous "mod chip" installed in the Playstation console—search the Internet for tips on where to find one. Second, the dual-Plextor drive combination is incredibly effective at making backups of software, but it is not 100-percent foolproof.

The truth is, some games and applications cannot be copied no matter what configuration of hardware and software you use. Software distributors have a vested interest in foiling would-be pirates and have stepped up efforts to protect their intellectual property rights with copyright protection.

To be honest, bit-for-bit copying is just a marketing term Plextor uses to describe the extreme accuracy of both its CD-ROM and CD-RW drives. Plextor officials say the whole "bit-for-bit" thing is an easy way of describing numerous behind-the-scenes features of its drives that ensure complete accuracy during reads and writes.

To answer your question, the Plextor MVP software will work just fine with another vendor's CD-ROM drive, so you don't have to buy a Plextor CD-ROM drive. However, no other CD-ROM drive that we know of is capable of the level of accuracy of a Plextor CD-ROM drive, so having a Plextor will give you the best odds for accurate disk-to-disk duplication.

## Doin' Double Duty

In your October RAID article, there are several points that need clarification.

First, RAID 0+1 is not the same thing as RAID 1+0, although they are commonly mistaken as the same. In the RAID 0+1 scheme, two physical disks are striped, and the resulting logical array is mirrored to another logical array created in a similar fashion. If you lose any of the four disks in this arrangement, the combined pair of logical arrays is compromised and you are essentially back to a single RAID 0 array. Repairing the damaged rank of disks is also more labor- and time-intensive.

However, when you use RAID 1+0, you aren't as vulnerable, because you're first mirroring two disks together into a logical array and then striping that logical array with a similarly configured pair. The loss of any one disk in this arrangement doesn't compromise the entire setup. Also, if you're using hot plug disk housings and a RAID controller that permits hot-swapping without affecting the running OS, you can

recover from a disk failure much more rapidly and easily using RAID 1+0. I don't think any IDE-based RAID controller supports this feature (and the same can be said of most SCSI-based, Intel-platform-targeted offerings).

Also, why didn't you include the Adaptec AAA-UDMA RAID controller in your lineup? It's been out for months (definitely before your issue went to print) and, except for a current lack of support for Windows 98/ME, it's the only "true" RAID controller for IDE that I've come across, as it supports RAID 5.

—Clifton W. Prescod

### Reviews Editor Josh Norem

**responds:** You are correct: RAID 0+1 and



**RAID 0+1 is not the same thing as RAID 1+0, although they are commonly mistaken as the same.**

1+0 are not the same thing, and your summary of both levels is indeed on the money. We lumped the two levels together because of their intrinsic similarities, as well as because of space constraints, but perhaps we should have clarified the distinctions in greater detail.

We didn't review the Adaptec UDMA/66 RAID controller simply because at the time of publication, it wasn't really a "fresh" product (we try to focus on recent releases); in addition, it supports ATA/66 as opposed to ATA/100. Yes, we reviewed the AMI ATA/66 Hyperdisk, but that was to provide comparative scores for the dual-channel ATA/100 FastTrak controller from Promise. Also, you are correct that the Adaptec card is the only IDE RAID controller to support RAID 5, and we stated as much in the introduction to the controller reviews.

## Hoppin' to Chopin

I would like to know which vaunted Chopin piece you use to test speaker quality. Is it perchance "Polonaise No.6 in A-Flat (Op.53)"? Could you please inform me?

—Wing-kei S Yu

### Reviews Editor Josh Norem

**responds:** The piece in question is Chopin's "Waltz in C-Sharp, (Op.64 No.2)", performed by Robert Silverman. We chose the piece for speaker testing

because it contains several hammering piano passages that require a system's satellites to simultaneously reproduce very high-pitched tones as well as midrange frequencies. A vast number of speaker systems are unable to reproduce these passages at high volumes without distortion, as the drivers' frequency response is incapable of handling the full range of tones.

By the way, we've recently added a new disc to our speaker test fleet: Roy Orbison's "Black and White Night," recorded in Dolby Digital 5.1 and DTS. The entire live concert—which features backup singing by Bruce Springsteen, Bonnie Raitt, and K.D. Lang—is mastered from the perspective of Orbison's position on stage. So, with 5.1

speakers, you can hear the backup singers in the rear channel, the band members across the left and right front channels, and the crowd clapping all around you as each song ends. It's an incredible recording that no music lover should pass up.

## Tracking the Wily Windows Error

In your October review of the Intel 815EEA motherboard, you stated, "We never witnessed a blue screen, GPF, or other such hassles." While I've had my fair share of run-ins with blue screens, I'm not sure if I've ever experienced a GPF. Is it a Goopy Puddle of Fluid? Grainy, Pukey Frames? If either of these is the actual definition, I've *still* never experienced a GPF.

—Doc

### Editor-in-chief Jon Phillips replies:

Ah, yes, the old General Protection Fault. When two applications vie for the same block of memory, a GPF can occur, taking down the intruding competitor, but not the entire system (thus your system is afforded a layer of "protection").

## Tit for Tat for Tit

You don't like the G4 Cube—then, fine, leave it alone. Mac people are quite happy with the product. I don't find any humor in your article regarding the uses of a G4 Cube (Inside Sources, October). You will never find a Mac person taking a PC apart to show uses other than what it was intended for. What a waste of talent and mind.

—Lani

**Editor-in-chief Jon Phillips**

**replies:** You obviously have never read *MacAddict*. It's our sister magazine, and it has made a living out of bashing the PC. I don't know if *MacAddict* has ever actually taken apart a PC in the same manner that we took apart the Cube, but it has certainly gone out of its way to mock PCs and PC users. But we don't mind because we know it's all in good fun. And we understand the Mac crowd's scrappy, underdog position.

We do our best to review all products (both PC and Mac) with an extremely critical eye, and, as such, some Apple products have been criticized for what we perceive as faults, but have still received higher review verdicts than many PC products. For example, this month the G4 SMP machine receives a measured endorsement, and the Apple Cinema Display receives our highest accolades.

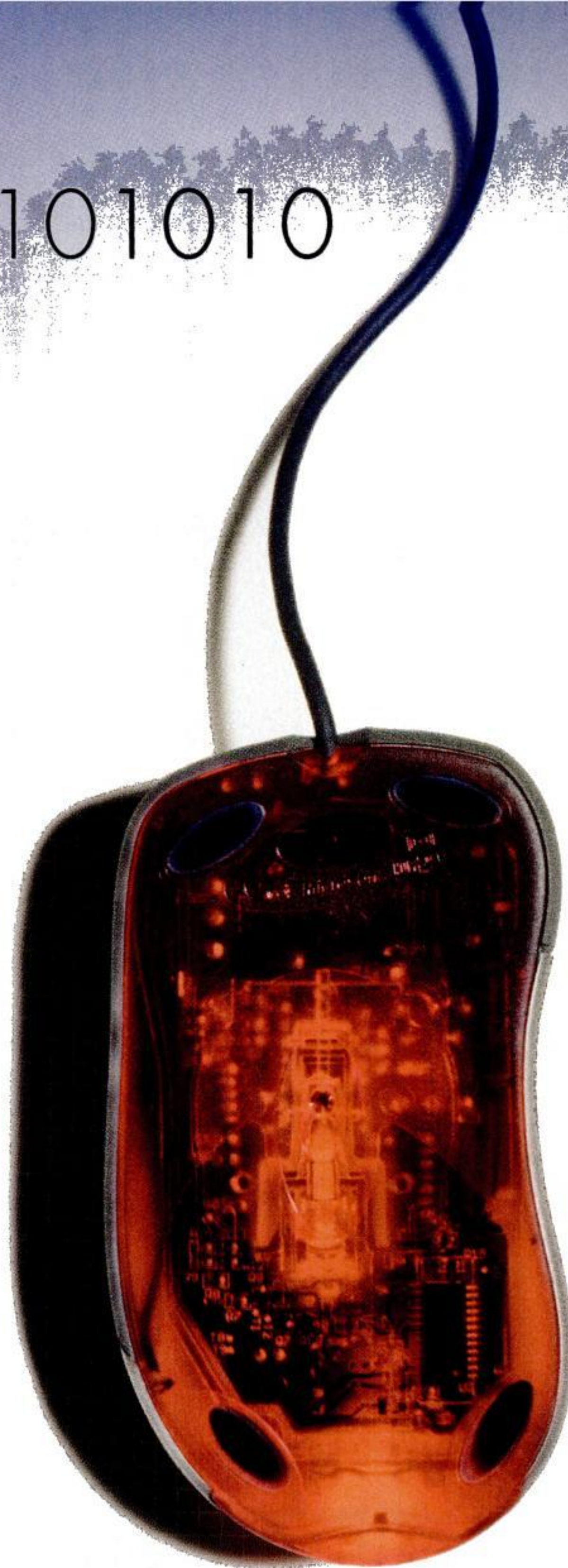
**Lani replies:** You are correct, I have not read *MacAddict*. And neither do I intend to, especially if they spend their time "bashing" PC products. If I am reading articles in a magazine for PCs, I am there to read about PCs, not to read about the editors' personal hate and bashing of Mac products. Your personal opinion is that people who use Mac products are scrappy underdogs. You just can't leave it alone, can you? You have to throw in your little comments, just to make a point.

I doubt very seriously if any of your PC readers could care less about articles regarding Mac products. If you're trying to fill space, try writing something nice about other products. Edit out your personal opinions, be objective, and leave the hate at home.

**CUT COPY PASTE**

► In November's "Next-Gen Napsterism" article we misprinted the URL for the *Hotline Connect* app. The correct URL is [www.bigredh.com](http://www.bigredh.com). In November's review of Thunderbird motherboards, the specs of our test rig were misreported. The system actually included a 1GHz Thunderbird Athlon, Windows 98SE, Seagate Barracuda II ATA/100 drive, Elsa Erazor X2 DDR GeForce using Crucial Technologies PC133 CAS2 SDRAM. ●

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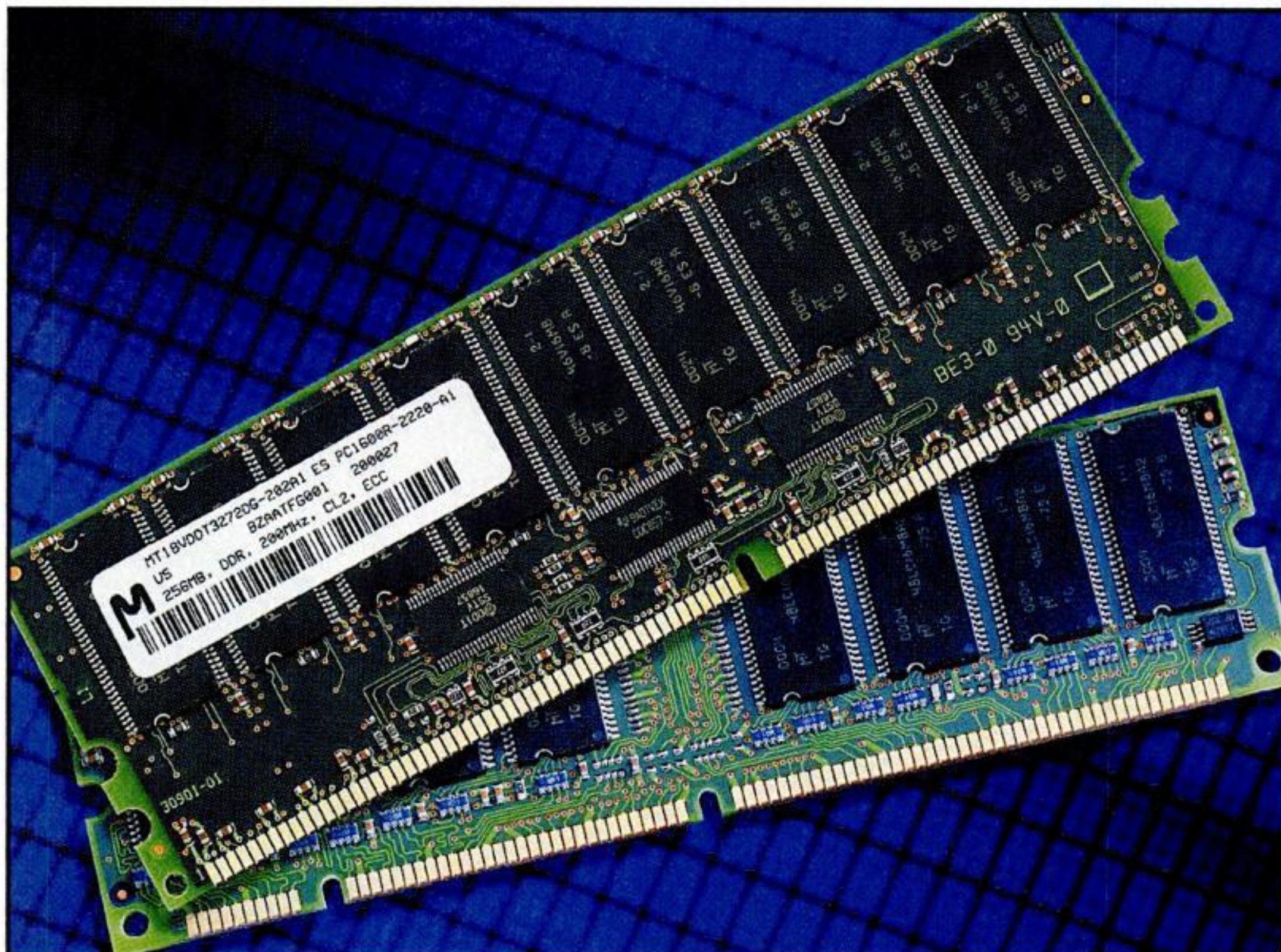


# Faster and Cheaper RAM?

Start Worrying, Rambus—DDR SDRAM is Here! And It's Prepped to Ship on AMD Mobos

If you thought you'd figured out which memory to buy, think again. With DDR SDRAM, a new memory standard set to launch this year, your options will broaden once again. DDR SDRAM promises greater memory bandwidth and better performance without inflating the price of your PC, potentially relieving a memory bottleneck that's hampered PCs for years. CPUs generally run much faster than the components around them, so that once a CPU is finished crunching data, it searches its own internal super-fast memory for more data, then hits your main system RAM—the equivalent of shifting into low gear.

Currently, most PC users are employing PC100 SDRAM or PC133 SDRAM memory. PC100 sends and receives data on a 64-bit pathway at 100MHz, which equals about 800MB/sec of bandwidth; PC133 ups the speed of data to 133MHz on the same 64-bit pathway, for about 1GB/sec of bandwidth. DDR SDRAM will offer an evolutionary benefit over PC100 SDRAM and PC133 SDRAM by sending data on both the rising and falling edges of the clock.



DDR memory modules will be physically and electrically incompatible with PC133 and PC100 systems, but will offer double the bandwidth.

PC1600 and PC2100, the two flavors of DDR SDRAM set for release, will double currently available bandwidth to 1600MB/sec and 2.1GB/sec, respectively.

Does all this talk of memory bandwidth sound familiar? That's because it wasn't so long

ago that Intel introduced its own panacea for the memory bottleneck: the now-controversial Direct RDRAM memory from Rambus, coupled with Intel's 820 chipset. On the 820, RDRAM offers 1.6GB/sec of bandwidth. In dual-channel configurations, such as Intel's

840 chipset and Pentium 4 850 chipset, RDRAM can hit 3.2GB/sec of bandwidth.

Intel's push for RDRAM fell short, however, because of chipset glitches, performance problems, and painfully high prices. While a 256MB module of PC100 SDRAM could be had

## SPIN CYCLE

This month's top stories broken down ►

HEADLINE	NEWS	DETAILS	THE SPIN	OUR TAKE
<b>Glitch Delays Pentium 4 Launch</b>	Intel delayed the release of the Pentium 4 by two weeks after a bug was discovered in the new CPU's chipset.	Some Pentium 4 machines are prone to crashing after a PCI graphics card is installed.	Intel said the delay was a minor bump and would have a minimal impact on the launch.	Smart move. With the recent MTH fiasco and the recall of 1.13GHz P-IIIs, a bungled P4 launch could prove fatal.
<b>AMD Demos Dual Athlon</b>	AMD publicly demonstrated a dual Athlon system at the 2000 Microprocessor Forum.	Two Athlons (married to the AMD 760MP chipset) were shown breezing through 3D Studio MAX. Expect AMD SMP to ship this year.	"Today's demonstration brings AMD one step closer to enabling our customers to offer next-generation, dual-processor workstations and servers."	We want dual-Athlon-loving ASAP, but we want AMD to do it right—which means no bungled launches.

for roughly \$300 during the summer of 2000, a 256MB module of RDRAM set folks back \$900.

With RDRAM foundering, DDR proponents say their technology is poised to become the next big standard—and, at first glance, they appear to be right. DDR certainly has the price advantage. Because it uses the same manufacturing equipment as SDRAM, it's predicted to be slightly more expensive than what you're used to paying.

But there seem to be a few potholes in DDR's road to success. One is litigation by Rambus, the creator of RDRAM, against DRAM manufacturers for alleged patent infringements. NEC, Toshiba, Hitachi, and Oki have agreed to pay royalties to Rambus. Micron and Hyundai have countersued, claiming that Rambus' patents don't apply to the production of DDR SDRAM.

If Rambus' litigation is successful, memory manufacturers may be forced to raise the price of DDR memory to compensate

for the cost of royalties. "DDR is going to happen regardless of any lawsuit issues," says Doug Fawson, an analyst at InQuest Market Research, which has been sharply critical of RDRAM performance. "The question is, How much will it cost?" Fawson believes that even if DDR ends up costing significantly more than RDRAM, memory makers will pursue volume production.

"[RDRAM] is harder to yield, it's harder to process, and it's difficult to manufacture," Fawson says. Memory makers will simply be able to make more of the fastest DDR memory than they can of the fastest RDRAM memory, he explains.

Rambus officials say that's simply untrue, and that while yields on RDRAM are certainly lower for companies that aren't making very much, memory manufacturers that have been producing RDRAM in bulk are getting great yields.

More importantly, says Rambus official Avo Kanadjian, DDR must suffer the same teething pains that RDRAM

suffered when it was introduced.

"I've been in the DRAM industry for over 15 years, and before joining Rambus, I was at Samsung. I personally introduced DDR to the market in

### DDR at a Glance

**Q:** Can I use my current motherboard with DDR?

**A:** No. Because it requires an entirely new chipset, DDR will require a new mobo.

**Q:** Why the switch from a 168-pin DIMM to a 184-pin DIMM?

**A:** DDR requires more ground and power lines, and it uses 2.5 volts as opposed to the 3.3

volts used by 168-pin DIMMs.

**Q:** Will DDR cost a lot?

**A:** DDR is expected to cost about the same as PC133 memory.

**Q:** Who will introduce chipset support for DDR?

**A:** AMD, VIA Technology, ALi, and SiS will support DDR. Intel is "evaluating" it.

1997, [but] DDR has yet to [catch on]. It's been confronted with one delay after another," Kanadjian says.

Kanadjian says that even officials at the largest DDR manufacturer acknowledge that DDR won't ship in production systems until late 2000, citing issues with the design philosophy. Compared to RDRAM, DDR runs at a lower clock speed, but features a wider, 64-bit interface, which requires more pins (the actual electrical connections from the chipset to mobo). RDRAM runs at higher frequencies, but uses a 16-bit interface, which requires fewer pins. RDRAM backers say the lower pin count makes it far easier to design and manufacture motherboards that can run at high speeds.

"It's very easy to criticize Rambus for having gone through a learning curve, but

industry experts are saying that DDR is not out of the woods, and they're going to have a big challenge," Kanadjian says.

DDR supporters say that's exactly what you'd expect Rambus to say.

AMD released its DDR-ready 760 chipset in late October. Acer Labs says it will have DDR chipsets on shelves before Christmas.

VIA Technology is a bit behind, but plans to offer a DDR chipset by 2001 for the Pentium III. Even Intel said it's mulling over DDR for use with the Pentium 4.

Micron Technology's Jeff Mayhew thinks DDR will definitely happen, and very soon, at that: "I expect that in the first half of 2001, DDR will be running pretty smooth, and that it will be at a cost parity with SDRAM within a year."

—Gordon Mah Ung and Scott Tarr

BENCHMARK	ATHLON 1GHZ DDR BETA SYSTEM
SYSmark 2000	196
Photoshop 5.5	124 seconds
Inspire	235 seconds
Sisoft Sandra Streaming Integer	472MB/sec
Sisoft Sandra Streaming FPU	580MB/sec

DDR System: Polywell 1GHz Athlon, PC1600 128MB DDR DRAM, Tyan S2398 motherboard with AMD 760 chipset including an AMD 766 South Bridge, Windows 98SE.

## to the pertinent details.

HEADLINE	NEWS	DETAILS	THE SPIN	OUR TAKE
<b>AMD Hits 1.2GHz</b>	With its new 1.2GHz Thunderbird, AMD has put 200MHz between its fastest Athlon and Intel's fastest Pentium III.	Much to Intel's chagrin, AMD has again executed on schedule and is producing the fastest CPUs available in volume.	Does 1.2GHz seem impressive? AMD says you ain't seen nothing yet.	While some prominent analysts think AMD is a one-hit wonder, the company hasn't missed a mark yet this year and doesn't look like it will.
<b>Creative Labs Buys Aureal</b>	Bankrupt Aureal has been purchased by arch-rival Creative Labs for \$28 million in cash.	Creative gets control of Aureal's patent portfolio and puts an end to a long running legal battle between the two.	Creative said Aureal was prepared to continue litigation even during the bankruptcy.	At some level, Creative must have feared a ruling that would've handed Aureal more than the \$28 million necessary to buy the company.

# Has T&L Delivered?

The GeForce's Vaunted 3D Acceleration Technology Hasn't Revolutionized Gaming—Yet



Next-gen titles such as *Giants: Citizen Kabuto* take advantage of hardware transform and lighting to provide more realistic effects and greater detail.

When it was introduced one year ago, the GeForce 256 was heralded by nVidia as the 3D accelerator of the future, the first consumer card to accelerate transform and lighting.

By handling the first two of the four intensive stages that make up the 3D graphics rendering process—chores typically handled by the CPU—hardware T&L cards prompted pundits to predict that model poly counts would rise, more CPU

**Many games are still written to target accelerators that are three years old, such as the Voodoo2 and TNT.**

cycles would be dedicated to AI and physics calculations, and gaming on the PC would magically improve.

One year later, however, the shiny new world that T&L promised has yet to be realized. Certainly, OpenGL and DirectX 7.0 games have faster frame rates, but bots in *Quake III Arena* aren't any smarter when used with T&L-enabled cards such as the GeForce or ATI's Radeon. And while some new games feature more complex models and animations, those improvements are due in large part to advances in game technology—for example, the use of skeletal

modeling instead of the more traditional vertex method.

So, why aren't we seeing more advanced games? T&L proponents say the main reason has to do with the years it takes to develop and ship a game. Titles currently hitting store shelves were being created when the GeForce was first announced. In addition, using

high polygon counts in a game severely limits the number of 3D accelerators the game will support—which, in turn, limits the number of PCs the game will run on

and the number of people who will buy a game. Most games today still target accelerators that are three years old, such as the Voodoo2 and TNT. One solution would be to create models of two different scales, with high-poly count models for those with T&L cards, and with low polygon counts for the slaver-ing, T&L-deprived masses.

Unfortunately, this isn't easy, and developing two different sets of models doubles the amount of content that has to be created by the developers.

If this sounds disheartening, T&L supporters say some

upcoming titles may prove that your T&L purchase wasn't pointless. Titles such as *Giants: Citizen Kabuto* and *Sacrifice* might cripple a 733MHz Pentium III even with a GeForce2 Ultra card. Also due out in a few months are *Evolva* and *Black and White*, which boast higher-than-average poly counts and variable levels of detail.

Like most new PC technologies, hardware T&L has been slow taking off, but 2001 will likely be its breakout year. Next year, expect to see the first titles that truly benefit from a 3D accelerator with T&L—although you won't see "Hardware T&L required" on the box.

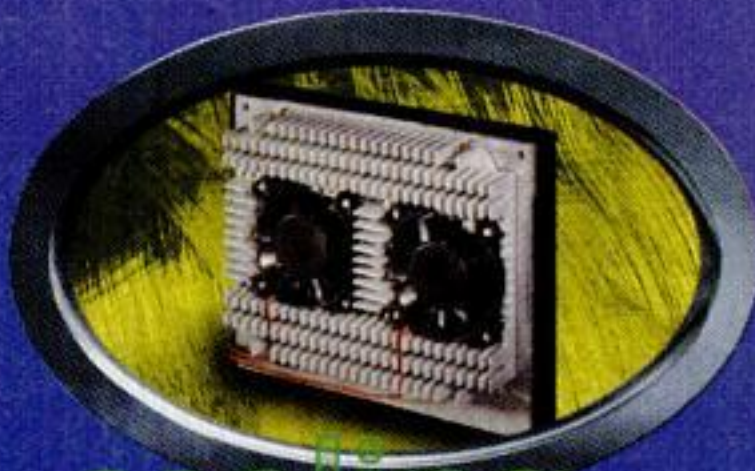
Hardware T&L titles will get another boost next year when the new crop of T&L-enabled game consoles, including Microsoft's X-Box, are released. These titles will squeeze everything they can out of the graphics T&L engines, and once the games are ported to the PC, they should make T&L-equipped machines shine.

—Will Smith

## T&L Enabled Games: On shelves now (or will be soon)!

B-17 Flying Fortress	Max Payne
Black and White	Mechwarrior 4
Blademasters	Midtown Madness 2
Colin McRae Rally 2	Neverwinter Nights
Comanche 4	No One Lives Forever
Combat Flight Simulator 2: WWII Pacific Theater	Oni
Crimson Skies	Pac-Man 3D
Demolition Racer	RC Racers Deluxe
Dogs of War	Real Myst
Drakkan 2	Return to Castle Wolfenstein
Dungeon Siege	Sacrifice
Escape from Monkey Island	Sanity: Aiken's Artifact
Exile	Silex
Experience	Spirit of Speed 1937
Evolva	Star Wars: Obi Wan
FIFA 2001	Star Trek Voyager: Elite Force
Freelancer	Sydney 2000
Giants: Citizen Kabuto	Team Fortress 2: Brotherhood of Arms
Halo	Terminator 3D
Heavy Metal F.A.K.K.2	Test Drive 6
Hidden & Dangerous 2	Titanium Angels
Hitman: Codename 47	Tribes 2
Homeworld: Cataclysm	Ultima Worlds Online: Origin
	Ultimate Bass Fishing 2000
	WarBirds III
	Warcraft 3
	Werewolf: The Apocalypse
	X-Plane

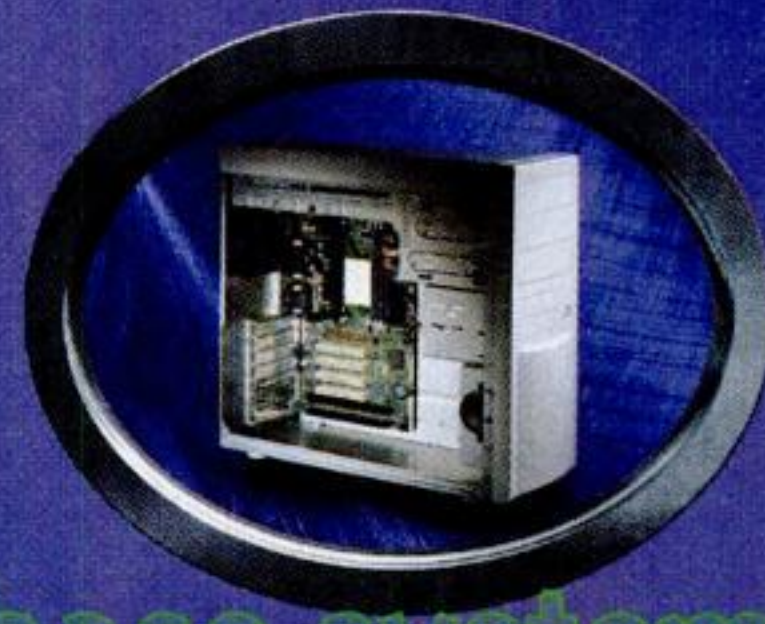




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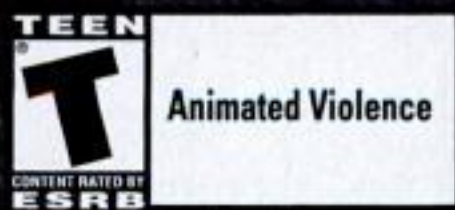
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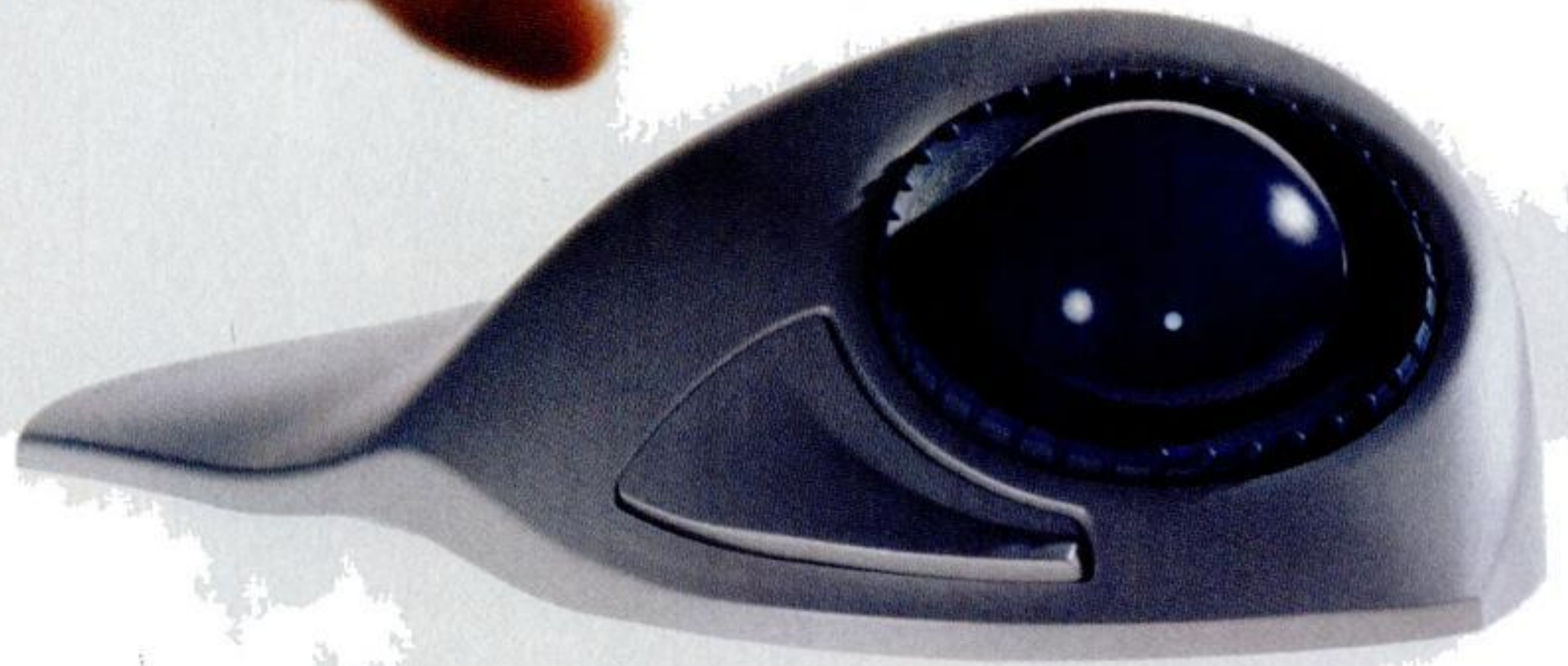


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# ► Maximum PC takes a bite out of bad service and gear

# WATCHDOG



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

## CREATIVE SWALLOWS AUREAL

In a move tantamount to Intel buying AMD, Creative Labs has purchased arch-enemy Aureal for \$28 million in cash.

Aureal's fall from grace (chronicled in November's Inside Sources) marks more than the passing of a well-respected PC audio company. It may also mean the end of support for Aureal soundcards.

The Dog recently gnawed bones with Creative Labs executive Craig

McHugh, who said that Creative Labs purchased Aureal's intellectual property, not its liability. This means that if you are owed money by Aureal, you'll have to seek it from the decaying remains of Aureal, not from Creative Labs.

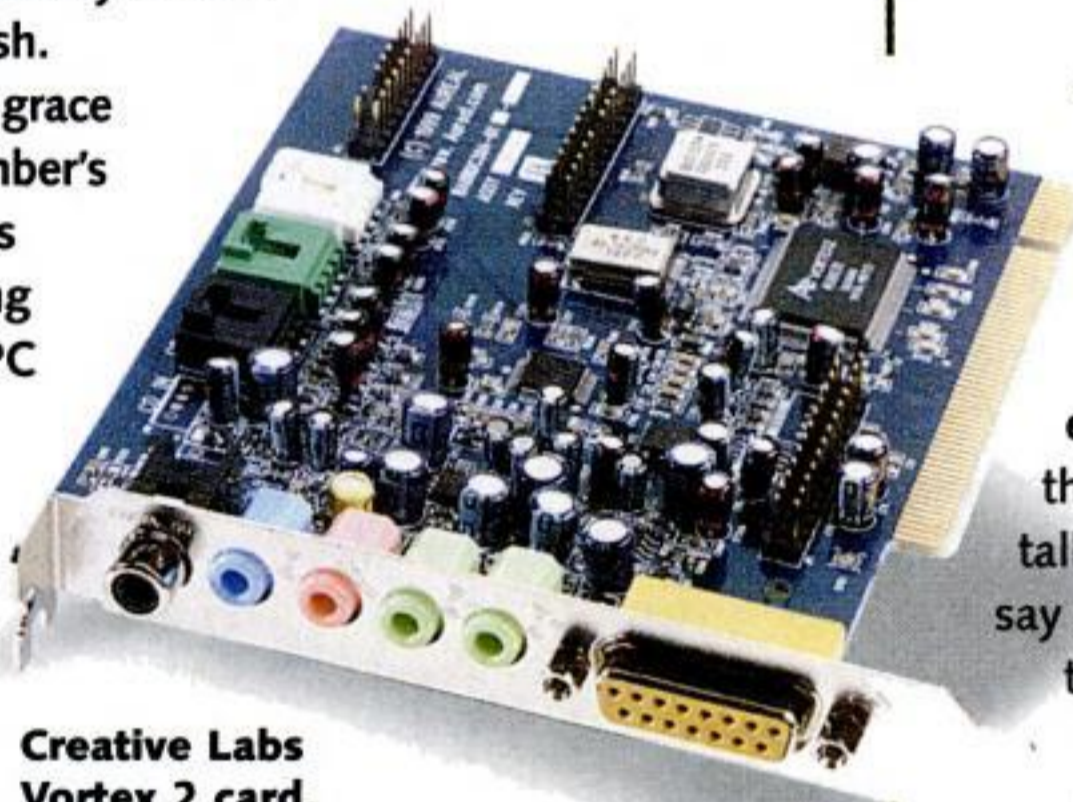
Will Creative Labs offer new drivers for Aureal equipment? McHugh said Aureal has retained contractors to finish a set of drivers for Aureal-based cards, but could offer no insight on when the drivers would be released.

And what about Aureal's product line—its unreleased SQ3500 chipset, its A3D 2.0 API, and its self-tuning speakers?

"We have not been able to assess the current state of Aureal's product line and have not finalized any product plans," McHugh told The Dog. McHugh also wouldn't comment on the possibility of implementing A3D technology in the Sound Blaster product line.

If this all sounds like McHugh is holding out on the goods, please consider that the companies were once bitter enemies, and Aureal kept Creative Labs officials at arm's length up until the end. In fact, some Aureal investors protested the sale of assets to Creative and would've preferred a sale to Guillemot for less cash. McHugh said Creative Labs was behind on examining what to do with Aureal's assets because the deal took so long to hash out.

Stay tuned for more on Aureal support.



Creative Labs Vortex 2 card, someday?

## PAYSCAM

**Dear Dog:** I got an e-mail this morning that said, "You won \$10!" It directed me to a web address with "PayPal" in the URL. When you click on the URL, it takes you to a fake PayPal login screen that is meant to steal your PayPal login and password. I believe they then use this information to steal money from your PayPal account.

I immediately changed my passwords after seeing what happened and informed PayPal. Please let others know about this.

— Mark Whiteford

**The Dog Responds:** Thanks for the warning, Mark. Sadly, this isn't a new trick. Scumbags often use the name of legitimate businesses, such as PayPal, to send folks to fake pages hosted on free web service sites. Once the thieves have farmed enough account names and passwords, they shut the site down and move onto another scam. The Dog talked to PayPal about the fraud attempt. PayPal officials say people should always be wary of being misdirected to fake sites. To address growing concerns over fraud, PayPal offers an anti-fraud guarantee. For more information, visit [www.paypal.com](http://www.paypal.com) and click on the fraud protection link.

The real lesson is to be skeptical of web sites you visit and to make sure you're really visiting the right site. You should exercise the same skepticism if called by someone who purports to represent a company you do business with. If, for example, Amazon.com calls and says it needs to investigate credit card fraud activity on your account, and needs your credit card number to continue, a bell should go off. Doesn't Amazon.com already have your credit card information? If you're suspicious, don't give out the information until you're sure you know who you're talking to. You can ask to call the representative back if you have doubts about his or her identity, then easily check that number against the customer service number listed on the company's web site.

**"I believe they then use this information to steal money from your PayPal account."**

## DEATH STARRED

**Dear Dog:** I purchased a new IBM Deskstar 34GXP 7,200rpm ATA/66 drive at a computer show in May. About two months later, the drive quit working. My PC's BIOS won't even detect the drive anymore. I called IBM to get it replaced under the three-year warranty, but discovered that the drive was originally sold to Gateway. I was directed

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## WATCHDOG

to call Gateway for service, which promptly turned me away because I don't even have a Gateway PC.

Is there any way I can possibly get it replaced by Gateway? The drive is from Gateway; IBM can even confirm this through the serial number on the drive. I don't understand why IBM won't replace it, as a friend had his Western Digital drive replaced directly from WD without having to go through Gateway.

I really don't want to have paid \$200 for a lump of aluminum!

— Kevin Chu

### The Dog Responds:

Bad luck, Kevin. The Dog's been warning people about the dangers of buying "OEM" equipment for months now, and this is yet another case of such equipment biting the buyer. Hard drives, however, fall into a special category of OEM equipment because people are often confused about which drives they're purchasing.

Hard drive vendors sell their wares into two different channels. The first channel feeds drives to large system OEMs such as Dell, Gateway, and HP. To get a price break on the drives, the OEMs agree to cover the drives under their own system warranties. If a drive dies, the OEM handles the complaint directly. These OEM drives are not intended to be sold as individual parts to consumers; a consumer should only receive such drives in fully integrated systems. But sometimes a whole shipment of drives is stolen, and the drives are later sold individually at



**"IBM maintains its position that it will not warranty OEM drives, period."**

computer shows. Likewise, sometimes an OEM will sell excess inventory to a broker, who will later sell the drives to a retailer who may not know that the drives aren't covered by warranty. Hard drive companies generally discourage such "gray market" sales.

The second sales channel feeds hard drives into "distribution." These are the hard drives you'll find in familiar

retail packaging at computer megastores. They're intended for individual sale and are covered by the hard drive manufacturer's own warranty.

Hard drive manufacturers also sell "bare" drives to mom 'n' pop PC stores

for use in machines and for sale to consumers who don't want to pay the extra bucks for the retail packaging.

The situation gets confusing when you run into an OEM drive at a computer show and assume it's a "bare" drive covered by warranty. To avoid getting burned, you should only buy drives in retail packaging. This won't get you the cheapest deal in town, however, and many fully warrantied drives aren't

sold in retail trim. If you absolutely must buy a suspect drive, ask the seller about the drive's warranty. It also pays to research model numbers, as the drives sold to OEMs can have different model numbers than distribution drives.

The Dog has done some research on vendors' policies concerning OEM drives. Maxtor, Quantum, and Seagate all say they will instruct customers to get help from the OEM first. Why? Because OEMs sometimes author their own firmware to increase the drive's performance or reliability. If the PC OEM tells you to take a hike or has gone out of business, Seagate and Quantum say they will likely warranty the drive, but on a case-by-case basis. Maxtor officials say they offer a "no-quibble" policy and will warranty all drives including OEM drives (although they want you to talk to your PC maker first.) IBM maintains its position that it will not warranty OEM drives, period. ☘



This OEM hard drive carries no warranty.

## HERCULES KIA?

Reader John Cimbara noticed Hercules on The Dog's list of dead companies, and wondered if the warranty on his Hercules 3D Prophet card would be affected. Don't worry, John. Hercules was purchased by Guillemot. Any GeForce-based card is covered by Guillemot's warranty. Older cards, such as Hercules' TNT2, are not, however.

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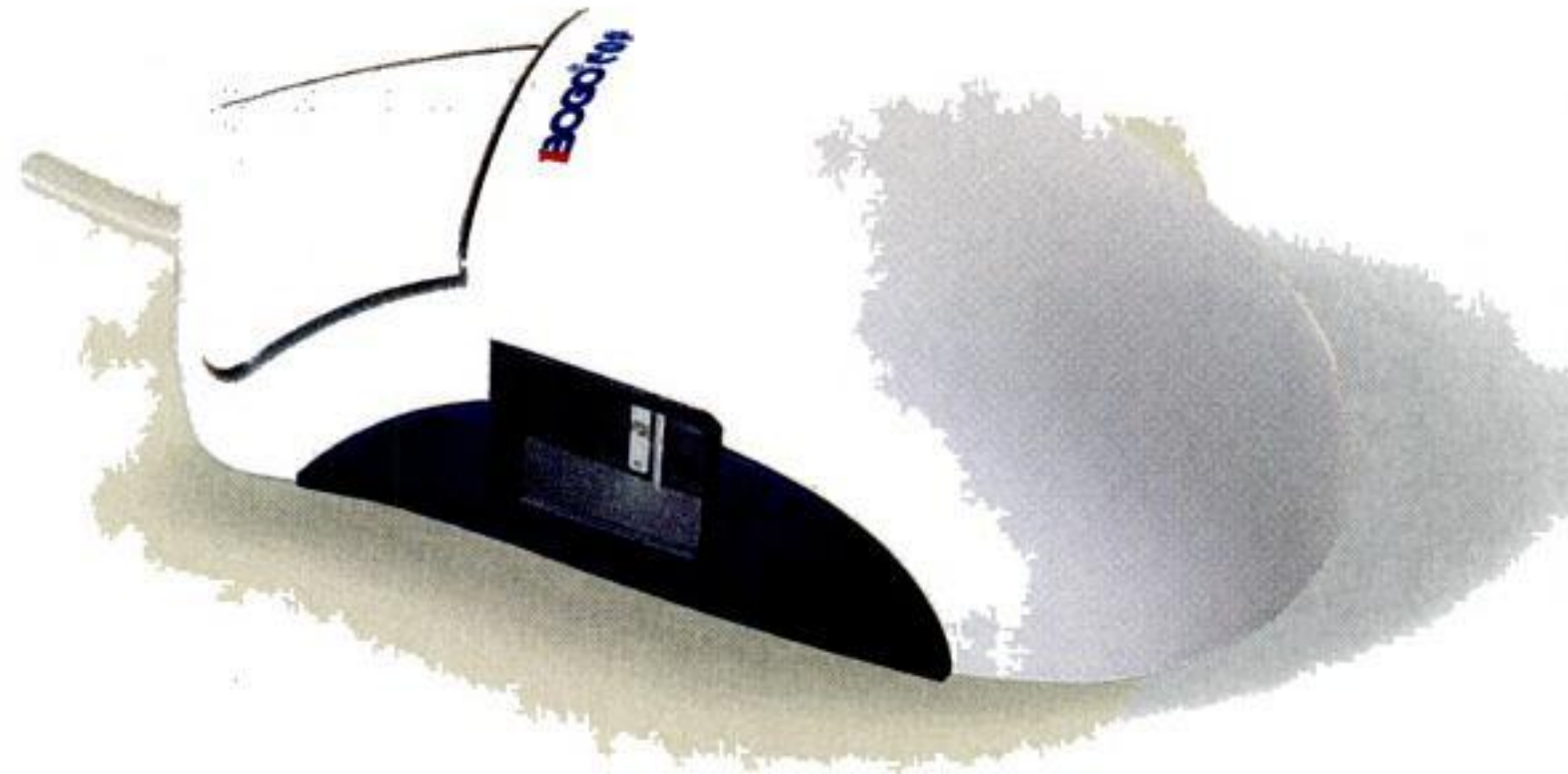


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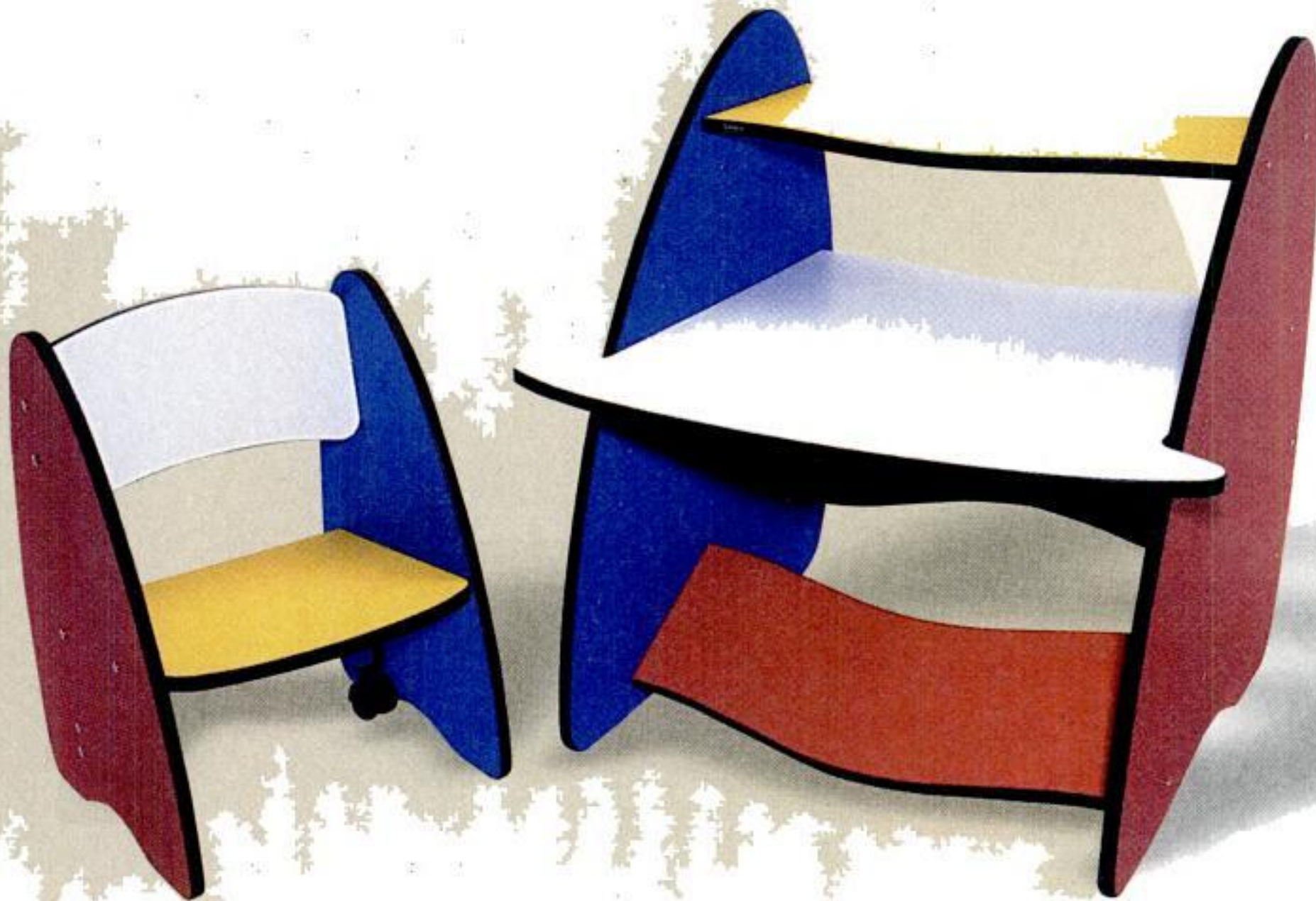
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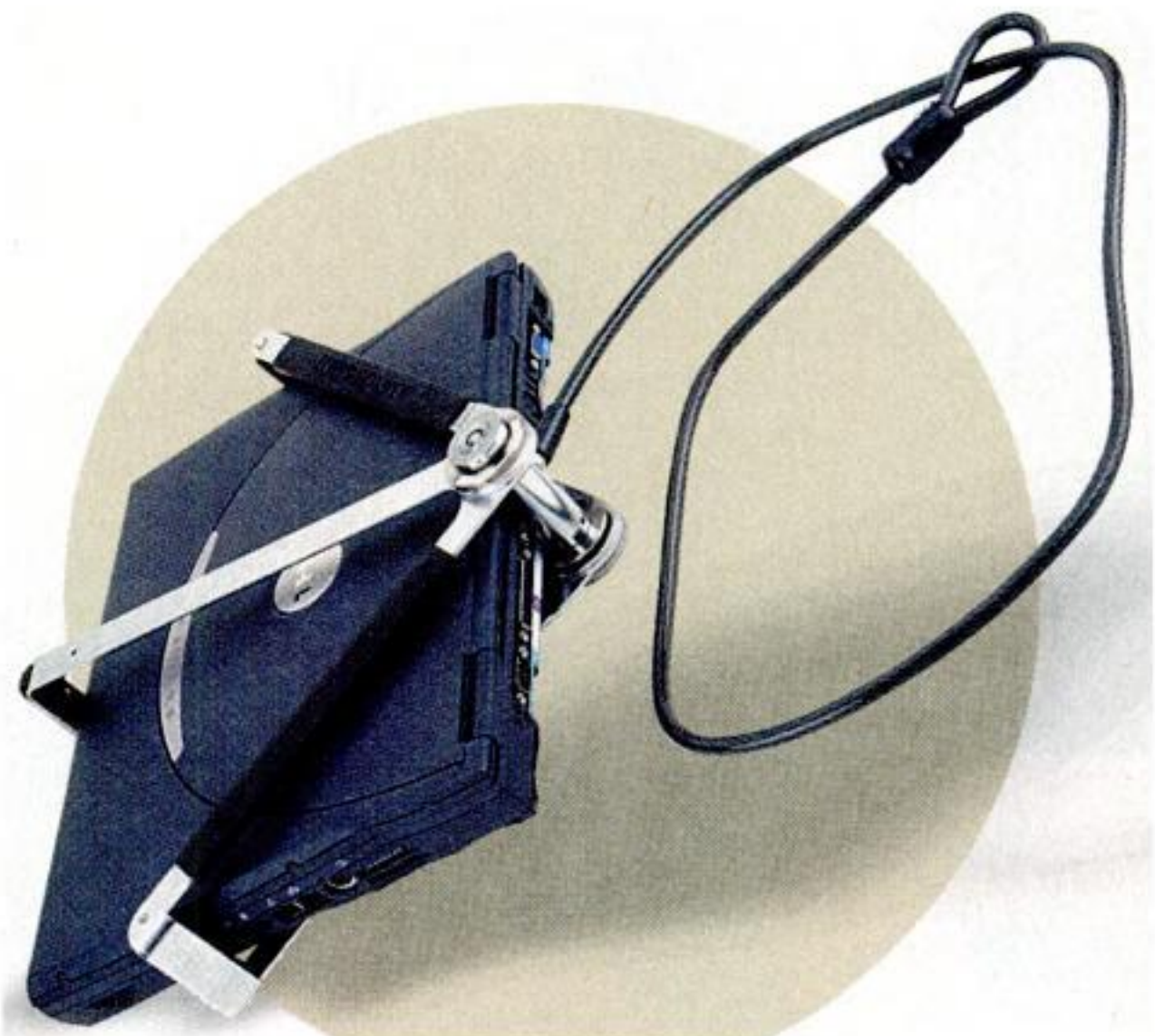
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## FAST FORWARD

Everybody craves more power. More processing power, that is. But the never-ending quest for higher clock speeds and greater performance comes at a price: more power. More electrical power, that is.

Despite greatly improved battery technology, today's notebook computers don't run much longer on a charge than older notebooks because faster CPUs and bigger LCDs require more juice. But thanks to new power-saving processors from Transmeta, AMD, and Intel, that's about to change—and I think the same technology will appear in future desktop PCs, as well.

Transmeta shook things up earlier this year by announcing its power-stingy Crusoe chips (see "The Truth About Transmeta," Fast Forward, May 00). Sony began shipping a Crusoe-based notebook this fall, and more Crusoe notebooks are coming from Fujitsu, Hitachi, IBM, and NEC. Sony's PictureBook C1VN has a 600MHz Crusoe TM5400 and is supposed to run five and a half hours on a battery charge, compared with two and a half hours for the Pentium II-based model. (I'm writing this before the new PictureBook is available for testing, so for now we'll take Sony's word.)

Although five and a half hours doesn't fulfill Transmeta's original promise of "all-day computing," it's still a huge improvement over two and a half hours, which is more like "half-morning computing" or "waiting-around-the-airport-to-change-planes computing." Sony made some design trade-offs that compromise battery life. The PictureBook is luxuriously equipped for an ultralight, with 128MB of memory, a 12GB hard drive, a built-in video camera, a FireWire port, and a Memory Stick slot.

## Power Me Down, Scotty

FUTURE DESKTOP PCS COULD USE POWER-SAVING TECHNOLOGY, TOO

Transmeta's chips conserve power with a feature called LongRun. AMD has a similar feature called PowerNow in the K6-2+ and K6-III+, a pair of processors also designed for notebooks. Here's the secret formula behind LongRun and PowerNow:

$$W = 1/2CV^2F$$

Actually, it's not a secret, because this equation is commonly found in engineering textbooks. **W** (watts) is the chip's power consumption. **C** stands for capacitance, which we can ignore for this discussion. The vital terms are **V** (squared), the chip's voltage,

**Eventually, all PCs will use these power-saving tricks, because PCs are running too hot.**

and **F**, the clock frequency. The lower those values, the less power the chip consumes and the less heat it dissipates.

LongRun and PowerNow take advantage of this equation to slash power consumption when the CPU doesn't need to run at full speed. All modern processors already do this to some degree. They have a sleep mode that turns off the chip's circuitry, reducing power consumption to a few milliwatts. The operating system periodically issues an idle command that tells the CPU to sleep during brief periods when the demand for processing power is low. These naps can be as short as the microseconds between

your keystrokes. When the computer needs a burst of performance, the CPU wakes up.

LongRun and PowerNow go far beyond this common type of power management. They monitor how much time the CPU spends in sleep mode and figure out whether the CPU could handle the same workload at a lower frequency. For example, if the CPU is spending half its time asleep, then it could deliver the same performance at half the clock frequency without sleeping. So the CPU automatically reduces its frequency and voltage. Basically, it underclocks itself.

Merely reducing the frequency would save little or no power because the chip spends less time asleep. But look at that equation:  $V^2$ . The voltage is squared. By lowering the voltage along with the frequency, power consumption drops much faster than the linear frequency curve. A chip that's almost always awake at half the clock frequency and a lower voltage consumes much less power than a chip that's awake half of the time at its



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normal frequency and voltage. Bingo!

One difference between LongRun and PowerNow is that LongRun doesn't require

any modifications to the computer—Transmeta's x86-emulation software does the work. AMD's PowerNow requires changes to the BIOS and motherboard, which is why most notebooks don't use the feature. (One notebook that uses PowerNow is Hewlett-Packard's Pavilion N3300.)

Intel's SpeedStep is much less sophisticated. SpeedStep simply lowers the frequency and voltage to fixed levels when the notebook runs on batteries. On AC power, the processor runs at full speed. (I think SpeedStep should be called SlowStep, but Intel disagrees.) Intel is working on other techniques and will probably find a solution similar to LongRun and PowerNow.

Eventually, I think all PCs—including desktops and servers—will use these power-saving tricks, because PCs are running too hot (see "How to Beat the Heat," Fast Forward, June 00). Apple's fanless G4 Cube proves that a powerful computer doesn't have to fry eggs or sound like a vacuum cleaner. A monster machine can be cool in more ways than one. ☀

### Random Thoughts

▶ Software workloads are deceiving. In an experiment at Transmeta's lab, I discovered that selecting a paragraph of text in Microsoft Word briefly consumes more power than playing a DVD movie. Crazy!



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[www.microsoft.com/games/crimsonskies](http://www.microsoft.com/games/crimsonskies)

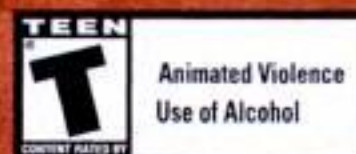
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▶ THE SCOOP FROM A MAJOR PLAYER

# GAME THEORY

If you're a PC gamer, chances are good that you're a *Half-Life* fan. So what if I told you that Gearbox was at work dramatically improving the game, which was originally designed for low-end Pentiums? What if you learned that the company is rebuilding all the figure models with double the amount of polygons and individually rendered articles of clothing? What would you think about an entirely new mission called Blue Shift? Excited? You bet you are. Now what if I told you it was all being done for the Dreamcast port of the game? As a hardcore PC gamer, you probably just went limp faster than if your mom popped out of a cake at your stag party. Consoles? Are you kidding?

Hardcore PC games such as *Quake*, *Unreal*, *Railroad Tycoon II*, and *Half-Life* are getting radical facelifts for their Dreamcast ports. This includes new graphics, new missions, and, in some cases, integrated online play via Seganet. What does this mean to the PC gamer?

Let's start with a PC hit that came to Dreamcast in a version that would leave PC fans breathless. Tremor ported *Railroad Tycoon II* with a sharp 3D engine. Can we hope to see this on a PC any time soon? Phil Steinmeyer, of PopTop Software, says no: "A while back, we thought about using the RT2 DC engine for some kind of PC project, but that didn't pan out. At this point, it's unlikely we'll re-use that engine. For our current game, *Tropico*, we are using a very upgraded version of the RT2 PC engine. For the next game, we'll use a new engine custom created for the task of using all the latest 3D bells and whistles." So RT2 fans who want to see the world in 3D on their PCs are out of luck.

The prospects for *Half-Life* are more promising. *Half-Life* is the oldest of the ported titles in terms of technology, and Valve does nothing in half-measures. Based on a radically modified version of the *Quake II* engine, *Half-Life* for the PC was designed

other extras. Additionally, the new Barney has almost twice the number of bones [used to animate the character] so that his chest expands when he breathes and his new fingers can actually grasp his weapon and pull the trigger. The original model on the PC simply had blocks for hands and painted-on clothing features. Side by side, the difference is remarkable. And these kinds of added and enhanced features permeate the entire game.

"Textures for characters and weapons have had quite a bit of attention," Pitchford continued. "Not only has a lot more texel density been earned in the mappings, but some clever efficiency in the textures themselves makes the new artwork much more friendly to the console architecture. For example, the original world model of the machine gun took up about 6,000 texels worth of texture memory, but only actually used about half of those texels on the model. The new assault rifle world model only takes up about 5,000 texels worth of texture memory, but uses every single one of them on the model. The result is that the Dreamcast version of the game boasts obvious increased visual detail, but it does it with less impact on the game's performance



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within the confined memory of the Sega Dreamcast."

I don't know about you, but I'm positively moist with anticipation.

## The Trickle-Down Theory

### HOW AN AWESOME HALF-LIFE PORT MIGHT BENEFIT PC GAMERS

to run on Pentium 133s with 32MB of RAM and second-gen 3D hardware. *Half-Life 2* is in development and under heavy wraps, and *Team Fortress II* just went back to the drawing board with a scratch-built 3D engine, so we have no clear sense yet of what Valve has in store for PC gamers. We do, however, know what is being done by Gearbox for the Dreamcast port, and it provides some tantalizing glimpses of what may be in store for us as well.

**I don't know about you, but I'm positively moist with anticipation.**

"In order to make details really stand out for the Dreamcast version," Randy Pitchford of Gearbox told me, "just about every piece of art in the game was overhauled, upgraded, and enhanced. Most characters now have nearly twice the number of polygons that they had in the original PC version, and some of them have a number of new bones for animation articulation. The Barney [security guard] model, for example, uses the added polygons for details such as geometric vest panels; an identification badge that's an actual object; and a visible collar, tie, and

Should I be? My source at Valve dodged and teased when I asked when we'll see these goodies on a PC: "Will this new content come to the PC? Extremely likely. How and when will it happen? The plan right now is to complete this work and ship it in the Dreamcast version, then determine how it arrives on the PC."

The main reason for hope is that PC-to-Dreamcast ports and vice-versa are not the massive enterprises of, say, a PC-to-Playstation port. Dreamcast uses Microsoft CE, and the 3D acceleration is provided by a potent PowerVR chip. Dreamcast developers use the Windows CE SDK, which is built around Microsoft's Visual Studio and its Visual C++ based tools—the same tools used for Windows game development. The Win 32 and DirectX APIs used in the Dreamcast SDK are source-code-compatible with Win98.

This is a win-win situation. Even if the benefits of an enhanced Dreamcast port don't immediately rebound to the PC gamer, they will down the road. You have to know that something as cool as the new *Half-Life* models will find their way to the PC someday, though probably not soon enough for you. In the meantime, Dreamcast only costs \$149. . . .

# Gear

of the

# Year

We pick the best PC hardware  
of the year 2000.



In our pursuit of pure PC power, we spend a lot of time scrutinizing PCs and their components. A *lot* of time. For days on end we're locked in the *Maximum PC* Lab, putting part after part through its paces, building and benchmarking and all-around ball-busting. We cut our hands on sharp case corners and smack desktops in frustration when CPUs won't boot. We spend hours on the phone grilling manufacturers about products that don't perform as promised, and days crafting articles designed to tell you which products deserve damnation and which deserve your dough.

Without further ado, we present to you our winners of the 2000 Gear of the Year Awards. On the following pages, you'll find our picks for the best parts available in every product category we cover. Though you'll note that some products have yet to receive space in the *Maximum PC* reviews pages, you can be sure that we've thoroughly tested every product herein. In fact, we've spent so much time in the Lab lately, our friends and family haven't seen us for weeks.

## Processor

### AMD Athlon with Performance Enhancing Cache

The year 2000 belonged to AMD—it beat Intel to the 1GHz mark, then rubbed dirt in Intel's face by producing faster processors in such high volume that people could actually find and buy them. But the topper is the Athlon with "Performance Enhancing Cache," a.k.a. the Thunderbird Athlon. With full-speed cache and a core architecture that can scale to ever-faster frequencies, it's clear why the Thunderbird Athlon is our CPU of the year. **\$850; [www.amd.com](http://www.amd.com); featured in September 2000**

## AMD-based Mobo

### Asus A7V

When it comes to Socket A mobos, the Asus A7V delivers the goods. Overclockers love the primo power of a BIOS that allows myriad frontside bus speeds (up to 145MHz) and are pleased by tweaks that allow any Socket A proc to be unlocked. For the best in IDE, there's even ATA/100 support via the onboard Promise controller. No doubt about it—the A7V is Kick Ass, through and through. **\$158; [www.asus.com.tw](http://www.asus.com.tw); received a 9/Kick Ass in November 2000**

## Intel-based Mobo

### Abit BX133-RAID

This board takes the rusty-krusty BX chipset to new heights with a super-fast HPT 370 RAID controller glued onto the PCB. Where other boards allow just a little overclocking leeway, the BX133's ultra-suave Soft Menu III BIOS allows FSB options up to 200MHz and controllable voltage settings that give extra oomph when pushing pesky processors to desired speeds. Smokin'! **\$150; [www.abit.com.tw](http://www.abit.com.tw); receives a 9 in this issue, page 68**

## IDE Hard Drive

### IBM 75GXP

It's the fastest IDE drive ever created, it's cheap and reliable, and it can best single SCSI drives when used in a RAID 0 configuration. What more is there to say? For all of its platter-packin' power, you'd think the GXP was a SCSI drive. For cheap, usable IDE power, this is as good as it gets. **\$615 for 75GB; [www.storage.ibm.com](http://www.storage.ibm.com); received a 9 in August 2000**



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## SCSI Hard Drive

### Quantum Atlas 10K II

We love the technology of the Seagate X15, but we hate that Seagate stuffs just a measly 18GB into its drive. The 73GB Atlas 10K II can store all the, ahem, "software" on your FTP server and then some. Plus, it pummels the X15 in read-burst speeds, courtesy of an 8MB buffer and large areal density. SCSI rules for top performance, and the 10K II is the best of the best. **\$1,650 for 73.4GB; www.quantum.com; received a 9/Kick Ass in October 2000**

## DVD-ROM Drive

### Pioneer DVD-115 16x

With 16x read speeds for DVD-ROM and 40x read speeds for CD-ROM, the Pioneer DVD-115 is the fastest DVD-ROM drive out there, bar none. It won a *Maximum PC* Kick Ass Award, was included in our Dream Machine, and has now won Gear of the Year. Next stop, the DVD-ROM Hall of Fame. **\$170; www.pioneerusa.com; received a 9/Kick Ass in August 2000**

## CD-RW Drive

### TDK VeloCD 12/10/32

Why choose IDE over SCSI for Gear of the Year? Because the VeloCD's "Burn Proof" technology makes burning coasters a thing of the past. The drive also has the fastest speed rating of any CD-RW drive on the market and a killer software bundle. Simply put, the VeloCD has everything we want in a CD-RW. **\$350; www.tdk.com; not yet reviewed**

## Case

### ASL Full Tower

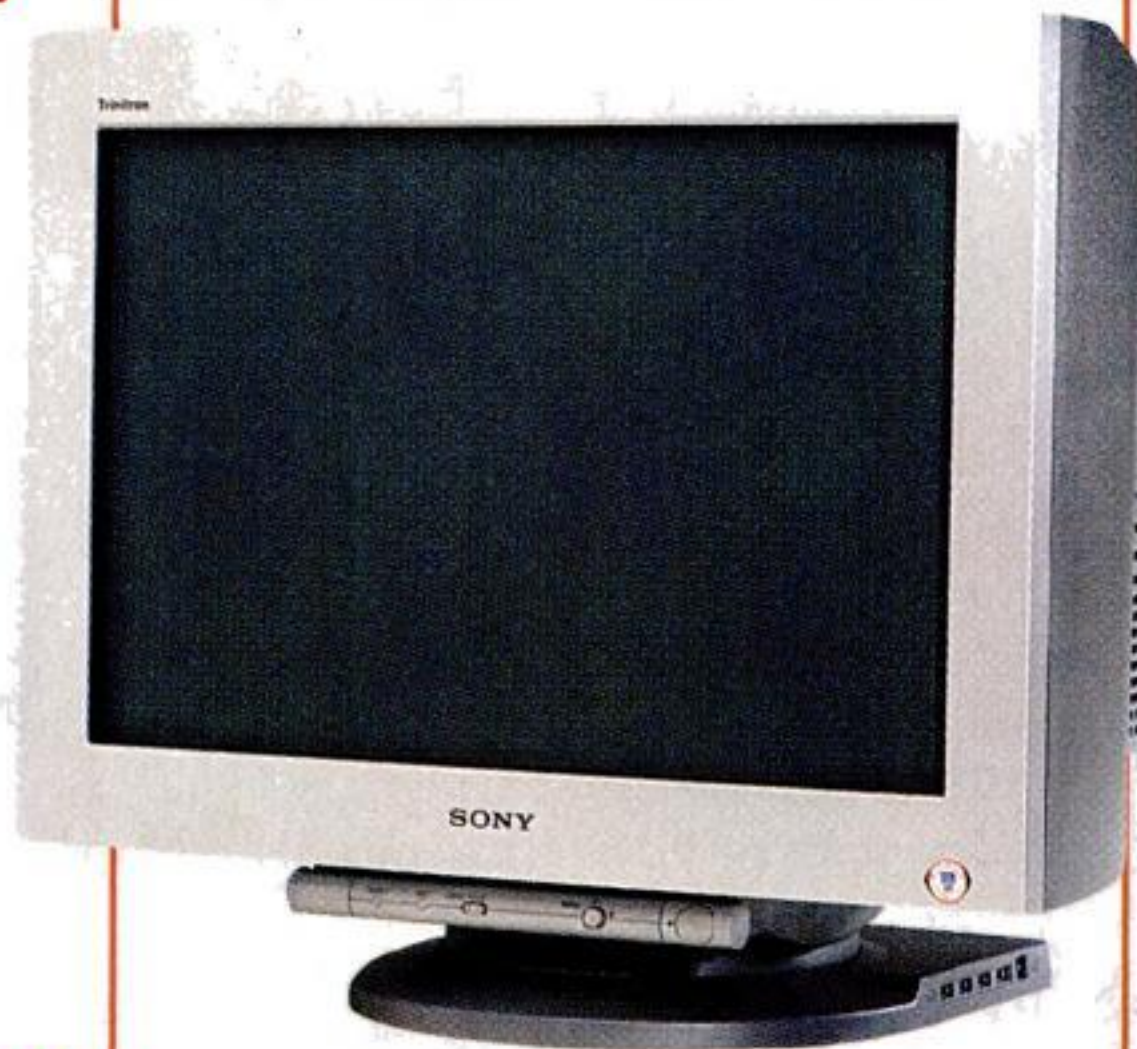


It's not the sexiest tower on the block, but the Full Tower case from ASL Lab (an OEM of Chenbro's Genie) features massive fans, a vented cage for your RAID array, swing-out doors, and enough front bezel space to fulfill the needs of the burliest PC. All that, and it still fits nicely under a desk. **\$155 without power supply; www.aslab.com; received a 9/Kick Ass in April 2000**

## Monitor

### Sony GDM-FW900

Boasting a 22.5-inch diagonal viewing area, this aperture grille marvel is the most



coveted display in our Lab. It's bright, vibrant as a peacock, and flat-flat-flat—no bulbous fishbowl glass here, folks. Top resolution hits 2304x1440 at a flicker-free 80Hz refresh rate. Simply put, the FW900 has everything going for it—maximum screen real estate and a spectacular picture. Must be seen to be believed. **\$2,500; www.sel.sony.com; received a 9/Kick Ass in Oct 2000**

## Flat Panel

### Apple Cinema Display

We thought we saw flat panel perfection when we reviewed SGI's 1600SW—but perfection just got better. The Cinema Display's pure digital image is the best we've ever seen from a flat panel—ever. And while the SGI hits just 17.3 diagonal inches, the Apple hits 22. We don't even care that the Cinema Display only connects to Macs—it's an engineering tour de force deserving of our highest honors. **\$4,000; receives 10/Kick Ass in this issue, page 64**

## 4.1

## Speakers

### Klipsch ProMedia v.2-400

These superb speakers offer warm midrange, crisp highs, and teeth-shattering bass. Their 400W power rating is completely ridiculous for a PC speaker system, but the excess power ensures incredible sound reproduction at lower and moderate volumes. For gaming and music, no other speaker system even comes close to these bad boys. You'll love these speakers as much as your neighbors will hate them. **\$250; www.klipsch.com; received a 10/Kick Ass in January 2000**

## 5.1 Speakers

### VideoLogic DigiTheatre DTS

Warning: If you buy these speakers, you may never leave the house again. With 220W of pristine power, support for Dolby Digital 5.1 Surround Sound, DTS, and Dolby ProLogic decoding, the DigiTheatre DTS have been known to cause indulgent DVD-watching, as well as fits of ecstasy during movie scenes that contain gunplay. **\$600; www.videologic.com; receives a 10/Kick Ass in this issue, page 70**

## Soundcard

### Sound Blaster Live! Platinum with Live Drive

Creative Labs didn't just conquer its arch-enemy Aureal this year—it ate the remains for dinner. Since introducing the original Sound Blaster Live!, Creative has consistently offered a smorgasbord of I/O options and hammered out a large list of developer support. With front-mounted S/PDIF and MIDI ports, a strong game bundle, and enough audio software to synthesize your very own boy band, the SB Live! Platinum takes the cake. **\$199; www.soundblaster.com; not yet reviewed**

## 3D Accelerator

### Creative Labs Annihilator 2 Ultra

If PCI is your thing, your only remotely hard-



# Gear of the Year



# Gear of the Year

core choice is the Voodoo5 5500 PCI. But true videocard nirvana can be found in only one place: a Creative Labs box. The Annihilator 2 Ultra is capable of pushing an astounding two gigatexels per second. Equipped with an nVidia GeForce2 Ultrachip running at

250MHz, and sportin' supafast 230MHz DDR memory, the Annihilator 2 smacks the crap out of everything else we've seen. Our only complaint? We have yet to find a benchmark that makes this bad boy break a sweat. **\$500; www.creativelabs.com; received a 9/Kick Ass in November 2000**

## All-Around Videocard

### ATI All-in-Wonder Radeon

ATI has long equipped its All-in-Wonder cards with video capture and editing capa-



bilities, but it never gave us a compelling 3D performer—until now. With Radeon power under the hood of the latest All-in-Wonder, we finally agree with ATI's PR people: The All-in-Wonder is truly a do-everything wonder card. Clocked at 166MHz, it delivers badass 3D, TiVo-like PVR functionality, and MPEG-2 video capture. We expect it to do the dishes any day now. **\$300; www.ati.com; received an 8 in November 2000**

## Best MPEG-2 Decoder Card

### Utopia DVD Motion

Even with today's powerful processors, DVD still puts a heavy strain on a system, and no software decoder can play

fullscreen on a secondary monitor or TV while you continue to work on the primary monitor. The Utopia card costs the same as most software players, but it delivers an anamorphic widescreen picture and digital soundstream (Dolby Digital 5.1 and DTS) to die for. **\$50; www.utopia.com; not yet reviewed**

## Multifunction Printer

### Hewlett-Packard LaserJet 3150

With its one-piece, drop-in toner cartridge,



## Best Technology Launches

*It's by no means a complete list of the innovations that cropped up in 2000, but following are our picks for those that meant the most.*

**Napster:** The R.I.A.A says it's piracy. Computer users say it's frickin' awesome—just type in the song you want and, wham, it's yours to download (usually). *Napster* is revolutionary stuff, but since it challenges so many people with so much to lose, it saddens us to predict that its days are numbered.

**Burn Proof:** This is a technology from Sanyo that eliminates buffer underruns when you're burning CDs. Burn Proof should not only elevate IDE's status to that of SCSI in terms of reliability and speed, but should also allow IDE disc duplication speeds to increase to 16x and beyond.

**AMD Thunderbird:** AMD's fastest processor smokes Intel's Coppermine CPU in almost every benchmark we've run. It's widely available at speeds of up to 1GHz and is just a downright stellar offering from the CPU underdogs.

**Transmeta Crusoe:** Transmeta is looking to take a big bite of the mobile market share with its Crusoe chip. Designed to lower a notebook's power consumption by using a fluctuating

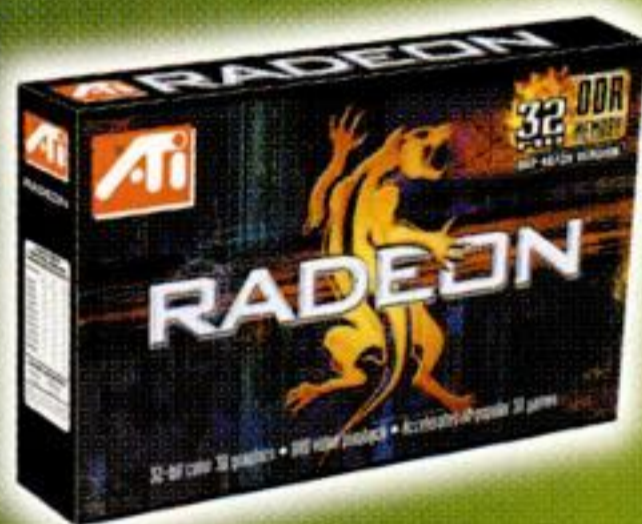
voltage meter and "Code Morphing" to translate x86 instructions into the chip's proprietary instruction set, Crusoe should mean seriously extended battery life.

**Combo Optical Drives:** We hate buzzwords like "convergence," but we love the combination of CD-RW and DVD-ROM drives. Ricoh, Toshiba, and Samsung all launched "combo" drives this year, offering CD-RW speeds of 6/4/24 and 4x DVD speeds. They're hardly the fastest drives on the market, but what they lack in speed they make up for in flexibility. Recently, Ricoh released a drive with 12/10/32 CD-RW and 8x DVD-ROM speeds. Check, please!

**Intel's SpeedStep:** It allows a notebook's processor speed to "step down" via a voltage switch when a laptop is unplugged, conserving power and extending battery life. Anyone who's been forced to watch "Mad About You" reruns on the plane because their notebook ran out of juice will understand just how important this function is.

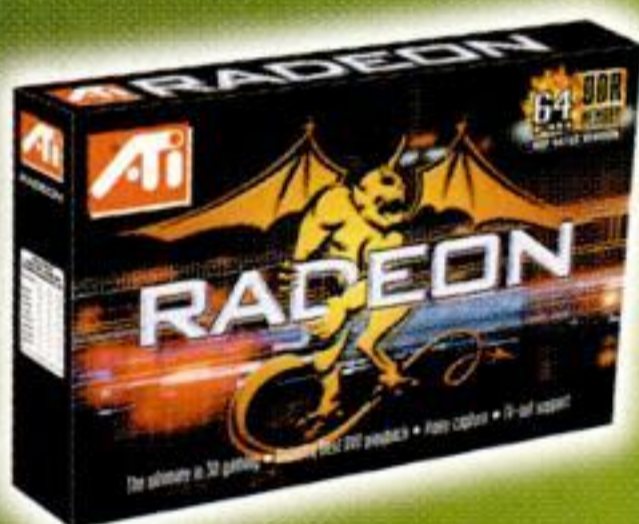
**Zingos Extra Strength Caffeinated Peppermints:** Three have as much caffeine as a "cola beverage." Wonder what three dozen will do to Will Smith, our technical editor? We plan to find out at our company Christmas party...

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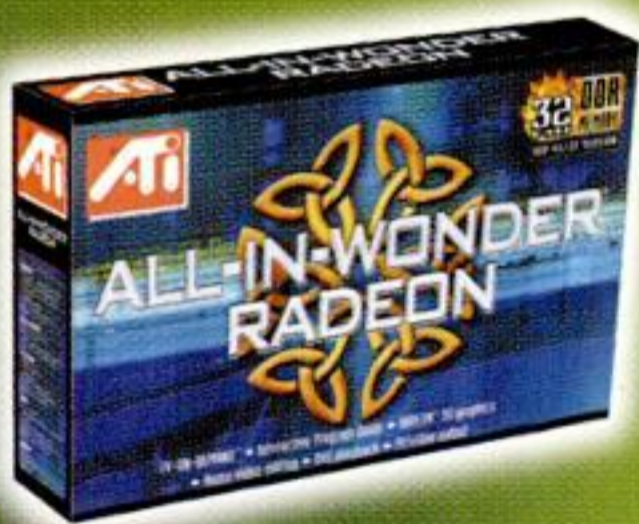
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600dpi resolution at 256 shades of gray (300dpi for the sheetfed scanner), multi-tasking options, and stand-alone and network capabilities, the LaserJet 3150 is a small-office must. No other multifunction even comes close to the 3150's power and performance without looking and weighing in like a Sherman tank. **\$600; www.hp.com; received a 9/Kick Ass in October 2000**

## Photo Printer

### Epson Photo Stylus 1270

The Photo Stylus 1270 boasts a six-ink (CcMmYK) supply for richer and more accurate color; archival and waterproof inks; a whopping 1440x720dpi resolution; and Epson's phenomenal Micro Piezo print heads. Add a ridiculous 13x44-inch maximum print output, and you'll see why you shouldn't trust your photos to any other machine. **\$500; www.epson.com; not yet reviewed**

## Scanner

### Epson Expression 1600 Pro-FireWire

The Expression 1600 features a mind-numbing 1600x3200dpi maximum hardware resolution at 36-bit color depth. In addition to blistering speeds, the Expression includes a transparency adapter with a mechanism that reduces Newton rings, a cold Xenon gas tube that eliminates warm-up times, and Epson's phenomenal color correction. It's simply the most impressive professional scanner on the market. **\$1,400; www.epson.com; not yet reviewed**

## Digital Camera

### Nikon D-1

Yeah, it's a little on the pricey side... but the D-1 is worth every penny. There's just no faster (or more adaptable) digital camera out there. The D-1's 2.74-megapixel CCD can shoot high-definition pictures at a massive 2000x1312 pixel size and dole out a dizzying shooting speed of 4.5 frames a second. Add an RGB filter, a Low-Pass filter that gets rid of infrared rays and reflections, and interchangeable lenses, and

you have a digital camera that can handle any shot you dream up. The D-1 bridges the gap between film and digital cameras like nothing else we've seen. **\$5,000; www.nikonusa.com; not yet reviewed**

## Digital Video Camera

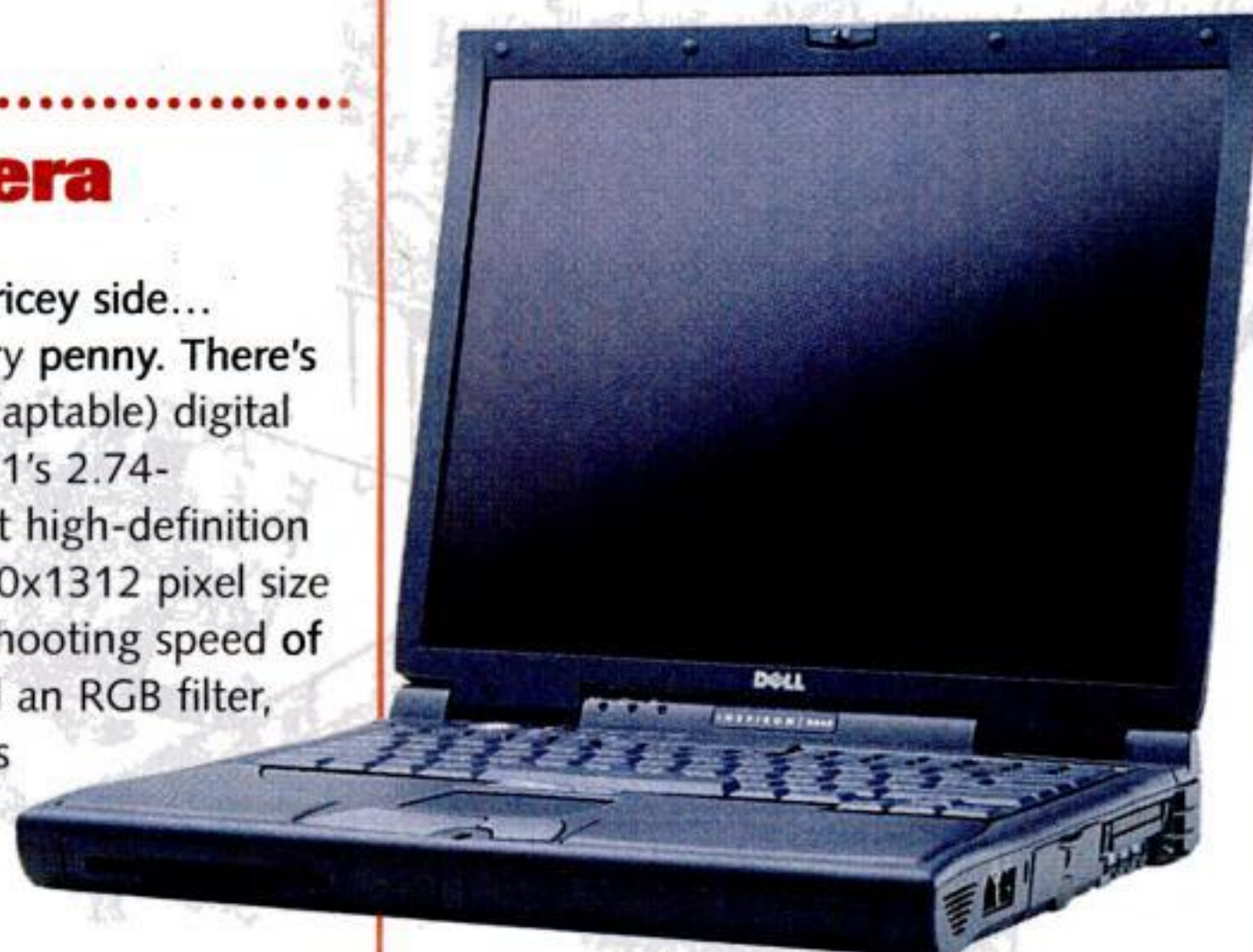
### Sony DCR-TRV900

Let's cut to the chase: *three* 1/4-progressive scan CCDs, 12x optical and 48x digital zoom, and image stabilization that will rock your world—all for under three grand. Deals don't get much sweeter than that. Digital still-camera functions, PCM digital stereo, and a pass-through system for analog video conversion also make this one of the most versatile cameras on the market. Get one and go score at Sundance. **\$2,500; www.sel.sony.com; not yet reviewed**

## Notebook

### Dell Inspiron i8000

Based on the Solano desktop chipset, the i8000 boasts an 850MHz SpeedStep processor, 128MB of RAM, and a whopping 32GB hard drive. An integrated NIC, modem, and FireWire, as well as a fixed optical drive with two extra bays ensure productivity up the yin-yang. A new ATI graphics chipset offers 1600x1200 resolutions and phenomenal frame rates and DVD playback. **\$3,577; www.dell.com; receives a 10/Kick Ass in this issue, page 74**



## Wireless Networking Kit

### Lucent ORINOCO

It's almost too good to be true—the ORINOCO 802.11b-compliant wireless kit lets you surf from anywhere. With

download speeds topping out around 11Mbps, the ORINOCO will satisfy all but the most voracious of downloaders. As if that weren't enough, the ORINOCO's access point also allows connection sharing from either a broadband source or a dial-in account. Ah, wireless bliss. **\$500; www.lucent.com/orinoco; received a 9 in October 2000**



## PDA

### Palm Vx with Minstrel V Wireless Modem and OmniSky wireless web service

This setup allows you to check up to six POP3 e-mail accounts, buy plane tickets while you're on the bus, and check out virtually any URL. A new rev of the OmniSky software will also let you send e-mails from different accounts to different in-boxes, and store MapBlaster directions in your Palm Memo Pad with one click. We've actually started to travel with this instead of a notebook. **Palm Vx: \$400; www.palm.com; not reviewed; Minstrel V and OmniSky: \$300 for modem, \$40/month for service; www.omnisky.com; received a 9 in October 2000**

## Game Controller/Joystick

### Act Labs Force RS Wheel with shifter; Microsoft Sidewinder Force Feedback 2

Va-va-va-voom! With the most powerful and realistic force-feedback effects we've seen this year, a groovy leatherette wheel,



**Gear**  
of the Year

Ace pilots don't settle for cheap thrills.

Real flying is all about wrestling the raw powers of Mother Nature. Hanging on as you throttle your engines. And relishing the feeling as your wheels kiss the tarmac. You've never felt anything like the new SideWinder® Force Feedback 2 joystick. Using a next-generation processor, it takes technology to the limit by delivering over 100 distinct forces with more speed and strength than ever before. Turning more than 200 force feedback-enabled games into the most intense gaming experience imaginable. So the next time you're ready to push the envelope, you'd better buckle in first.



MICROSOFT  
**SIDEWINDER**  
FORCE FEEDBACK 2

and a buffet of buttons, the Force RS is as real as you're gonna get under 200mph. For the true racing nut (or anyone who wants to see what happens when you shift from sixth gear to first), Act Labs also offers the only desk-mounted gearshift available. **\$200; [www.act-labs.com](http://www.act-labs.com); received an 8 in December 1999**

Buttons in all the right places and the best force-feedback jolts we've found in any stick make the Microsoft Sidewinder Force Feedback 2 our fave FF joystick. **\$140; [www.microsoft.com/sidewinder](http://www.microsoft.com/sidewinder); not yet reviewed**

## MP3 Player

### Nomad II MG

With 64MB of onboard memory, an open SmartMedia slot, an FM tuner, voice recorder, and excellent sound,

the Nomad II MG is the best portable MP3 player we've run across this year. It may not hold as much music as some of the monsters currently hitting the market, but it also won't break if you go running with it. **\$400; [www.nomadworld.com](http://www.nomadworld.com); not yet reviewed**



## System

### Dell XPS B800r

In February, Dell blew us away with its XPSB800r, a machine so fast and powerful, we had to wear sunglasses just to look at it. With a custom-made 64MB DDR GeForce, a lust list of hardware, and benchmark scores that were literally off the charts, it won a Perfect 10 verdict, and though it's nearly a year old, it continues to kick ass on today's games and applications. Yes, we know it's no longer the latest and greatest—but that doesn't change the fact that when it arrived, it was better equipped than any other system we'd seen. We haven't handed out a 10 to another system since. **\$3,929; [www.dell.com](http://www.dell.com); received a 10/Kick Ass in March 2000**

**Gear**  
of the **Year**



## Lemons of the Year

*The bushels of ripe PC goodness we saw this year can't rid us of the bitter aftertaste of bad technology.*

**Daikatana:** We're currently collecting signatures for a class-action lawsuit against John Romero in order to receive backpay for the four years we waited for this game, as well as for the time spent suffering through each ridiculous level.

**MTH i820 recall:** Intel did its damndest this year to erase its reputation for producing the world's fastest, most reliable PC chipsets, and its 820 "Camino" chipset went a long way toward achieving that goal. The first 820, heralded for its three RIMM slots, was recalled when folks found that the board crashed if all three slots were filled. The second iteration of the chipset, which employed the infamous Memory Translator Hub to allow SDRAM to work with the RDRAM-only chipset, was recalled for general bugginess. According to Intel, the MTH recall itself set the company back a quarter-billion bucks.

**1.13GHz recall:** With full knowledge that its 1GHz P-IIIs yields were sucking big-time, Intel actually had the cojones to announce even *faster* 1.13GHz P-IIIs! This, despite the fact that its current core architecture and manufacturing process basically guaranteed that such aggressively clocked

CPUs would be rarer than a slice of perfectly grilled ahi. The 1.13GHz P-IIIs were promptly recalled because of lock-up and reliability problems that are commonplace in *overclocked* CPUs—and Intel lost face. Message to Santa Clara: Don't try to keep up with the Joneses unless you have the technology in the bank.

**Seagate X15/DPT RAID combo:** We've got a monkey on our back, and its name is SCSI RAID, care of the DPT Decade controller and Seagate Ultra160 hard drives. The combination didn't work in the Dream Machine, nor did it function in the system sent to us by reader Mark Miller for review in the November issue. Seagate says it doesn't know what the problem is; DPT says the same. We don't care whose fault it is, but until somebody takes responsibility, this configuration gets our stamp of disapproval.

**Starship Creator Warp II:** Even with tricorders in hand and Spock ears glued on, we couldn't get into this game. It's worse than a hangover from drinking too much Romulan ale, or contracting Tribble VD.

**"Candy Coating of America":** Technology is beginning to look like a bag of M&Ms, as most OEMs cover everything from desktops to notebooks to PDAs in a multi-colored, iMac-esque plastic casing. Whoever's doing the market research on this one is asking the wrong slice of society.

## Staff picks (and dirty tricks)

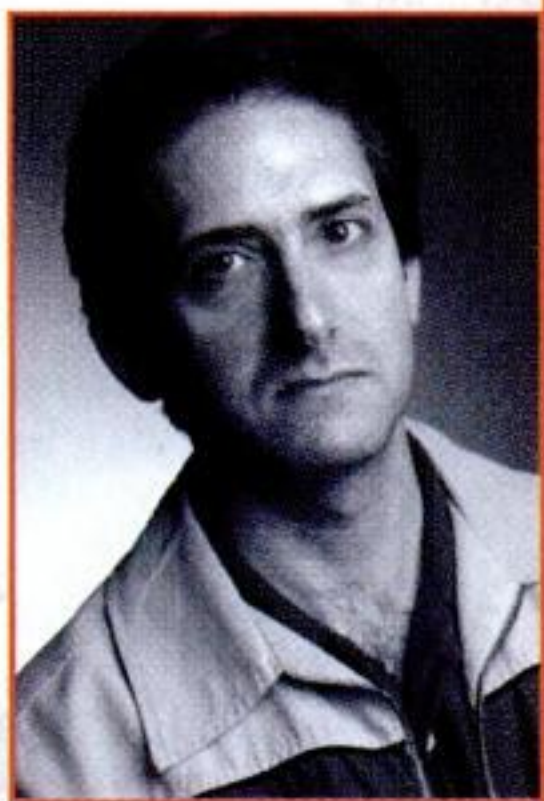
### Jon Phillips Editor-in- Chief

**Beat:** Monitors

**Best game of the year:** *Sammy Sosa High Heat Baseball 2001*.

**What I want for christmas:** Tickets to the 2001 US Grand Prix and a 50-inch plasma monitor.

**Technology I'd most like to see in the next year:** A browser scripting language that doesn't crash my entire PC and frequency jammers that squelch all cell phone communication within a 50-foot radius of my person.



**Best TV moment of the year:** Watching the Oakland A's win the final game of the year and take the division crown in the process.

**Best vendor schwag:** HP's "Jaguar Racing" shoulder-pack.

### Gordon Mah Ung Senior Editor

**Beats:** CPUs, memory, chipsets, motherboards

**Best game of the year:** The free *Counter Strike* add-on for *Half-Life*.

**What I want for Christmas:** The Magellan 750M GPS vehicle navigation unit and Kenneth Cole shoes that fit my feet.

**Technology I'd most like to see in**



**the next year:** A massively linked online world that doesn't suck, with super-large textures and billions of polygons.

**Best TV show of the year:** "The West Wing."

**Worst TV show of the year:** "Titans."

**Best movie of the year:** *High Fidelity*.  
**Worst movie of the year:** *The Cell*.

**Best news story of the year:** A federal judge ordering Microsoft split into pieces.  
**Worst news story of the year:** Napster's battle to survive an onslaught of lawsuits from the record companies.

**Worst "Maximum PC moment":** At 1:30 a.m., when it seemed the Dream Machine would never boot.

**Best "Maximum PC moment":** At 2 a.m., when the Dream Machine was up and running and chewing through benchmarks.

**Best vendor schwag:** The hula girl planted on my monitor.

**Noteable product:** If you have a Palm, you must have Think Outside's freaking cool Stowaway keyboard.

### Kristen Salvatore Features Editor

**Beats:** PDAs, MP3 players, notebooks

**What I want for Christmas:** The plasma display we used in the PC Entertainment Center, John Waters' *Pecker* on DVD, and a 1959 Cadillac Eldorado convertible in good working order.



**Technology I'd most like to see in the next year:** Voice-activated kitchen appliances.

**Best book of the year:** *Me Talk Pretty One Day* by David Sedaris.

**Worst book of the year:** *Natural Blonde* by Liz Smith.

**Best TV show of the year:** Any episode

of "Strangers with Candy."

**Worst TV show of the year:** Any "Olympic moment."

**Best trend of the year:** *Napster* and mojitos.

**Worst trend of the year:** Razor scooters and tube tops.

**Best song of the year:** "Never Gonna Come Back Down" by BT and M. Doughty.

**Worst song of the year:** Anything currently in heavy rotation on "TRL."

**Best "Maximum PC moment":** Spontaneous "Copacabana" dance party in the Lab. "Her name was Lola..." Rockin'!  
**Worst "Maximum PC moment":** Watching the company's server crash, taking a finished cover feature down with it. Oh, the humanity!

**Best vendor schwag:** Gift basket of fine cheeses and pate. Swanky!

**Worst vendor schwag:** Set of tiny reading glasses that fold up and fit inside a ballpoint pen.

### Josh Norem Reviews Editor

**Beats:** Speakers, optical storage, pointing devices

**Best game of the year:** *Deus Ex*.  
**Worst game of the year:** *Daikatana*.

**What I want for Christmas:** World peace and a Klipsch 5.1 speaker system that decodes both AC-3 and DTS movies. If it included a headphone jack, I would die a happy man.

**Best book of the year:** *What Really Matters* by Tony Schwartz.

**Worst book of the year:** *Internet Heroes* by Who Gives a Rat's Ass.

**Best movie of the year:** *The Way of the Gun*.

**Worst movie of the year:** *Battlefield Earth*.

**Best web site:** Shugashack ([www.shugashack.com](http://www.shugashack.com)).

**Worst web site:** Stevie Case's page ([www.steveana.com](http://www.steveana.com)).

**Best trend of the year:** CPU/MHz price war. From 600MHz to 1.5GHz in one year!

**Gear  
of the Year**



**Worst trend of the year:** Great companies going out of business (Aureal, Looking Glass, Quantex/Cybermax).

**Best "Maximum PC moment":** Receiving handwritten letters from people who are supportive of our work.

**Worst "Maximum PC moment":** Receiving e-mails telling us how much we suck.

**Best vendor schwag:** Mini General Lee replica to promote "Dukes of Hazard" driving game.

**Worst vendor schwag:** *Daikatana* comic books from Eidos.

## Will Smith Technical Editor

**Beats:** Videocards, MPEG-2 decoders, networking products

**Best game of the year:** *Homeworld: Cataclysm*.

**Worst game of the year:** *Daikatana*.

**What I want for Christmas:** A dual Thunderbird 1GHz rig and a 55-inch HDTV.

**Worst personal Windows moment:** When Kristen replaced Josh's desktop wallpaper with a screenshot of his desktop and moved all his icons, then watched him go nuts trying to figure out what was wrong. Oh, wait, that was Josh's worst Windows moment... [Zing! Gotcha, Josh!—Ed.]

**Technology I'd most like to see in the next year:** Space elevators.

**Best movie of the year:** *American Psycho*.

**Best web site:** Ars Technica ([www.arstechnica.com](http://www.arstechnica.com)).

**Worst Web Site:** Network Solutions ([www.networksolutions.com](http://www.networksolutions.com)).



**Best "Maximum PC moment":** Finding out I didn't have to sit next to Geoff.

**Worst "Maximum PC Moment":** Gordon pinning the smoke alarm incident on me (see Lab Notes, November 00).

## Geoff Visgilio Associate Editor

**Beats:** Notebooks, digital cameras, printers, scanners

**Best game of the year:** *Deus Ex*.

**Worst game of the year:** *Daikatana* (the most disappointing, anyway).

**What I want for Christmas:** A digital video dream machine custom-built by Alienware and bundled with a Canon XL-1, and a motorcycle.

**Worst personal Windows moment:** Crashing Windows 2000 beyond repair by trying to run *SYSMark2000*—and then doing the same thing a second time.

**Technology I'd most like to see in the next year:** Plasma screens and better cooling in notebooks, the further development of Transmeta's Crusoe chip, and affordable multi-pass scanner technology.

**Best TV show of the year:** Season premiere of "The West Wing."

**Worst TV show of the year:** Any of those stupid reality shows ("Survivor," "Big Brother").

**Best movie of the year:** *Gladiator*.

**Worst movie of the Year:** *Deuce Bigalow, Male Gigolo*.

**Best group:** U2 (new album on Halloween!).

**Worst group:** \*Nsync, Boys II Men, Backstreet Boys—any of those stupid, stupid, stupid, boy-band, rockapella crap groups.

**Best "Maximum PC moment":** I don't know, but I was most likely drunk at the time.

**Worst "Maximum PC moment":** Dressing like a woman for a photo shoot,



then having the marketing department exploit it ad nauseum (special thanks to Alison Kohl McCreery).

## Scott Tarr Associate Technical Editor

**Beats:** Chipsets, motherboards, hard drives, removable storage, cases/cooling, SCSI controllers

**Best game of the year:** *MDK2*.

**Worst game of the year:** *Sydney 2000*.

**Technology I'd most like to see in the next year:** Full-scale broadband to my bathroom, so I can read the latest news while taking a sh...ower. I guess it would need to be water-resistant, too, huh?

**Best movie of the year:** *Gladiator*.

**Worst movie of the year:** I don't know, I only saw one and it was *Gladiator*.

**Best musical group of the year:** Godsmack.

**Worst musical group of the year:** Meaty Cheesy Boys (from the Jack-in-the-Box commercials).

**Best web site:** Internet Movie Database ([www.imdb.com](http://www.imdb.com)).

**Worst web site:** Go.com ([www.go.com](http://www.go.com)).

**Best trend of the year:** RAID becoming more widespread.

**Worst trend of the year:** Gas prices, what else?

**Best news story of the year:** Napster's trial over IP for MP3s.

**Worst news story of the year:**

Microsoft's antitrust case.

**Best vendor schwag:** VIA's world time clock.

**Worst vendor schwag:** Freaking bouncing balls with lights. I request freaking "lasers"! Who wants lights? ●



**Gear  
of the  
Year**

# Adobe vs Macromedia

# SHOW

Adobe and Macromedia have long battled over multimedia content creation territory, with Macromedia winning in the web design realm and Adobe ruling the print roost. They've each just released a slew of new web and imaging apps, so we pitted them against one another in a multimedia showdown—'cause this town

just ain't big enough for the two of 'em.

Both companies recently unveiled new WYSIWYG web editors, vector illustration programs, and web animation apps; our reviews of each begin on page 44. To figure out who's got the quickest, mightiest draw, we considered the following criteria:

#### WYSIWYG Web Editors

A superior app will:

- Have a fully customizable interface with dockable palettes and a wide-open work area.
- Offer a library of commonly used symbols, site elements, and actions, including buttons, logos, and other reusable graphics, as well as simple

commands such as linking to other sites.

- Provide access to a code-level text editor, for making fine-tuned tweaks.
- Support XML, full Java, and CSS (Cascading Style Sheets).
- Support older browsers and work seamlessly with other applications made by the same manufacturer.
- Keep all code intact when a site goes live.

#### Illustration Programs

A superior app will:

- Use layers.
- Easily produce editable blends and gradations.
- Provide precision manipulation of vector points.
- Convert shapes into masks (windows that crop selected artwork).



# in a multimedia

# DOWN

BY GEOFFREY VISGILIO

- Support bitmap files and a large range of other file types.
- Allow you to place type on a path.
- Support Pantone colors.
- Save files as write-protected templates.
- Import and export files in any recognized format.
- Provide web layout tools for customizing graphics for the Internet.
- Offer effortless JavaScript-rollover and banner-creation tools.

#### Web Animation Programs

A superior app will:

- Have a large, easy-to-follow timeline that can handle every frame and cell in your

animation as a separate entity, yet allow them to be easily linked to a whole.

- Allow you to adjust speed, size, color information, and actions at keyframes (points along the timeline where changes or "key" elements of the animation take place).
- Offer vector tools in the animation program itself, so you can create viable graphics without launching a second app.
- Deal easily with imported art and JPEGs, and offer re-sizing tools.

- Allow you to easily export finished animations into other programs or let them stand alone as a standard *Flash* tag accessible by all browsers.
- Allow objects to be manipulated separately or grouped together at any time in the creation process.
- Provide you with the tools needed to create an entire web site.



Illustration by Lance Leekander

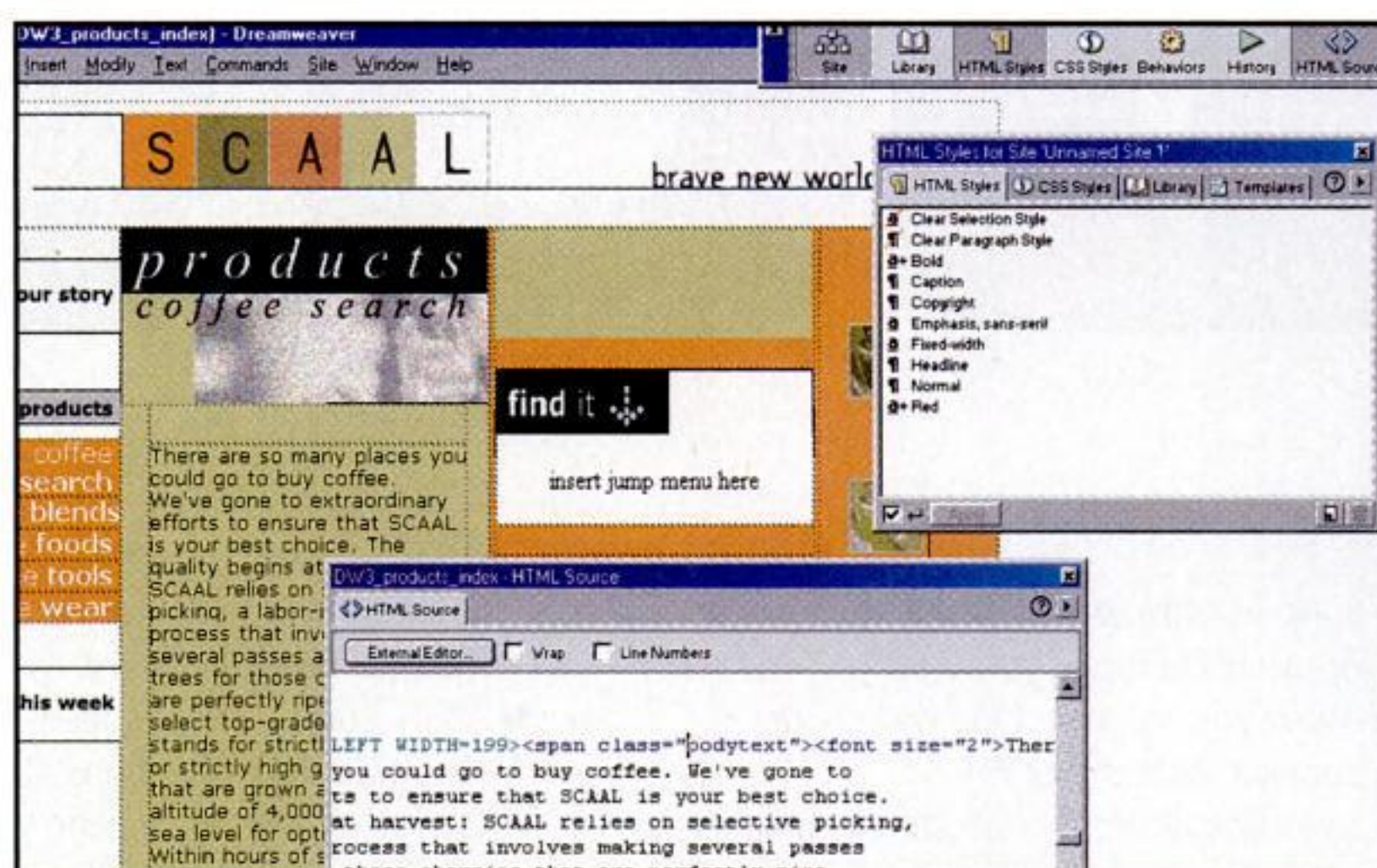
# Adobe GoLive 5.0 versus Macromedia Dreamweaver 3

Adobe's first foray into the web design territory ruled by Macromedia's *Dreamweaver* was marked by butchered HTML code, poor site-management abilities, and a confusing interface. Adobe's *GoLive 5.0* is in much better shape, but still plays second fiddle to the awesome power of *Dreamweaver*, now in its third iteration.

*Dreamweaver 3*'s most powerful weapon is Roundtrip HTML, which keeps HTML source code completely unchanged when it's exported, and keeps files intact when they're imported from non-native *Dreamweaver* formats such as ASP or *ColdFusion*. We also like the QuickTag editor, which allows you to "spot code" areas of a site without opening the main source-code editor. *GoLive 5.0* offers a roundtrip feature, called 360 Code, but it generates code that won't hold up on complex sites.

An app's customizable workspace is key to streamlining workflow. A powerful Javascript application embedded in *Dreamweaver* allows extensive customization options, so you can arrange onscreen tools to your liking or assign values to menus, palettes, and hot keys. *GoLive 5.0*, meanwhile, assigns common functions to a series of confusing icon tabs located in the palette menu. We were put off by the fact that those can't be changed, and that they were arranged in a way that obscured access to more advanced functions.

Chances are that if you're working with a WYSIWIG editor, you're also working with an image editor, a vector-graphic creation program, and animation software to generate all the pieces you're placing on your pages. Who wants to jump through hoops to move files across applications? *GoLive* allows you to easily import full *Photoshop* and *Illustrator* files complete with layers and tracing images, while *Dreamweaver* is kinder to native *Fireworks* files. Although this sort of favoritism is expected, it grows wearisome when you want access to *whatever* files will make your site shine.



**Dreamweaver's dockable HTML editor lets you edit source code instantly.**

The most important trait of a powerful web editor is extensibility—the ability to integrate mini-applications, called extensions, that enhance the WYSIWYG's overall power. Some extensions are made by the same manufacturer that created the application, but a good web editor will offer third-party developers a Software Development Kit (SDK) they can use to create extensions of their own. Extensions can look like any number of new utilities—*GoLive*'s integrated Extend Script JavaScript interpreter allows you to install new palettes, inspectors (plug-ins that allow you to make sweeping changes), and objects from other users. But *Dreamweaver* has the advantage here because it's had extensibility since its inception; Macromedia's web site alone offers over 150 *Dreamweaver* extensions. Because *GoLive* has only recently offered extensibility, there are simply fewer extensions available for it.

*Dreamweaver* also beats *GoLive* soundly with its inclusion of more and better HTML Styles (tweakable, pre-fabricated site templates). If you need to crank out a big site quickly, access to customizable Styles that already contain a basic site layout will save you time and headaches across the board. *Dreamweaver* also allows

be locked, so if you're working with other developers, you can secure parts of the site that you don't want altered by others. *Dreamweaver* templates are also site-wide, so changes made to a navigation bar, for example, are reflected across the site. And while both programs offer Libraries (where you can store often-used elements), and a History palette (a record of past actions, much like the History in *Photoshop*, so you can undo changes if you screw up), viewing your *GoLive* page in a browser clears out the history and undoes your option to undo. Poppycock!

*GoLive* includes syntax-checking and coloring for JavaScript, as well as pixel-precise image placement and drastically improved site management, with a special emphasis on reporting broken links and images. It also includes an excellent feature that *Dreamweaver* lacks: WebDAV (Web Distributed Authoring and Versioning) support, for cross-platform collaboration from a remote server. In spite of this, *GoLive* is really better suited for use by intermediate web developers—*Dreamweaver 3* is still the professional's choice.

## DREAMWEAVER 3

\$300 full/\$130 upgrade  
Macromedia | [www.macromedia.com](http://www.macromedia.com)

## GOLIVE 5.0

\$285 full/\$75 upgrade  
Adobe | [www.adobe.com](http://www.adobe.com)

## DREAMWEAVER PLUSES

Widespread interface customizability  
QuickTag editor  
HTML Styles  
Extensibility up the proverbial wazoo

## MINUSES

Steep learning curve  
Most new features cater to prosumers  
Not so kind to files imported from *Photoshop*

## GOLIVE PLUSES

Easy to learn  
WebDAV support  
Good third-party extensibility

## MINUSES

Not so internally customizable  
Palettes can be confusing and hide power features  
Meager Styles and iffy 360 Code

# Illustration never looked so good.

Eye-catching illustration, isn't it?

And yes, despite the glistening highlights, the realistic textures, the subtle shading, and the soft air-brushed effects, this is a completely vector illustration.

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D E N E B A

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\* 40 file formats available in Canvas 7 Professional Edition only.

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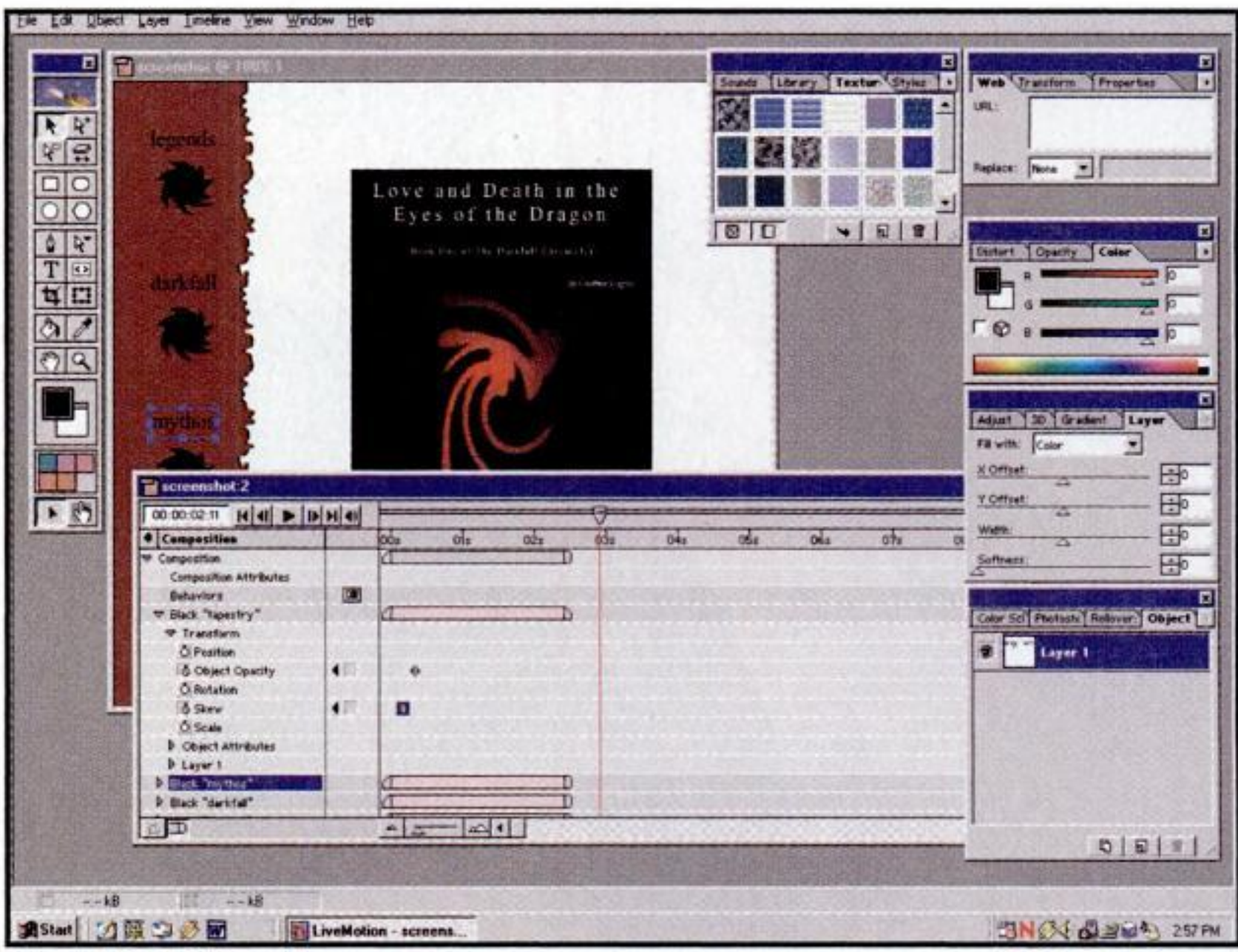


# Adobe LiveMotion 1.0 versus Macromedia Flash 5

With veteran app *Flash 5*, Macromedia enters the web animation battle with guns blazing. Though Adobe upstart *LiveMotion* puts up a valiant effort, it's simply no match for *Flash 5*'s stylings.

The first version of any software rarely stands up to scrutiny, but *LiveMotion* does display some merits. Veterans of Adobe *AfterEffects* will recognize the easy-to-use, object-oriented timeline that provides full control over each keyframe, so you can tweak such features as the duration of specific effects. Adobe made *LiveMotion*'s palettes similar to *Photoshop*'s, so there's an emphasis on color and text control. *LiveMotion* also allows text to be edited after it's animated, and offers multiple, pre-defined rollover and remote rollover styles, for easy button or banner creation. Nondestructive *Photoshop* filters let you create blurs and other artistic effects, and the live preview of file sizes means that before an image is exported, you can choose whether to export it as a vector or bitmapped graphic, which compression-format to use (JPEG, GIF, PNG, etc.), and what the final file size will be.

In spite of all this, *Flash* enjoys some critical advantages over *LiveMotion*. There's the fact that its open source-code is syntactically identical to JavaScript, so extension developers needn't learn another language when developing *Flash* plug-ins. There's also the fact that



**Veterans of *AfterEffects* will recognize *LiveMotion*'s intuitive, object-oriented timeline.**

users can create an entire web site using *Flash* alone. Whereas *LiveMotion* was designed to generate simple animation clips that can be inserted into a WYSIWIG web editor, *Flash* allows users to import *Fireworks* and *Freehand* images, and offers drawing and button tools, extensive libraries, and even rudimentary WYSIWIG tools—everything you need to create a full site.

Add to this a slew of new features, and you'll see why *Flash* enjoys such substantial firepower. Its ActionScripts—strings of code that make it a snap to tackle forms and simple data entry, or to add interactivity to e-commerce sites—are simply superior. An already strong set of vector drawing tools has been enhanced with bezier utilities. And support for MP3 files means

audio-intensive sites can be made more accessible to low-bandwidth folks who would otherwise be put off by a site full of larger WAV files. *Flash* has also enhanced its site management capabilities with shared libraries and precise layout control. Its included tutorials remain incredibly easy to use, and fantastic integration with *Freehand 9* means users can import entire *Freehand* files with specified sizes and layers intact.

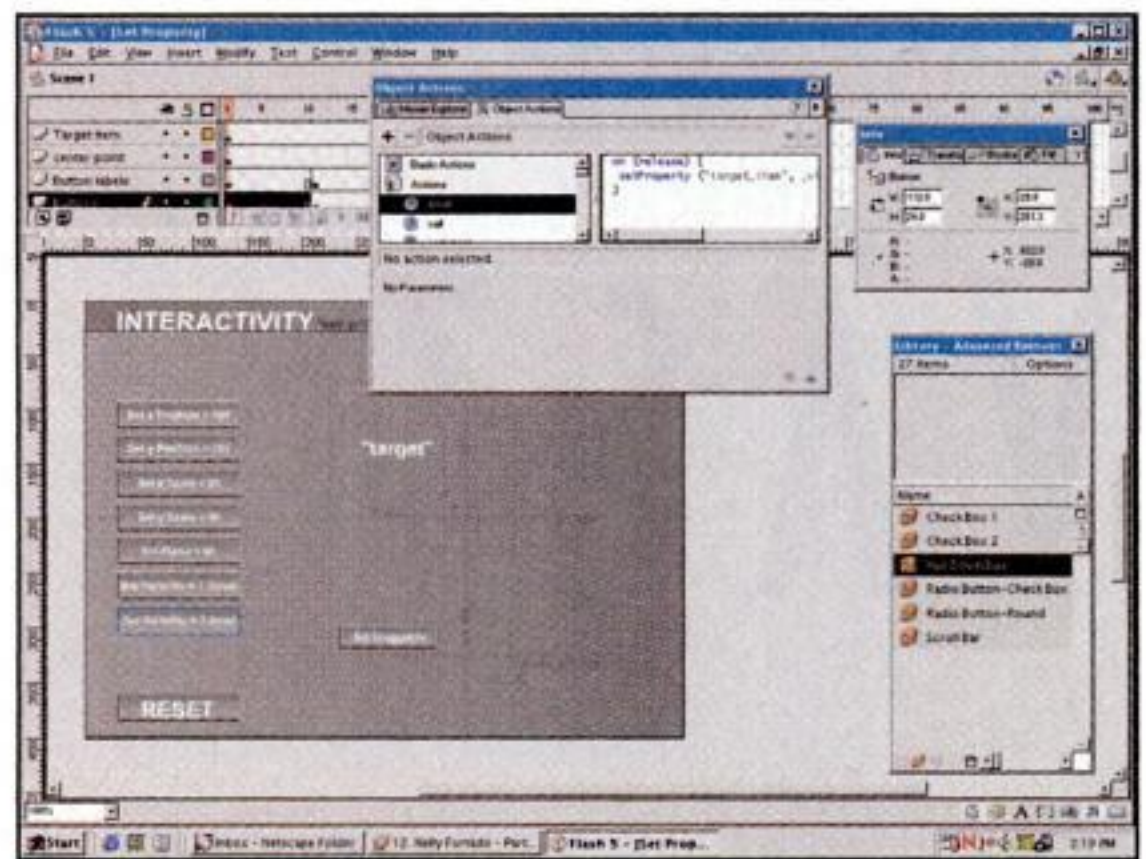
*LiveMotion* does offer one advantage over *Flash* that's worth mentioning: It processes and publishes bitmapped images especially well, and its compression engine for JPEGs and other bitmapped images is phenomenal. For developers who create animation with lots of bitmapped graphics, that's a feature worth considering. Still, with tighter *Freehand* support, greater extensibility, and full site-creation power, *Flash 5* is easily the last man standing when the dust settles and the smoke clears. Nice shootin', Macromedia.

**FLASH PLUSES**  
Opened code allows for new extensibility options  
ActionScripts allow for data driven sites  
Enhanced vector-drawing tools

**MINUSES**  
Bitmap support could be better  
Export options need help

**LIVE PLUSES**  
Handles bitmapped images phenomenally well  
Timeline is object-oriented  
Interface benefits from similarities to *Photoshop*

**MINUSES**  
Could do a better job of handling vector graphics  
Lacking in bells and whistles



Powerful and customizable, ActionScripts are the backbone to the new power of *Flash 5*.

**FLASH 5** **9**  
\$400 full/\$150 upgrade  
Macromedia  
www.macromedia.com

**LIVEMOTION 1.0** **7**  
\$300 | Adobe | www.adobe.com

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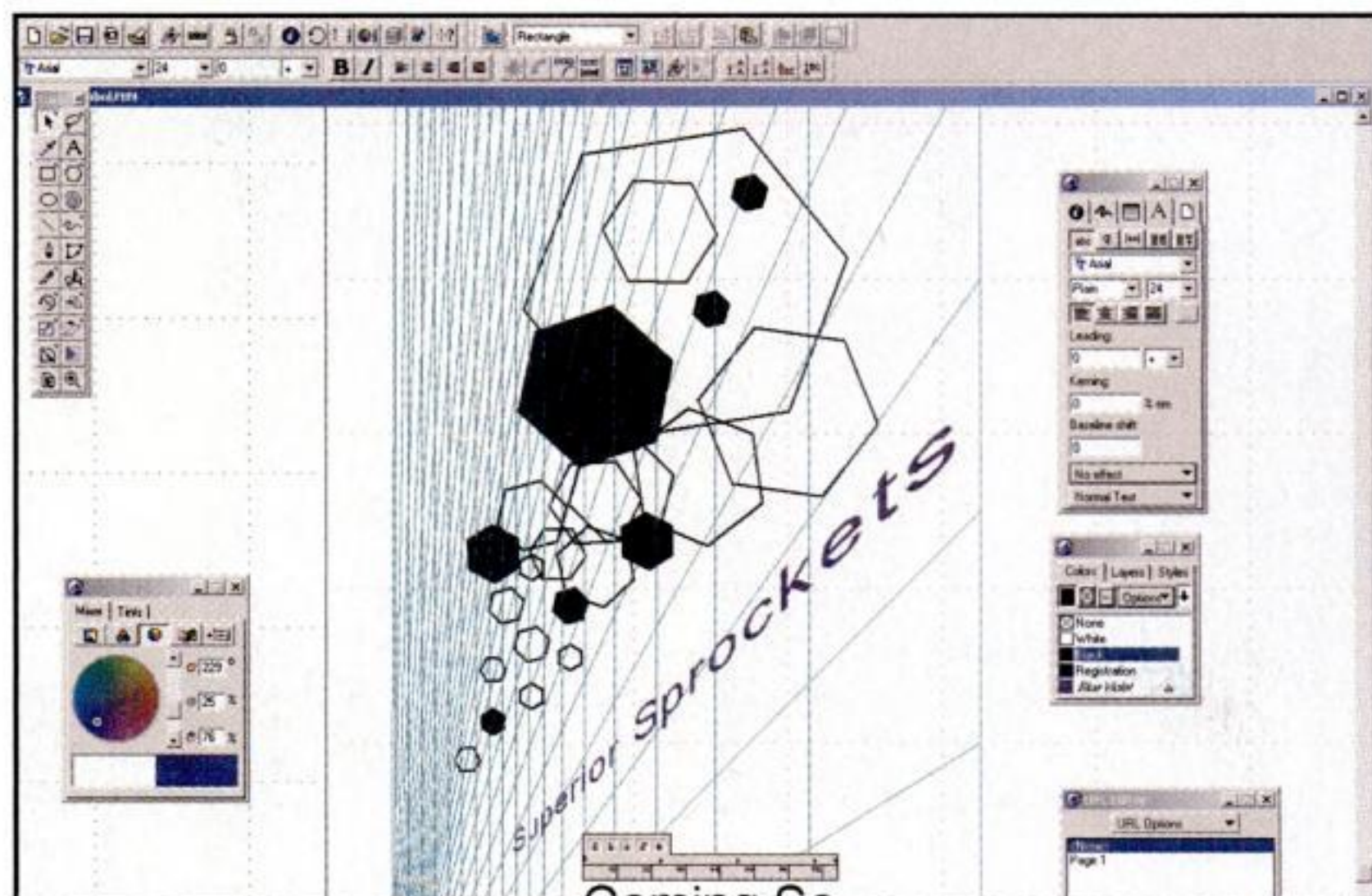


# Adobe Illustrator 9.0 versus Macromedia Freehand 9

Armed with revamped features that are completely dedicated to a web developer's fancy, Adobe's *Illustrator 9.0* and Macromedia's *Freehand 9* are so equally equipped, this standoff ends in a draw.

After years of catering specifically to those working in print, *Illustrator* is finally going the way of the *Flash* format. That's right—it's actually geared toward developing vector graphics for web animation. New features abound, including pixel support as a measurement option, for precise placement of web graphics (previous versions offered only inches and picas, the measurement standards of the print world). There's also web-safe color-palette support for real RGB viewing of illustrations, and a fantastic Pixel Preview Mode allows you to view the way rasterized images will appear on the web. Drop-shadows and glows for buttons are now effortlessly implemented and infinitely editable, and transparency and feathering features make for smoother transitions of text and images when animated. Add all this to the simply phenomenal Live Shape function—which allows you to create shapes that automatically resize in relation to text and other objects when changes are made—and you have a real winner from Adobe.

*Freehand* has long focused on web-friendly vector graphics, and it now offers enhanced page layout and design functions that cater to the layout end of complex site development. The application integrates phe-



**Freehand 9's awesome Perspective Grids allow you to add three-dimensional text and objects to your snazzy site design.**

nomenally with *Flash 5*, with fully customizable export options that seamlessly send *Freehand* files into *Flash*. We especially liked the "potential browser conflict" notification, the cross-application Symbol Library, and the anti-alias display that shows you how finished graphics will look in *Flash*. A Pasteboard function delivers page management functionality, so information architects can lay out sites with ease and make universal changes on the fly. *Freehand* also offers fantastic Perspective Grids that allow designers to create three-dimensional text and images with actual perspective points on a horizon. Add to this an unreal Enveloping tool that lets you distort graphics or text with cool effects, and you have... well, a real winner from Macromedia.

*Illustrator 9.0* doesn't offer *Flash*-compatible vector transparency (your transparencies won't translate to *Flash*), and it won't support multiple page sizes within the same layout—a major advantage of *Freehand* is that you can use it to easily create projects that contain varying-sized pages, as opposed to being locked into the same page size throughout. It's possible to do this with *Illustrator*,

but it's not easy. On the other hand, *Illustrator* boasts much tighter control over text, with a Smart Punctuation box that makes it a snap to include em dashes and smart quotes, for example. It also offers a Master Font control that allows you to create font adjustments at any time, though *Freehand* lets you skew text on a path, and *Illustrator* doesn't.

Shapes drawn with *Illustrator's* pencil and eraser tool are automatically reshaped into smooth bezier curves that can be adjusted at any time; *Freehand's* tools are a bit more crude. *Freehand's* Envelope and Perspective tools offer a new level of creative development, enabling skewing and fanciful or perspective-accurate shapes and text, but *Illustrator's* transparency effects and feathering brushes are far superior for adding artistic touches. To decide between these two, you'll simply have to decide which features you're most interested in using. Not a bad deal, eh, pardner? 🌟

## FREEHAND PLUSES

Perspective and Envelope tools are awesome  
Support for multiple page layouts  
Cross-application symbol library

## MINUSES

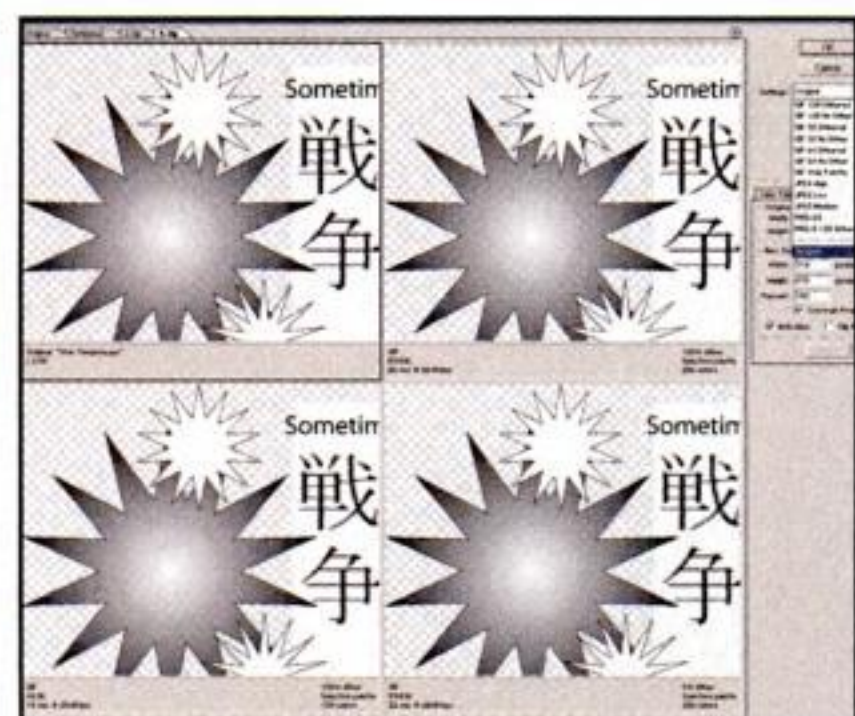
Text control could be better  
Transparency options aren't as robust as *Illustrator's*  
Free-form drawing tools are OK at best

## ILLUST. PLUSES

Pixel Preview mode rocks  
Drop shadows and glows are easy  
Transparency and feathering options abound

## MINUSES

Hefty learning curve  
No *Flash*-compatible vector transparency  
Multiple page support requires serious work



The Pixel Perspective mode in *Illustrator 9.0* lets you see exactly what your images will look like on the web before you export them.

<b>FREEHAND 9</b>	<b>9</b>
<b>KICK ASS! product</b>	\$400 full/\$150 upgrade Macromedia   <a href="http://www.macromedia.com">www.macromedia.com</a>
<b>ILLUSTRATOR 9.0</b>	<b>9</b>
<b>KICK ASS! product</b>	\$400 full/\$150 upgrade Adobe   <a href="http://www.adobe.com">www.adobe.com</a>



# Get to the **finish line** any **freakin'** way you can.



## MIDTOWN MADNESS 2

[www.microsoft.com/games/midtown2](http://www.microsoft.com/games/midtown2)



Microsoft

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# HARDWARE

# Assassin

*A look into the mind of a serial system slayer*



I am a computer killer.

I spent 15 years installing and troubleshooting hardware that didn't work properly. Finally, I decided it was time to fight back, to get pure and simple revenge against recalcitrant hardware such as IRQ-eating network cards, crash-

ing videocards, and hard disks filled with bad sectors.

There are many ways to punish troublesome hardware, and every method produces a different pleasure. Setting network cards on fire looks pretty, while hammering at them relieves stress. Cooking CD-Rs

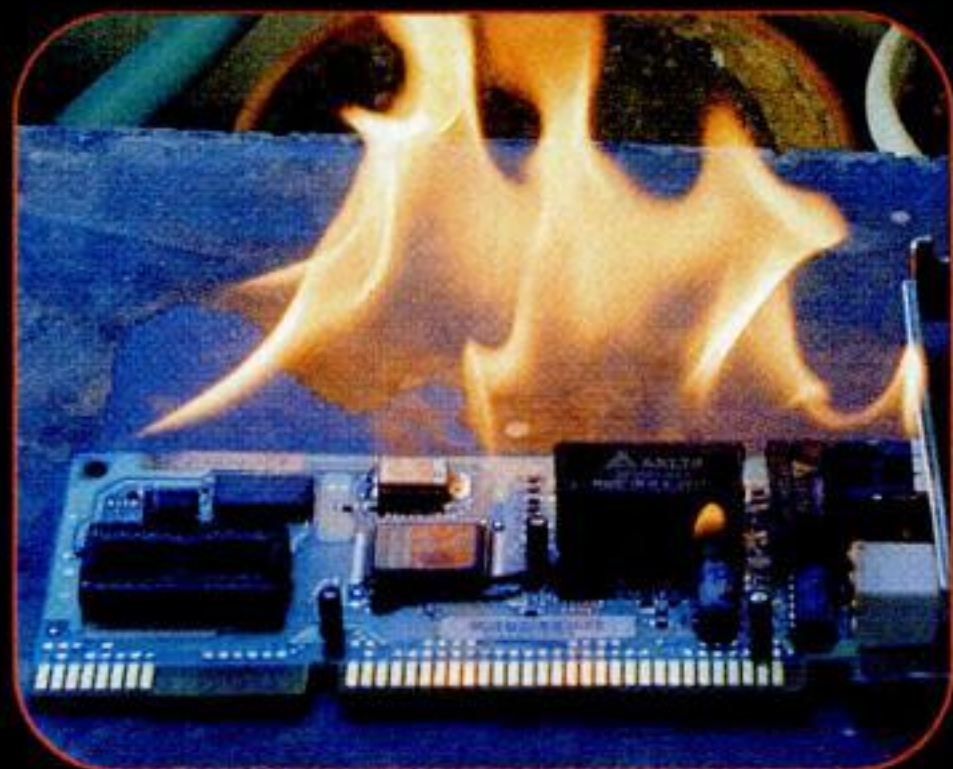
in a microwave is artistic; crushing them under my car's wheels is just plain fun. Cutting up a motherboard and blowing up its chips one by one—that's some of my handiwork to the right—simply sends me into fits of ecstasy.

Some people say I'm sick, but I know I'm not alone. There are lots of people out there, dreaming about murdering their old mice or breaking apart their keyboards. The only difference is that I actually execute.

When hardware refuses to work, I don't throw it out. I blow it up.

It's payback time.

—ShyBe



This nasty network card met a well-deserved death.



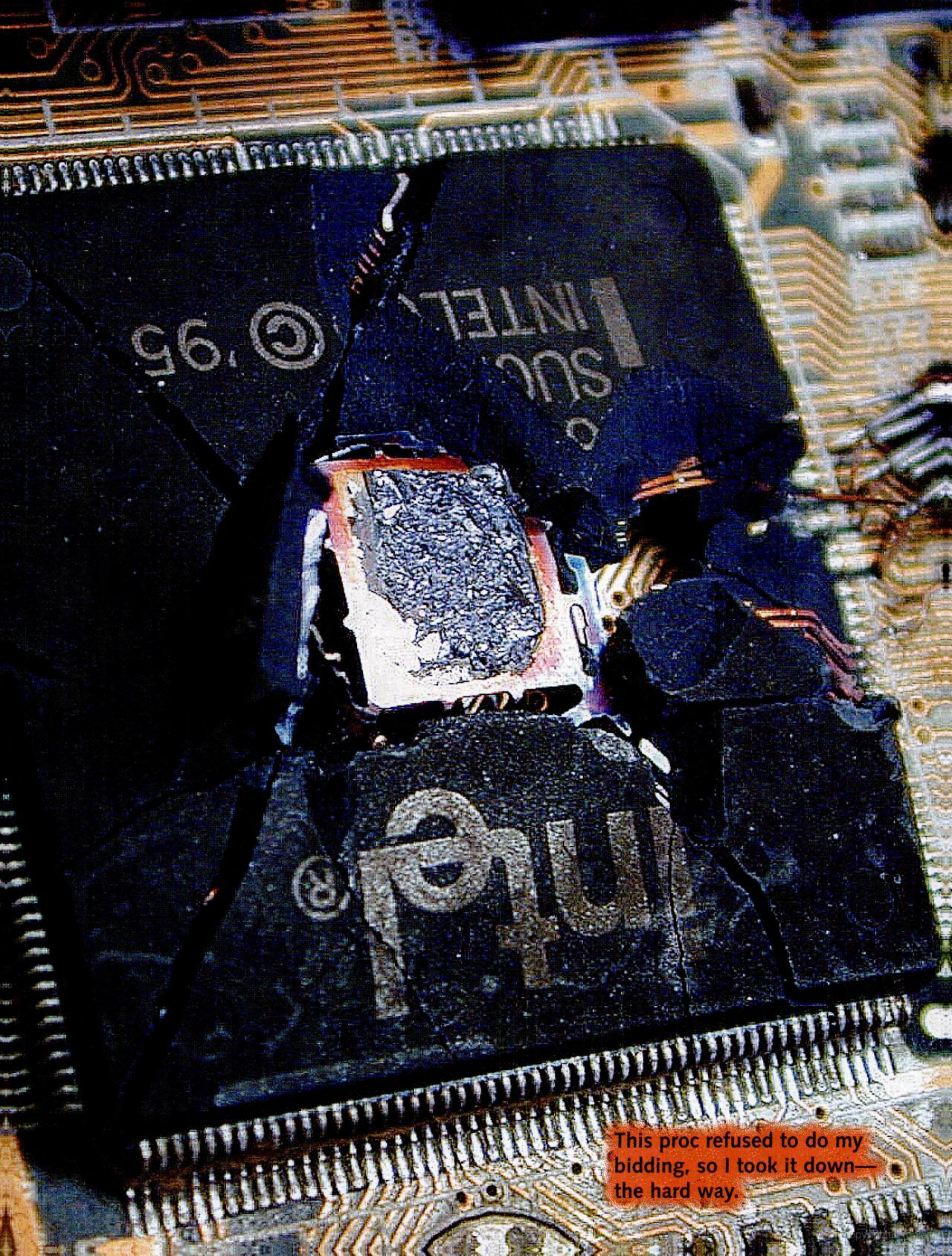
It's a CD-R sauté! Or is that flambé?



Fry, finicky floppy drive, fry!

**WARNING:** Do not try any of the stunts portrayed on these pages at home.

Copyrighted material



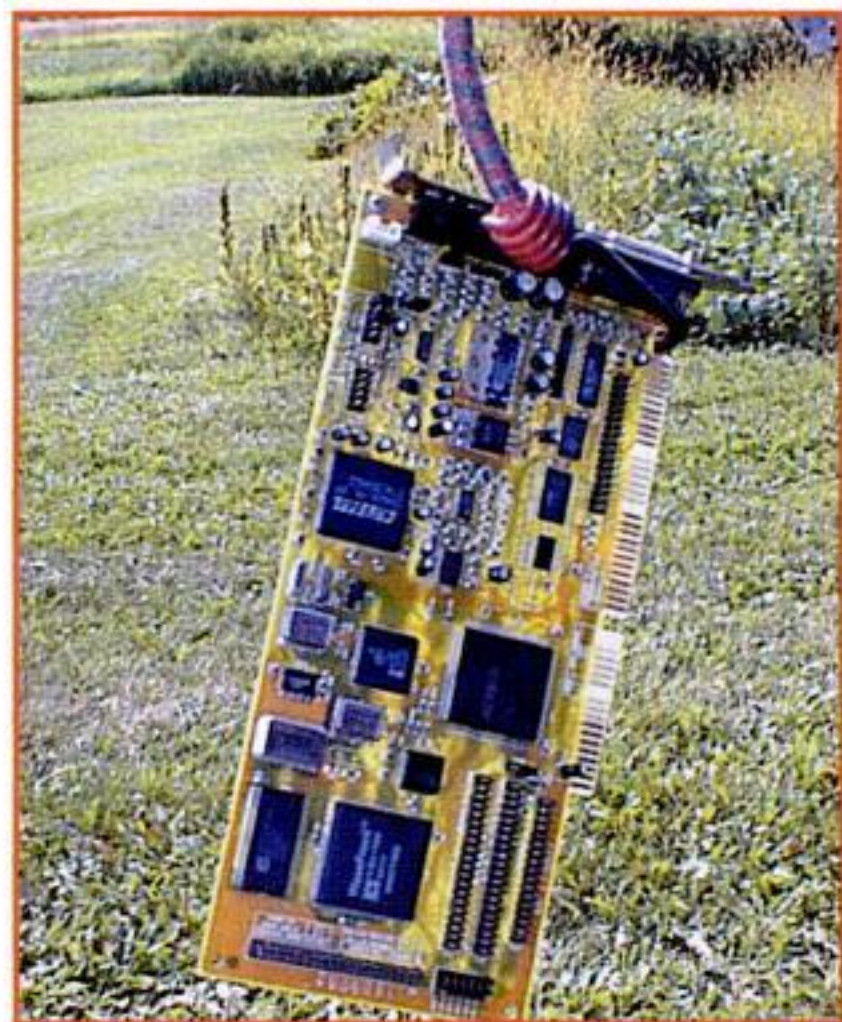
© 1995

INTEL  
SUC

INTEL

This proc refused to do my bidding, so I took it down—the hard way.

# Soundcard Slaying



**1** First, we hang it—a common intimidation technique.



**2** Then we shoot it point-blank with a 20-gauge shotgun. Despite the massive hole in its middle, it still seems to mock us.



**3** A few more shots leave it in pieces, but we decide to finish the job...



**4** For good. Burn, baby, burn! (Special thanks to Artanis and Viridian for the photos.)

# Printer Punishment



**1** Oh, little printer, begging for your life. Forget it! You refused to work properly, and so...

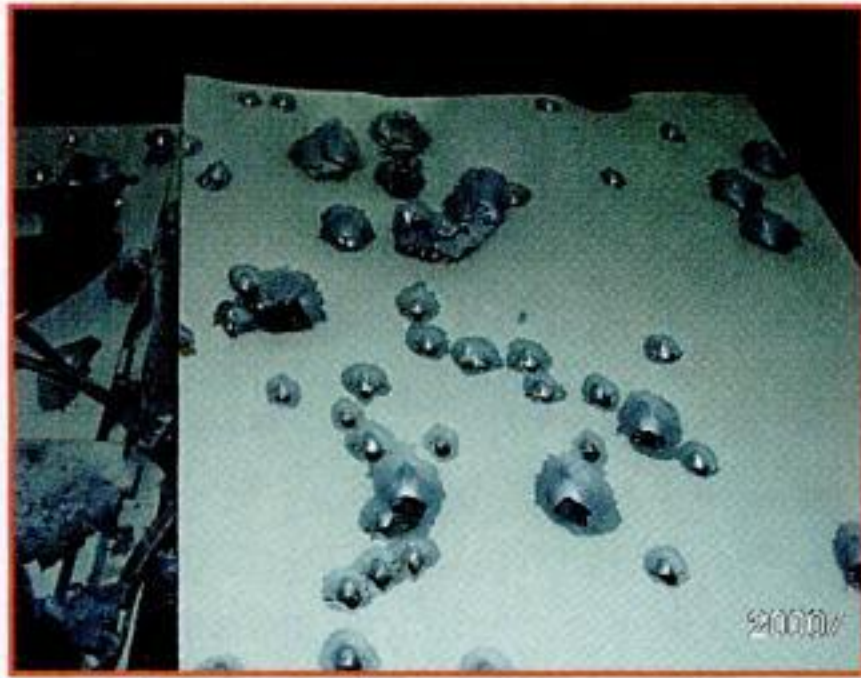


**2** You must die! The first hit from my 20-gauge is the hardest.

# Hard Drive Destruction



**1** It looks so innocent, but this case is hiding a hard drive that refused to perform.



**2** So we brought out the big guns. All 10 of 'em.



**3** From the M16 to the .357 Magnum, this baby felt the full thrust of our anger.



**4** Hard disks? They're not so hard anymore. (Special thanks to Frenkie for taking down this piece of crap.)



**3** Or maybe it's the second shot that's the hardest. See what happens to bad printers?



**4** Boom! No more paper misfeeds from you, my friend. (Special thanks to Artanis for the photos.)

# Mo' Better Memory?

## HOW MUCH RAM DO YOU REALLY NEED?

We're frequently asked, "How much memory is enough?" The answer depends on how you use your PC. If you use one application at a time and do nothing more strenuous than downloading e-mail and cruising goatpr0n.com, your requirements are considerably different than those of someone who downloads MP3s at the same time he's listening to music, burning a CD, and playing *Counter-Strike*. While 64MB of RAM might roast one person's chicken, another would scream bloody murder if you crippled his system with so little memory. On the other hand, stocking your PC with 2GB of RAM is excessive for even the most demanding power user. We decided to find out just how much memory a modern power user really needs in order to fulfill his computing obsession, without journeying into the land of total overkill.

One of the benefits of a massive memory bank is the ability to multitask more effectively—thus, we decided to develop a benchmark that tests a PC's multitasking abilities with different amounts of memory installed. Before we could develop that benchmark, we needed to consider why insufficient memory causes poor performance. Your system's RAM is a finite container that allows very fast access to the information your CPU needs. Because of that, performance is good when all the

information your CPU needs is available in RAM. When your RAM fills up, your computer has to dip into the swapfile on your hard drive for the data it needs. Because your hard drive is an order of magnitude slower than your RAM, your PC's performance suffers anytime it's forced to use the swapfile. Adding more RAM minimizes swapfile access and gives you a swell performance boost.

In our quest for a benchmark that measures the multitasking performance of a PC, we tried running our normal suite of benchmarks while simultaneously running a group of different apps in the background. Unfortunately, our benchmarks refused to run when background apps were active. So, instead, we decided to measure benchmark performance differences when more RAM was added to a PC. We ran *Quake III*, our standard *Photoshop* script, our standard *3DMark2000* benchmark, and a subset of *SYSmark* benchmarks consisting of *Bryce*, *CorelDraw*, *Photoshop*, and *Premier*. We also test-drove a new benchmark that measures the time it takes *Quake III* to load demo001. We ran all benchmarks in Windows 98 SE and in Windows 2000, to compare how different OSes performed.

To find out just how much memory provides optimal performance, we ran the benchmarks with memory configurations ranging from 32MB to 512MB of RAM. We then calculated the percent difference between the scores of each benchmark at

Wonder videocard and an IBM 75GXP hard drive.

## WINDOWS 98

Common wisdom dictates that 128MB of memory should be more than sufficient for Windows 98 users. The justifications for this number range from the humorous ("That's what <insert vendor name here> ships in all their systems") to the ridiculous ("Windows 98 can only address 128MB of RAM"). Let's clear this up right now: Windows 98 is capable of addressing up to 2GB of memory, and most vendors ship with 128MB of memory because that's the least they can get away with on a non-budget system.

What can we say? The results we saw in Windows 98 bucked the common wisdom. First, we discovered that most of our benchmarks wouldn't even run with just 32MB of RAM; the *Quake III*-based marks were the only exception. At 32MB, Windows 98 barely has enough memory for its own needs and has to go to the swapfile for almost all memory requests. It goes without saying—but we'll say it anyway: Those of you riding a 32MB system need to upgrade. Now.

At 64MB, we saw major performance increases over 32MB in both the *Quake III* timedemo and load times. Moving from 32MB to 64MB netted a 28-percent performance increase in the timedemo, and a whopping 45-percent decrease in load time. Our more memory-intensive benchmarks, including *SYSmark* and *Photoshop*, were painfully slow with 64MB of memory and constantly accessed the hard drive during the benchmark runs.

With a 128MB DIMM nestled snugly in our test system, we saw the performance we're accustomed to from a 600MHz Coppermine. Benchmark scores were up at least 10 percent across the board, with one notable exception: Frame rates in the *Quake III* timedemos went up less than one percent from those at the 64MB data point. Still, *Quake III* load time was 10 percent faster with 128MB installed than it was with 64MB installed. This shows that *Quake III* performance is only dependent on memory when there's insufficient memory available to load the *Quake III* executable and texture cache along with whatever other background

### Win98: How Extra RAM Affects Performance

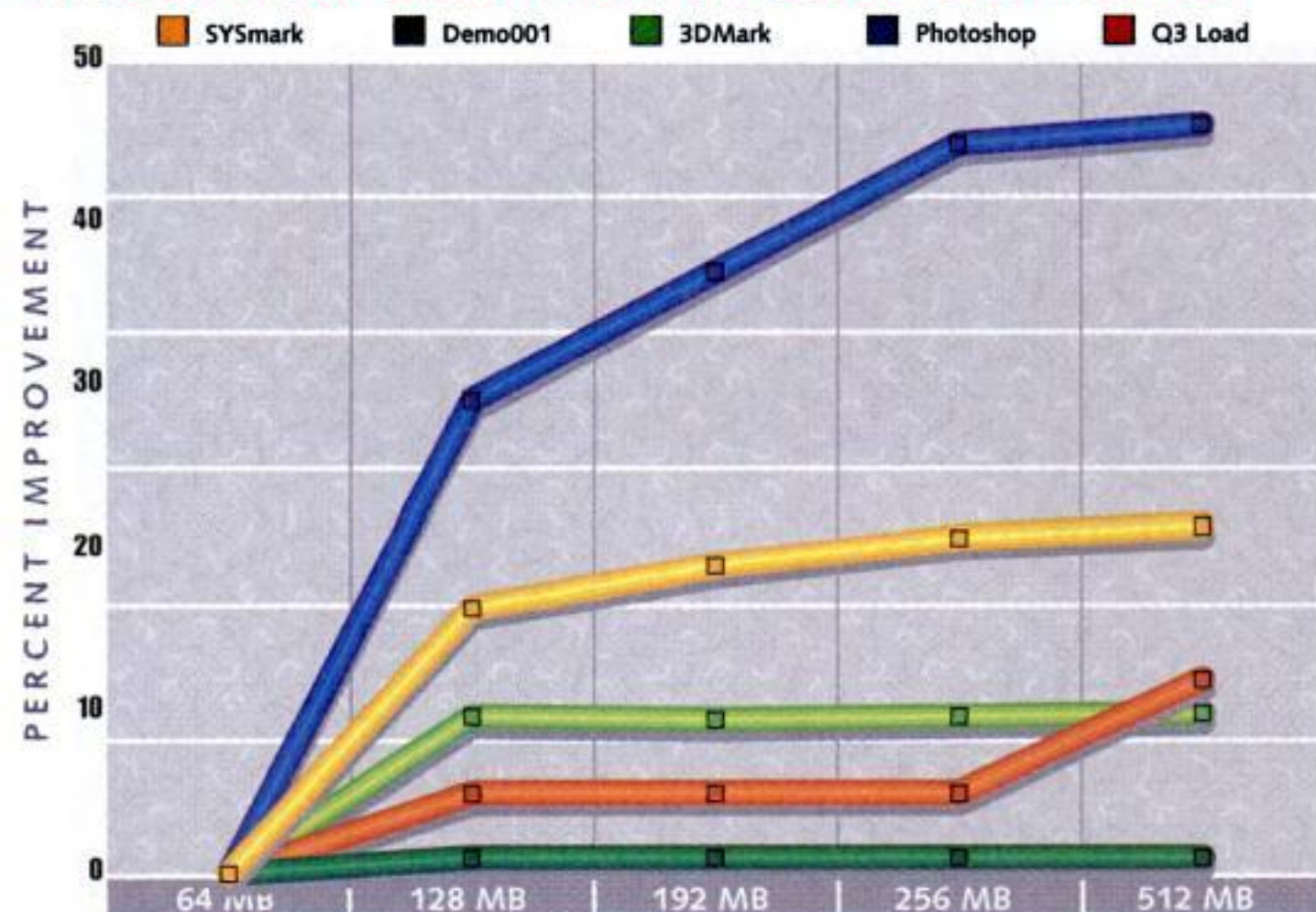


FIGURE 1. As you can see, performance gains in Windows 98 taper off above 128MB of RAM.

64MB and the scores of each benchmark at the other memory configs (see Figures 1 and 2 for results). For the record, we ran all of our benchmarks on an Intel 815-based system fitted with a Pentium III 600E, which runs on a 100MHz bus and uses PC100 SDRAM. We outfitted our test system with an ATI Radeon All-in-

processes are running.

With more than 128MB installed, the only app that showed any performance improvements was *Photoshop*. Because image manipulation requires large amounts of memory, *Photoshop* takes advantage of as much memory as you have—which explains the 20-percent performance increase in our *Photoshop* benchmark when we went from 128MB to 512MB.

If you want your rig to work without accessing the swapfile at all, you need 128MB installed, *plus* enough memory for the apps you always run in the background, such as *ICQ*. A single, additional 64MB DIMM—bringing you to 192MB total—ought to be sufficient for Win98 (and other Win9x) users, although bumping your system to 256MB will give you a little extra headroom.

## WINDOWS 2000

We expected Windows 2000 to perform differently than Windows 98 because Windows 2000 is based on the Windows NT kernel, which was originally designed for high-end servers and workstations typically configured with lots of memory. By using better active-memory management and optimizing the swapfile, Win2000 can fully exploit the capabilities of configurations with more memory.

Because of 2000's higher system requirements, we started this round of testing at 64MB. Our 64MB Win2000 system actually performed worse in *SYSmark* than our 64MB Win98 machine did. Because Win2000 has a larger memory footprint than Win98, there's less overall memory available for other apps to use.

With 128MB installed, we encountered two phenomena. First, due to poorly optimized Win2000 3D drivers, gaming performance didn't scale as well

as it did in Win9x. Second, the rest of the benchmarks scaled differently in 2000 than they did in 98. With 192MB installed in Win2000, *SYSmark* showed a remarkable 70-percent performance increase over a 64MB config. The *SYSmark* score of 524 in Win2000 with 128MB is a better score than we saw in *SYSmark* on the Win98 machine

with 512MB of memory installed. In addition, *Quake III* load times decreased almost 50 percent from 64MB to 128MB. On the other hand, *Photoshop* performance rose only 15 percent over this interval, as opposed to the 30-percent bump in Win98 from 64MB to 128MB. Win2000's increased memory footprint doesn't leave as much free memory for *Photoshop* as Win98 does.

Win2000 benchmark scores continued to improve when we upped the memory to 192MB, but above that, gains slowly tapered off. For most users, performance gains above 192MB weren't commensurate with the cost of the memory added to the system (as is shown in Figure 2). Even Windows 2000 has a point of diminishing returns—the point at which adding more RAM doesn't improve your system's benchmark performance. However, if you take into account the 64MB of background apps that you probably have running at any given time, it seems wise to run your

## Win2000: How Extra RAM Affects Performance

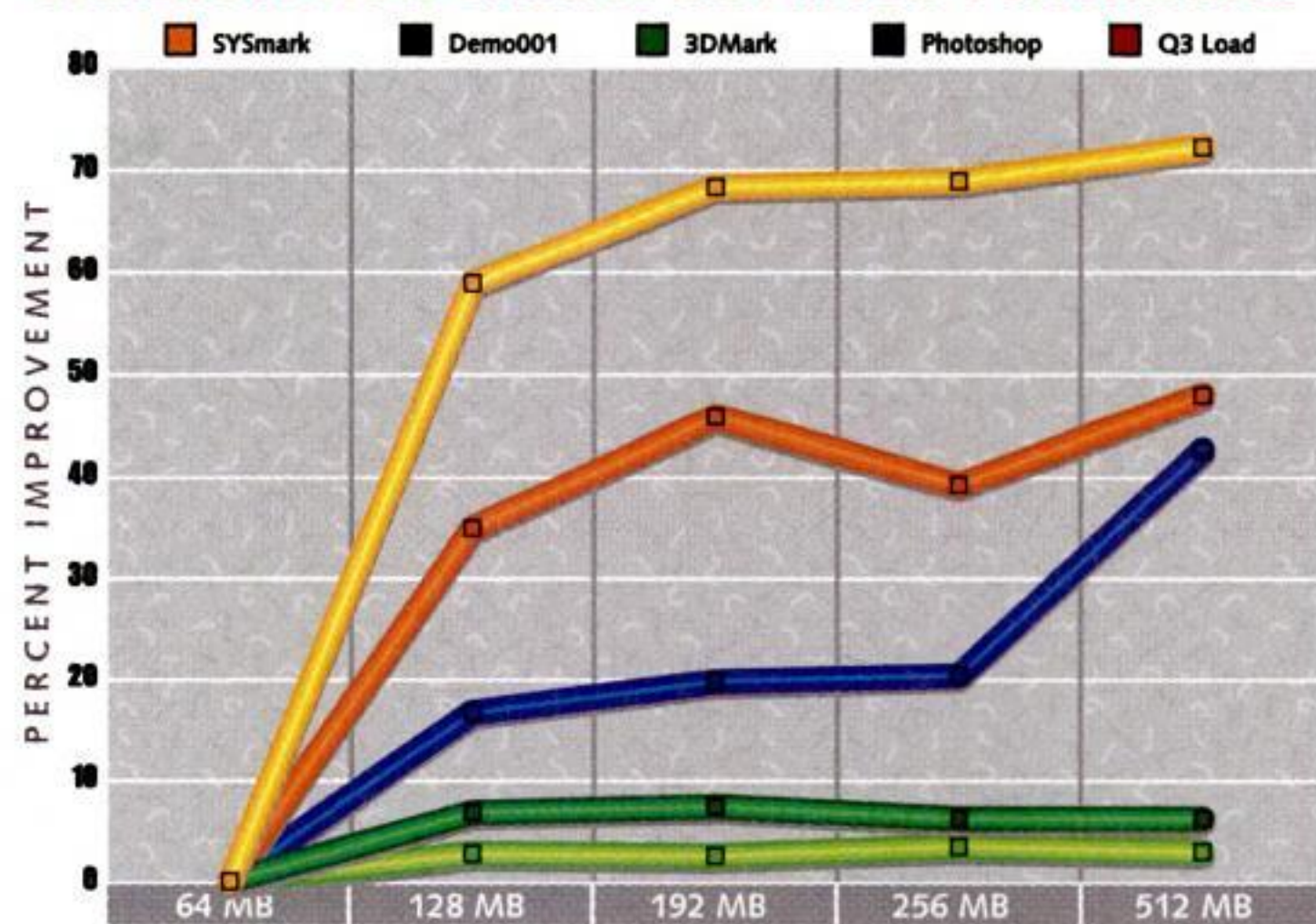


FIGURE 2. As opposed to Win98, performance in Win2000 rises steadily as more memory is added, in all but 3D applications.

Windows 2000 system with 256MB of RAM. Anything less is uncivilized.

## CONCLUSIONS

Our tests suggest that 192MB of RAM ought to be sufficient for Windows 9x users, but to fully utilize the power of Windows 2000, go with at least 256MB. We also discovered some interesting things about the strengths and weaknesses of different Microsoft OSes.

If nothing else, we think we've uncovered the reason Microsoft is foisting Windows ME—the successor to Win98—on home users, and selling Windows 2000 to business users. Windows 2000 is hampered in the 3D arena by unoptimized 3D drivers, as is evidenced by the *Quake III* scores. But Windows 98's performance in business apps—as shown with the *SYSmark* and *Photoshop* benchmarks—can't compete with a Windows 2000 machine.

With 192MB in a Windows 98 machine or 256MB in a Windows 2000 machine, you should have more than enough memory to perform day-to-day tasks. Your needs should inform your choice of operating system. If you're going to tackle memory-intensive tasks, such as video or image editing, you should see gains by moving to 2000. If gaming is your gig, the results are a little less clear-cut. The difference in 3D performance on our test system is entirely due to the lack of optimization in ATI's Win2000 drivers. Different cards may very well perform better in 2000 than the Radeon did. Keep an eye on this space for more info on the differences between 3D accelerator performance in Windows 2000 and Windows 98.

—Will Smith

### RAW DATA

WINDOWS 98					
SYSTEM MEMORY	SYSMARK	Q3A DEMO001	Q3A LOADTIME	3DMARK	PHOTOSHOP
32MB	Fail	42.8fps	57 sec	Fail	Fail
64MB	421	54.2fps	31 sec	53.6fps	343 sec
128MB	490	54.5fps	28 sec	58.8fps	243 sec
192MB	501	54.5fps	28 sec	58.7fps	216 sec
256MB	508	54.7fps	28 sec	58.8fps	189 sec
512MB	511	54.7fps	24 sec	58.9fps	185 sec

WINDOWS 2000					
SYSTEM MEMORY	SYSMARK	Q3A DEMO001	Q3A LOADTIME	3DMARK	PHOTOSHOP
64MB	330	34.4fps	46 sec	44.2fps	320 sec
128MB	524	36.6fps	30 sec	45.4fps	267 sec
192MB	555	36.8fps	25 sec	45.3fps	257 sec
256MB	557	36.4fps	28 sec	45.7fps	255 sec
512MB	568	36.4fps	24 sec	45.5fps	184 sec



“ You used the money for **WHAT?!** ”



“ **WHOA...** too hot! ”



“ We **TOLD** you it wouldn't hurt. ”

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# Symptom | Diagnosis | Cure

It always starts innocently enough—you want to update your video drivers, for instance. Next thing you know, you smell smoke, your PC won't boot, and that sinking feeling overtakes your gut. Doh! Don't panic—The Doctor is here to help. If you're experiencing a PC meltdown, send a note to [doctor@maximumpc.com](mailto:doctor@maximumpc.com). We can't help everyone, however. Please consult the *Maximum PC* forums or vendor tech support if you need assistance ASAP.

## Round and Round the Cable Goes

I've been hearing an awful lot about cable rounding [a procedure that reduces the footprint of ribbon cables for increased airflow inside a case]. The web site <http://sysopt.earthweb.com> shows how to do it, but I want to augment the project by covering the cable with flexible conduit. My question is, would enclosing the cables generate extra heat and negate the cooling benefits of cable rounding? Could it cause harm to my PC? Any advice on cable rounding would be appreciated.

—Mark Crane



Cutting the cable and then "rounding" it will maximize airflow through hot and bothered cases.

Cable rounding is a great trick for overclocking fiends who are concerned about heat build-up inside their cases. Most PCs are home to a rat's nest of ribbon cables that can actually block airflow critical to valuable system components.

The traditional solution has been to keep cable length to a minimum or to tie up the cables in neat bundles and get them out of critical air lanes.

But now the newest fad among the airflow-conscious is to "round" the ribbon cables. This involves separating each individual wire within the ribbon, then re-securing them together in a space-efficient, rounded bundle. The key is to avoid cutting the insulation around the wires themselves. This is especially important because exposed wiring would impair data integrity.

After you've carefully separated the individual wires, you should round them out by wrapping them with tape or putting jacketing around them. Flexible conduit (that is, a plastic hose) will work fine, and there's no need to worry about the wiring generating excessive heat.

You need to be careful not to cut any of the

cabling or you'll ruin a perfectly good piece of equipment. For this reason, it might be wise to purchase cables already rounded for your convenience. If you do it yourself, we suggest prettying up your cable with a nice red bow.

## Dell or Creative Drivers for SB Live?

Both Dell and Creative have told me that I should only use the drivers supplied by Dell for my Sound Blaster Live! Value card, even though Creative has a newer driver version available from its web site. I was told that this is because of differences in retail boards and OEM boards. Is this true? Can I use Creative's drivers on my system?

—John Lynch

It all depends on what you want out of your soundcard. If you like the little control panel that originally shipped with the Dell system, you'll want to stick with Dell's drivers. However, if you think you'll get more out of the Creative drivers, download them and try 'em out. If you don't have a copy of the Dell drivers, you can always download them from Dell's web site if you need to reinstall them.

But the questions you should ultimately ask yourself are, Do I like the soundcard experience I'm currently getting, and Are all my games playing properly? If you're currently a satisfied customer, there's really no

reason to switch drivers unless you simply want to window-shop to see what else is out there. To date, we are unaware of any problems with Dell's OEM driver build.

## SCSI Lane Changes

I've heard conflicting stories about how transfer speeds are affected when you mix different SCSI peripherals on the same chain. One story has it

The newest fad... is to 'round' the ribbon cables [for better airflow].

# ASK THE DOCTOR

### This month:

- ▶ Round and Round the Cable Goes
- ▶ Dell or Creative Drivers for SB Live?
- ▶ SCSI Lane Changes
- ▶ Silencing Case Noise Effectively

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Slow SCSI tape drives on a faster SCSI chain won't slow the entire chain down at all times.

that the whole SCSI chain defaults to the throughput ceiling of the slowest peripheral, similar to the maxim that a chain is only as strong as its weakest link. The other story states that speeds drop only when actually accessing the slow peripherals. What's the truth?

—Matt Myers

While it's true that a slow SCSI device on an otherwise faster SCSI chain slows the entire chain, it does so only under certain circumstances. After the SCSI-2 protocol was adopted, a new feature called Disconnect/Reconnect was built into all SCSI devices. This feature minimizes the occurrence of a slow device dogging the entire SCSI chain.

Let's say you add a slow SCSI-2 tape drive to an Ultra2 Wide SCSI chain that already boasts four Ultra2 Wide devices. When the slower tape drive isn't in use, it effectively "disconnects" itself electrically from the SCSI chain. When the system needs data from the slow tape drive, the drive "reconnects" itself to the chain. At this point, the entire chain slows to the speed of the SCSI-2 tape drive, but only temporarily.

Keep in mind that many tape drives are slower than your grandpappy's Model T. It could take minutes for the drive to find the data on its tape, and even longer to transfer the data to the requesting source. Once again, Disconnect/Reconnect comes into play because most tape drives

"disconnect" themselves while they hunt for the data on their own tape, thus saving the rest of the chain from being stoplighted during the process. Once the drive finds the data, it "reconnects" to the chain and slows everything down again.

So, in essence, both of the stories you've heard about the speed of the SCSI chain are true—but only under certain conditions.

## Silencing Case Noise Effectively

In an October 00 CommPort letter, a reader described lining the inside of his tower case with Dynamat material in order to reduce noise. I'm interested

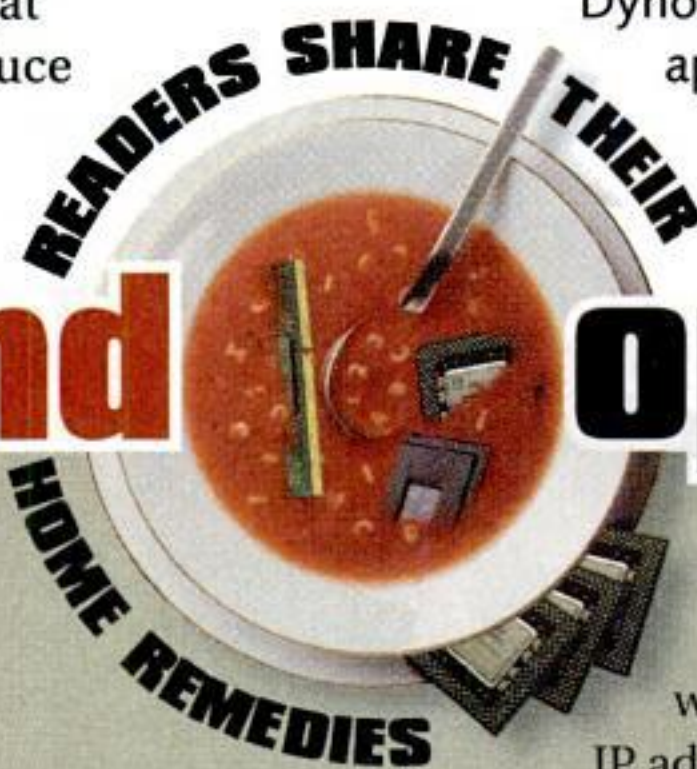
in knowing your opinion of this. Is it a good idea?

—Scott

It's a good idea if your case is excessively loud. However, avoid materials such as spray-on insulation—that stuff can render the entire case useless. The spray-on material tends to expand when drying, spreading into areas that you didn't intend to cover. Dynamat sound-proofing material should conform nicely to the inside of your case and shouldn't give you any problems. If the noise from your case can drown out the sound of jet engines, make sure you get enough

Dynamat for the entire case; simply applying it to the sides won't do much good. ☛

# second opinions



## Drive Letter Dilemma

In reference to the "Drive Letter Dilemma" (October 00), I can't believe you told that guy to format his drive without mentioning FDISK. It sounded very much like the guy would need to run FDISK before he could proceed to formatting.

—Ron Sneed

We were pounded on this question by many readers. The fact is, the letter writer didn't need to FDISK in this particular situation. It was obvious he already had his hard drive partitioned—we know this because Windows 98 wouldn't have even seen the drive otherwise. Granted, our response

would have been much more thorough if we had explicitly mentioned why FDISK wasn't necessary.

## Bogged Bootup Backtalk

In your "Bogged Down Bootup" response (October 00), you should have mentioned that many network cards slow boot times considerably. A lot of NICs

will automatically try to obtain an IP address. If you're not hooked up to a network, Windows will search for a DHCP server, and this will often take a long time. This is a common problem that I've fixed on many machines. If you're not on a network, you can just set an IP address like 192.168.0.1 and a subnet mask of 255.255.255.0

—Jeff Cabralda

Jeff is right. If there isn't a DHCP server available when the system boots, a lengthy delay can occur. But there shouldn't be a noticeable delay if you're being assigned an IP via DHCP. One of the new "features" in Windows 98 is IP auto-configuration, which assigns an address in the 169.254.x.x range when there's no physical network connection. This really speeds up boot times, but can cause problems if auto-configuration holds the network adapter hostage and won't allow it to get a real address when a physical connection is made.

The practical upshot of IP auto-configuration is the same as statically setting your address to an IP in a private subnet (such as the 192.168.x.x range), but without requiring any intervention on the part of the user. A properly functioning DHCP server should assign your computer an IP lease within several milliseconds of your computer's request.

**While it's true that a slow SCSI device on a fast chain slows the entire chain, it does so only under certain circumstances.**

# REVIEWS



## APPLES to ORANGES

This month, we jump the fence to review Apple's PowerMac G4 with dual 500MHz CPUs. To find out how it fared against its PC counterparts, turn the page, and please try to keep the flaming on *MacAddict's* forum to a minimum. Those Mac folk are good people. In other news, this issue marks the end of another year of pure power reviews, leading us to dream about next year's offerings. BitBoys Glaze3D 2400? 140GB optical drives? Your guess is as good as ours. But if this year is any indication, 2001 will be marked by unprecedented technological advances. Finally, we need to mention that last month's Wireball Assassin system did in fact receive a Kick Ass Award but the award logo was inadvertently left off the page.

—JOSH NOREM, REVIEWS EDITOR

### BEHIND THE BENCHMARKS

#### This Month: Soundcards

Even in this age of 1GHz processors, an add-in soundcard still offers a frame rate boost—software audio solutions simply rob too many CPU cycles. To test how well a soundcard can handle the 3D audio tasks of modern games, we use Microsoft's *Software Developer Kit for DirectX 7.1* to stream a mixture of DirectSound and DirectSound 3D to the card. We then check CPU utilization; high utilization generally translates into lower frame rates. While no games today would dare use 32 simultaneous audio streams—such a load would certainly bog your system—we still benchmark cards according to this worst-case scenario.

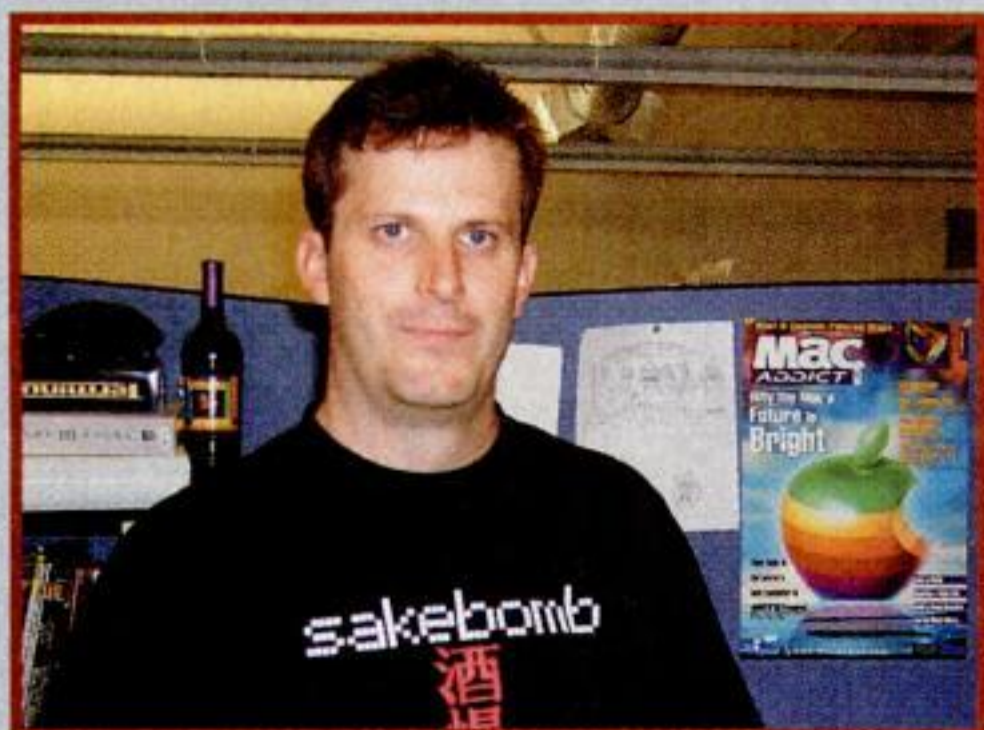
#### Wireball Assassin



## Have We Gone Too Far?

Is it possible that in our never-ending quest for pure PC power, we've actually gone too far? Have we overstepped the bounds of reality?

Are we leading readers toward a level of PC perfection that can never be realized? We asked three impartial third-parties to comment.



Rob Capps, editor-in-chief, *MacAddict* magazine: I actually don't think you're PC enough. You use crude language, crack jokes at other people's expense, and the shenanigans you pull in the Lab just can't be good for the environment.



Chris Anderson, chairman and founder, Imagine Media: I thought you were doing just fine until Accounting notified me of a \$12,000 expenditure for some PC built in September. You must be dreaming if you think we're paying for that.



Fouad Elchemali, Imagine Media deli manager: I don't know about pure PC power, but I would like to know when *Maximum PC* intends to settle its tab.

# A behind-the-scenes look at the Maximum PC Lab and the gearheads who work in it.

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REVIEWED!

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## The New Benchmark Chart Is Here!

We proudly announce revised system benchmark charts. First, we've eliminated two performance tests: *bootMark* and our MP3 ripping/encoding test.

Yes, *bootMark's* day was done. The test basically served as a simple "clock frequency speedometer," and, even in this respect, it only gauged rudimentary integer performance. We nixed it as an official system test because it never told us anything about a processor that we didn't already know. We will still use it, however, in breaking CPU coverage where rudimentary "speedometer" ratings can actually provide some insight.

The MP3 ripping/encoding test originally seemed like a great way to benchmark a CD-ROM drive and

CPU in one fell swoop. But as the months wore on, we discovered that *MusicMatch*, our testing software, was optimized for certain CD-ROM drives and not others. This explains why our testing results never quite jibed with the raw performance capabilities of individual drives. In coming months, we plan to add more benchmarks to our basic system-testing suite, and MP3 ripping/encoding might make a comeback at that time.

Second, we've changed the essential design of our benchmark chart to make it easier to read and interpret. The example chart below should explain everything quite nicely, and you can check pages 74 and 75 for real-world examples.

## HOW TO READ THE CHARTS

The scores in this column are achieved using our "zero-point" desktop system, which was configured with state-of-the-art components in May 2000 (we also configured a zero-point notebook at that time). The scores of the zero-point system are directly compared to the scores of the system under review. See [www.maximumpc.com/benchmarking](http://www.maximumpc.com/benchmarking) for the specifics of our zero-point desktop and notebook.

Here we illustrate the performance differentials between the zero-point system and the system under review. For example, if the review system performs 50 percent faster than the zero-point system in a specific benchmark, the green bar will extend half-way across the chart; the difference will be noted numerically as well.

This column identifies the benchmarks that were run on the system under review. For information on each specific test, go to [www.maximumpc.com/benchmarking](http://www.maximumpc.com/benchmarking).

TEST	ZERO	SYSTEM	DIFFERENTIAL	RANK
SYSmark	300	450	50.0	3rd Seed
Hard Drive	25MB/s	12.5MB/s	-50.0	Unseeded
CD-ROM	40x	60x	50.0	LEADER
Photoshop	250sec	125sec	-50.0	Unseeded
Direct3D	40fps	60fps	50.0	3rd Seed
OpenGL	40fps	20fps	-50.0	Unseeded

The scores in this column reflect the actual performance levels achieved by the system under review. If the system under review beats the zero-point system, the score is printed in green. If the system under review is trumped by the zero-point system, the score is printed in red.

This column notes how the review system's performance compares to that of other products we've reviewed in each benchmark category. For example, if the system under review posts the third highest *SYSmark* score we've ever seen in the Lab, it will be assigned a 3rd Seed ranking and receive a bronze background color. New Lab records will be assigned a Leader ranking and receive a gold background color. Ranking below 3rd Seed will be marked as Unseeded.

Rankings for hard drive, CD-ROM, Direct3D, and OpenGL are cross-referenced with both system reviews and individual component reviews. So, for example, if the system under review includes a videocard that's faster than any videocard that's ever appeared in another system review, but slower than a videocard that's appeared in a stand-alone videocard review, the system will receive a 2nd Seed videocard ranking.

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Hardware photography by  
**AARON LAUER**

# Power Mac G4

TWO CPUS FOR THE PRICE OF ONE



**Apple's dual-500MHz G4 machine is really fast—for a Macintosh.**

What do you do when your short-pipelined architecture doesn't let you squeeze any more megahertz out of your CPU? You offer two CPUs for the price of one.

That's the approach Apple is taking with its fastest desktop computer to date. The new G4 includes two Motorola 500MHz PowerPC G4s, or "twice the Pentium-crushing power" of the previous G4. Indeed, Apple's new SMP rig is one fast Macintosh. But it's a shame that Steve Jobs' mouth is writing checks that his hardware can't cash. Though the box might feature dual procs, the second CPU is about as productive as a college buddy whose been crashing on your couch for six months.

The problem is that Apple doesn't currently ship an OS with dual-proc support. There are a few applications—*Photoshop* being the most notable—that are actually able to use the second CPU through a software sleight-of-hand. This is good news for a subset of users, but it doesn't mean jack to every other G4 owner who must wait until Apple releases the SMP-aware OS X sometime in 2001.

Nonetheless, the G4 smokes the G3 Mac that we looked at last June. That 400MHz G3 took 445 seconds to render an image in *Inspire3D*. The dual 500MHz G4 rendered the same image in 342 seconds, a significant leap. Of course, the debate isn't G3 versus G4. It's G4 versus PC. To carry the flag for PCs, we turned to our very own Dream Machine 2000. Equipped with half a gig of PC800 Direct RDRAM, dual 1GHz Pentium IIIs, 64MB GeForce2, 15,000rpm SCSI hard drive action, and Windows 2000, it's the fastest PC in the Lab and the most obvious

competitor for the fastest available Mac.

DM2K pounded the dual-G4 like Mike Tyson in his prime. In *Inspire*, with both procs chugging along, the Dream Machine passed the checkered flag at 119 seconds; as previously mentioned, the G4 needed 342 seconds. To even the playing field a tad, we underclocked the Pentium IIIs to 533MHz, and, for one run, plucked out one Intel CPU and ran DM2K in single-proc mode. So is a dual-G4 system (with an SMP-unaware OS) faster than a roughly equivalent-speed single P-III? Yes and no. Just check

out the benchmarks in this spread. Of course, we must note that our *Photoshop* action scripts don't favor SMP of any flavor, nor do they favor Apple's AltiVec or Intel's SSE instructions.

The most brutal beatdown for the SMP G4 came in *Quake III* testing. The new G4 uses the same videocard used in last year's G3, an ATI Rage 128. This card is *how* old? Old enough to lag behind the P-III 533 GeForce2 combo by 70.7fps. We do need to mention that Apple has since added ATI's faster Radeon to the mix. Our box came with the moldy oldy, though.

Not all is bunk with the G4, however, as it includes some amenities that a PC should offer as standard fare. Like the G3, the G4 uses 64-bit PCI slots (though only three are

## UNDER THE HOOD

### THE BRAINS

CPU	Two 500MHz Motorola PowerPC G4s
L2 cache	1MB
RAM	256MB PC100 SDRAM (1.5MB max)
Motherboard	Apple Proprietary
Drive bays	Two 5.25-inch, one 3.5-inch
I/O ports	Two USB   Two FireWire

### DISPLAY

Video	ATI Rage 128
Monitor	17-inch Apple Studio Display
Refresh@max res	65Hz@1600x1200

### STORAGE

Hard drive	Maxtor 7,200rpm DiamondMax Plus 40GB
DVD	DVD-RAM
CD-RW	None

### NETWORKING

Fax/modem	Onboard Gigabit Ethernet
-----------	--------------------------

### SOUND

Soundcard	Cirrus Logic CS4212
Speakers	Onboard

### MISC

Two 400Mbps IEEE 1394   10/100/1000   Ethernet
--

### THE BUNDLE

Apple OS 9
------------

BOOT 0:59 DOWN 0:05

## PLUSES

- Side-opening case
- 64-bit PCI
- Gigabit Ethernet
- Onboard IEEE 1394
- Unique appearance—if that's your bag, baby

## MINUSES

- No OS Support for SMP
- Only three PCI slots
- Pathetic speakers
- Obsolete graphics
- No CD-RW

## DARE TO COMPARE

MANUFACTURER	DUAL 500MHZ G4	DUAL 1GHZ P-III	DUAL 533MHZ P-III	SINGLE 533MHZ P-III
<i>Inspire3D</i>	342 seconds	119 seconds	209 seconds	383 seconds
<i>Quake III</i>	12.5 fps	89.5 fps	76.1 fps	83.2 fps
Adobe <i>Photoshop 5.5</i>	135 seconds	93 seconds	168 seconds	179 seconds

## MAXIMUM PC VERDICT

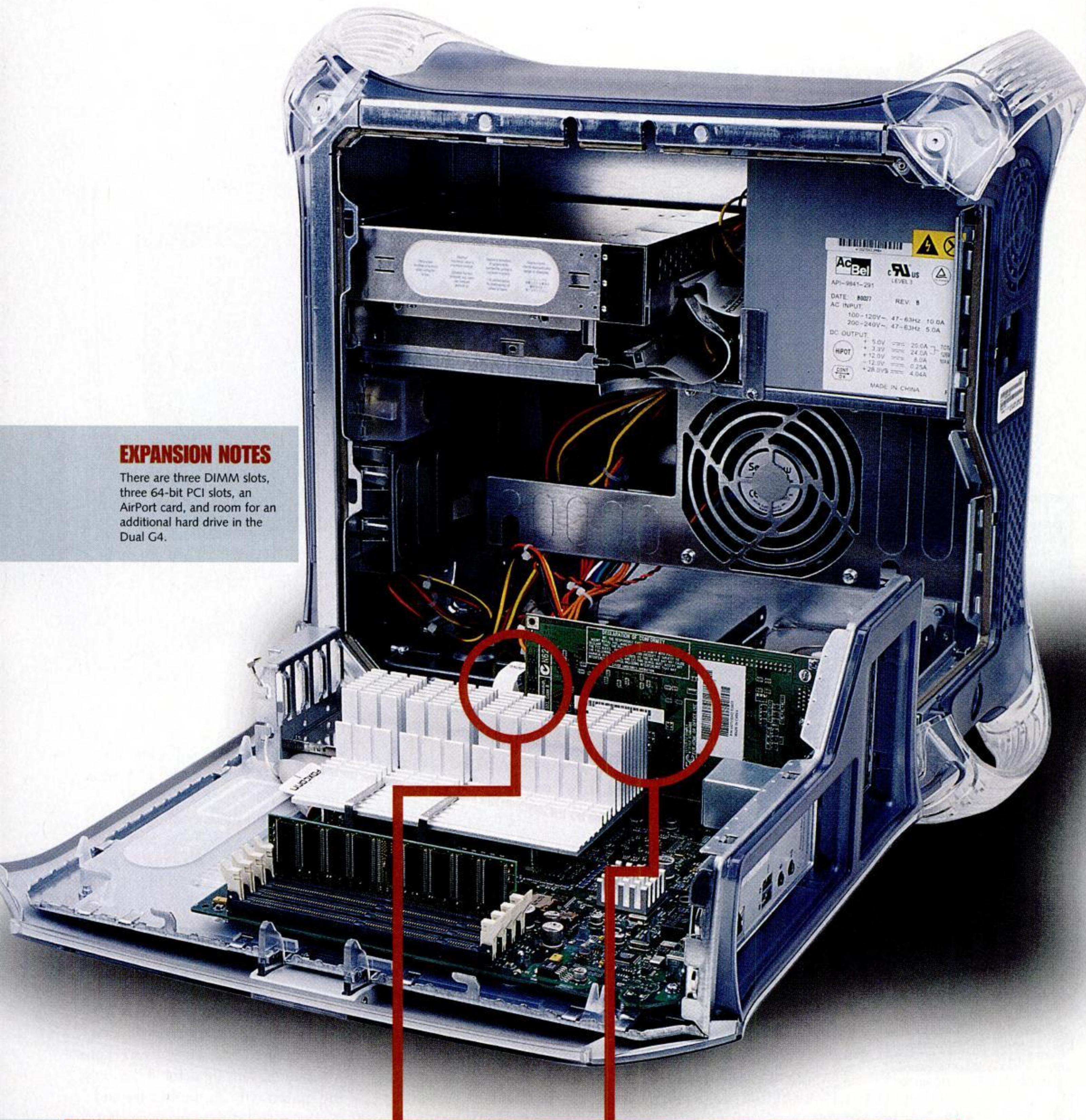
6

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—Gordon Mah Ung

desktop systems | notebooks | videocards | soundcard | storage | scanner | printer | input devices | network | misc

MAXIMUM PC DEC 00



**EXPANSION NOTES**

There are three DIMM slots, three 64-bit PCI slots, an AirPort card, and room for an additional hard drive in the Dual G4.



**Sleek and gray.** Apple's optical mouse is a big improvement over the "puck," but how are you supposed to launch flak grenades in *UT* without a second mouse button?



**Twofer one.** Since the PC world is now at 1.5GHz, Apple decided to hold a "buy one, get one free" sale with their 500MHz G4s.



**Where's the Radeon?** Early Dual G4s came with death-warmed-over ATI Rage 128 cards. Apple has since begun shipping ATI Radeon standard. If you got an early G4 like we did, you should be pissed.



**It folds open.** Everyone knows Apple users love to upgrade frequently, so Apple designed the G4's folding case door with this in mind. Just pop the door open and add antiquated components at will.

# Apple Cinema Display

WE'VE NEVER SEEN ANYTHING LIKE IT



You need to know about the Apple Cinema Display. You might not be able to afford it, and with its current interface, you can't hook it up to your PC. But this bad boy represents the pinnacle of LCD technology, and you need to know just how awesome a flat panel can be.

The Cinema Display boasts an outrageous 22-inch diagonal viewing area. This is just a half-inch smaller than Sony's state-of-the-art FW900 flat-screen CRT—a truly imperceptible difference in screen real estate. What's more, the Cinema Display consumes a minuscule desktop footprint (its width and depth tops out at 23.1x 8.3 inches) and releases no noticeable heat whatsoever. If you're sick of the size, weight, and heat of CRTs, but require the largest screen possible for your design work, the Cinema Display is the only game in town.

All that screen size wouldn't mean jack if the panel suffered from visual quality issues, but pixel by pixel, the Cinema Display offers superb performance that's equal to, if not better than, the SGI 1600SW, a flat panel that received a perfect 10 in our January 1999 issue. The Cinema

Display (like all the best flat panels) employs a pure digital interface, which precludes any video noise that might result from analog-to-digital conversion. Sure enough, the panel suffers no picture shimmer whatsoever.

The Cinema Display also boasts bright, lush color with true 24-bit color accuracy. Lesser flat panels claim 16-bit color, but some can't even achieve this low spec, leaving high-quality digital images a dithered mess. But with 24-bit talent, the Cinema Display

can be your favorite new *Photoshop* buddy (which is exactly what Apple is aiming for). Likewise, the true-color screen also offers amazing pixel response. That is, the pixel triads can twist from one color to the next with enough speed to preclude ugly



**With a 22-inch screen expanse, the Cinema Display will take your breath away. And dig the manly, carbon-fiber-ish body styling!**

streaking effects during full-motion video and fast-paced 3D gaming. The Cinema Display thus becomes a viable platform for video editing in Adobe *Premiere*.

As a 3D gaming monitor, the Cinema Display does suffer a compromise: Because it runs at a "native resolution" of 1600x1024, the panel simply runs at too high a resolution for playable frame rates. Of course, all LCD panels run best at their highest resolution (at lower, non-native resolutions, pixel interpolation will make everything blurry). But lesser panels are typically fixed at 1280x1024 or 1024x768, and thus are more amenable to today's resolution standards. That stated, no one should ever buy a flat panel if gaming is job one; these devices are intended for office apps and content creation.

The SGI 1600SW also runs at 1600x1024, but offers 110 pixels per square inch to the Apple's 85. You give up a pinch of fine detail

with Apple's lesser DPI spec, but your desktop icons and text appear larger (if not closer to accurate scaling). And the Cinema Display bests the SGI panel's diagonal screen size by a clean 4.7 diagonal inches, which looks a lot bigger than it sounds on paper.

Bottom line: The Cinema Display will knock you down with its lush, decadent expanse of pristine pixels. And we actually dig the faux carbon-fiber body work; a nice break from Apple's candy-coated color scheme. Because the Display uses its own proprietary digital connector, it can only be mated with Apple's Cube and SMP G4. But it does represent state-of-the-art flat panel technology, and we can only hope that some of its features appear in upcoming PC products. Flat panels are extremely expensive, so when you finally do pull the trigger to buy one, at least now you know what to aim for.

—Jon Phillips

## PLUSES

- Largest LCD screen expanse
- Largest LCD resolution
- No dithering!
- Great screen purity (no darkening on borders)
- Fast pixel response
- Digital interface

## MINUSES

- Digital interface is proprietary

## THE SPECS

### SCREEN SIZE

22-inch diagonal

### NATURAL RES

1600x1024

### COLOR DEPTH

24-bit

### USB HUB

Two-port, self powered

### INTERFACE

Apple Display Connector (carries video, USB, and power signals on same line)

### SIZE

18.9x23.1x8.3-inches (HxWxD)

### WEIGHT

25 lbs

MAXIMUM PC VERDICT

10

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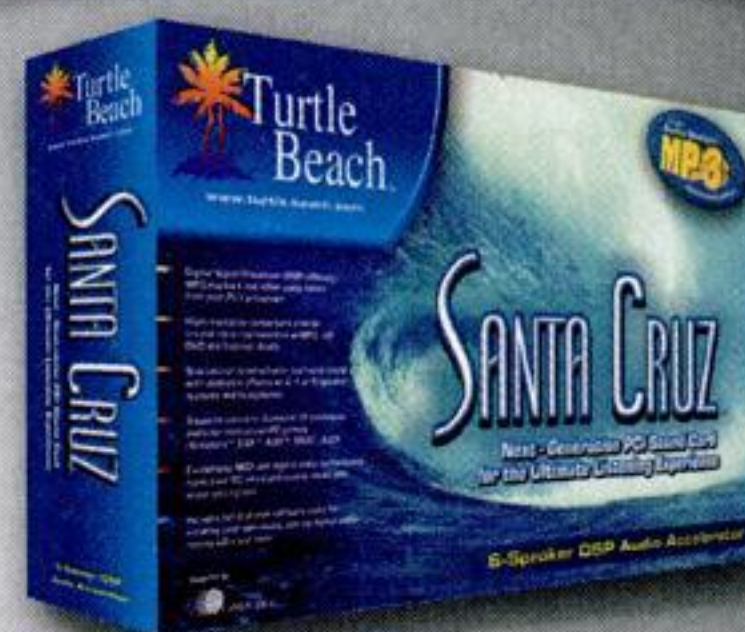
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# Laser Printer Lowdown

## SAMSUNG AND NEC GO HEAD TO HEAD

Laser printers of the past were monstrous contraptions that occupied too much real estate, took too long to warm up, and were so prohibitively expensive that they were generally reserved for big business. But times have changed. Ladies and germs, say hello to a new breed. Today's laser printers are small, fast, and actually affordable!

Before we begin the head-to-head comparison of the **Samsung QuikLaser 6100** and the **NEC SuperScript 1450**, let's take a look at what they have in common. Both printers print exclusively in black-and-white, operate at the same speed, and are capable of cranking out 12 pages per minute. Both warm up in less than a minute, offer the option to tweak or enhance text and graphics, and sport a toner-saving feature (similar to a draft setting on inkjets). The toner cartridge for both machines is a one-piece unit that's very easy to replace, and the toner for both printers is rated (at about five percent coverage for text) at roughly 5000 pages before it needs to be replaced. Both of these laser printers also offer USB and parallel port interfaces. Whew.

Similarities aside, deciding between these two printers is a matter of deciding which trade-offs to make. Both laser printers can be networked (an optional network card is available for the Samsung), but the Samsung's 100MHz RISC processor outpaces the



**Samsung's QuikLaser 6100 is small, expandable, and capable of producing prints so fresh we had to slap them.**

NEC's 66MHz chip, so the Samsung is able to multitask more effectively. Both have an ample paper tray, though the NEC has a 550-sheet capacity while the Samsung is limited to 250 sheets. Both also come with a 4MB buffer, which is more than enough for basic office tasks, but the NEC's memory is only upgradeable to 68MB, while the Samsung can be expanded to 76MB. Expanding the memory allows the printer to store additional incoming print jobs while you're printing. The Samsung also boasts a print resolution of 600dpi compared to the NEC's 1200dpi, but the Samsung includes a proprietary Resolution Enhancement Technology (RET) feature that cranks dpi up to 1200 for pictures or detailed presentations, and offers both text and photo enhancement options in the setup menu.

The real trade-off is in image quality. Both produce razor-sharp text and edges on standard 12-point type and are more than adequate for printing memos, written documents, and traditional *PowerPoint* presentations. But the Samsung has a knack for detail and intricate patterns that the NEC can't touch. Conversely, the Samsung is spotty in areas of black

and transitional gray, and exhibits banding and spotting in instances where large lines and color detail are concerned. The NEC handles the darks, shadows, and layers of straight black flawlessly and seems to be the broad-stroke printer of choice versus the more refined, detailed (if less saturating) strokes of the Samsung.

The Samsung's superior image quality is likely the result of its proprietary RET feature that allows the native dpi of 600 to be jacked up to 1200dpi for pictures or detailed presentations. The Samsung also has a filter that caters to either vector or rasterized graphics, which is handy for people using prints of web graphics versus illustrations.

It really comes down to preferences. Both are perfectly suited for the home office, and their efficiency and size make up for the little quirks. Price, of course, is a pretty even playing field for both printers. But for expandability and networking, the Samsung is the winner, by a hair.

—Geoffrey Visgilio



The NEC SuperScript 1450 offers 1200dpi resolution in an affordable package.

### THE SPECS

#### SAMSUNG LASER HEAD

##### MAX RES

600dpi

##### RATED SPEEDS

12ppm

##### PAPER TRAY CAPACITY

250 sheets (plus 100-sheet multi-purpose tray)

##### INTERFACES

Parallel | USB

##### SOFTWARE DRIVERS

Windows 3.1x, 95, 98, NT 4.0, 2000, DOS

### THE SPECS

#### NEC LASER HEAD

##### MAX RES

1200dpi

##### RATED SPEEDS

12ppm

##### PAPER TRAY CAPACITY

550 sheets (plus 100-sheet multi-purpose tray)

##### INTERFACES

Parallel | USB

##### SOFTWARE DRIVERS

Windows 95, 98, NT 4.0, 2000

### SAMSUNG PLUSES

100MHz processor  
Vector/raster graphic filter  
Memory expandable to 76MB

### MINUSES

Doesn't handle blocks of black or gray well

### NEC PLUSES

Higher dpi, less money  
Phenomenal color saturation  
Zippy warm-up times

### MINUSES

Doesn't handle fine details as well  
Slower processor

### SAMSUNG QUIKLASER

\$600 | Samsung  
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8

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DEC 00 MAXIMUM PC

67

# Intel Mobo A-Go-Go

## REVISED BX BOARDS BATTLE 815 UPSTARTS FOR BRAGGING RIGHTS

Intel's BX has been the core-logic chipset king for the last two years. The old warhorse should be obsolete by now, but vendors continue to add "enhancements" to BX boards—support for [ATA/66](#), [ATA/100](#), and onboard [RAID](#), to name just a few soldered-on amenities. And now mobo vendors are essentially guaranteeing 133MHz frontside bus support, going so far as to tag their products as "BX133" boards—despite Intel not officially endorsing BX at 133MHz. So how do the latest BX boards hold up against the new 815 mobos, which offer a 133MHz FSB with no questions asked? Let's take a look-see...

### ABIT PLUSES

Easily adjustable voltage  
Highly overclockable  
Impressive RAID scores

### MINUSES

Poor placement of LED block  
AGP 2x max

### SOYO PLUSES

29 different bus speeds  
Very fast

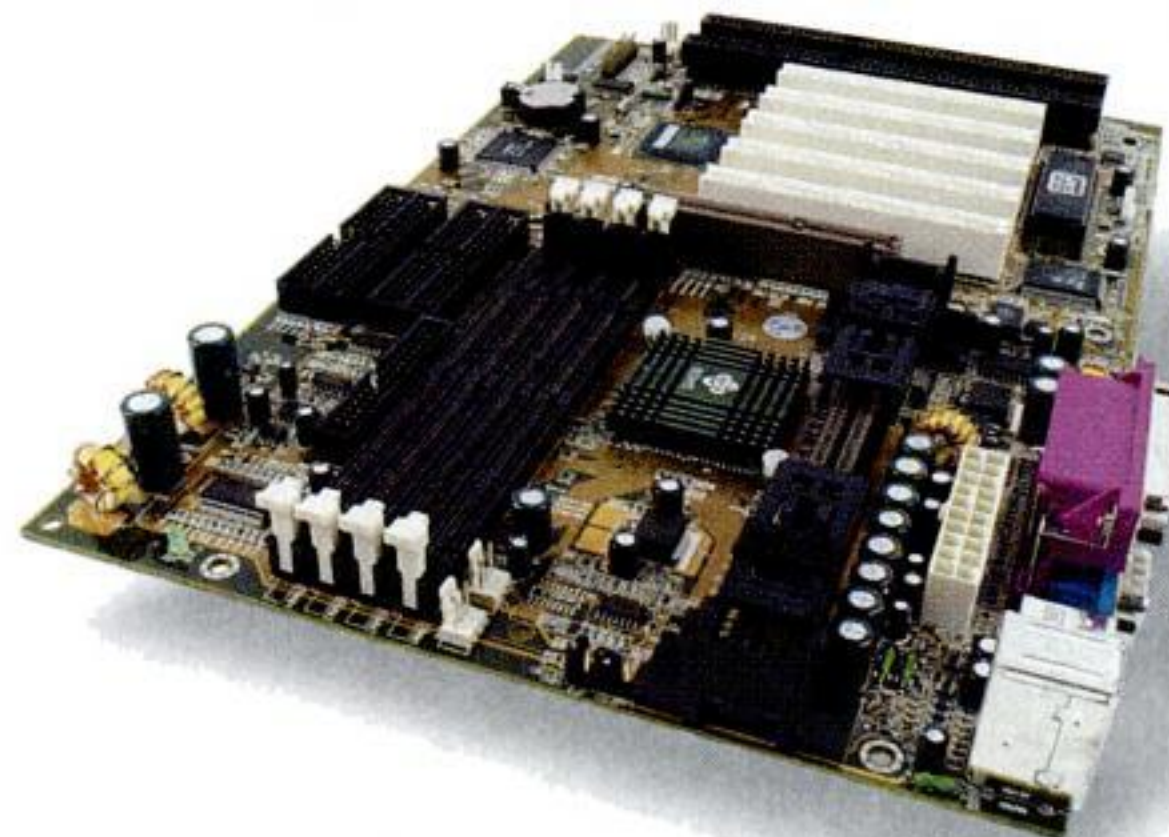
### MINUSES

No voltage adjusting for overclockers  
AGP 2x max  
Horrible RAID scores

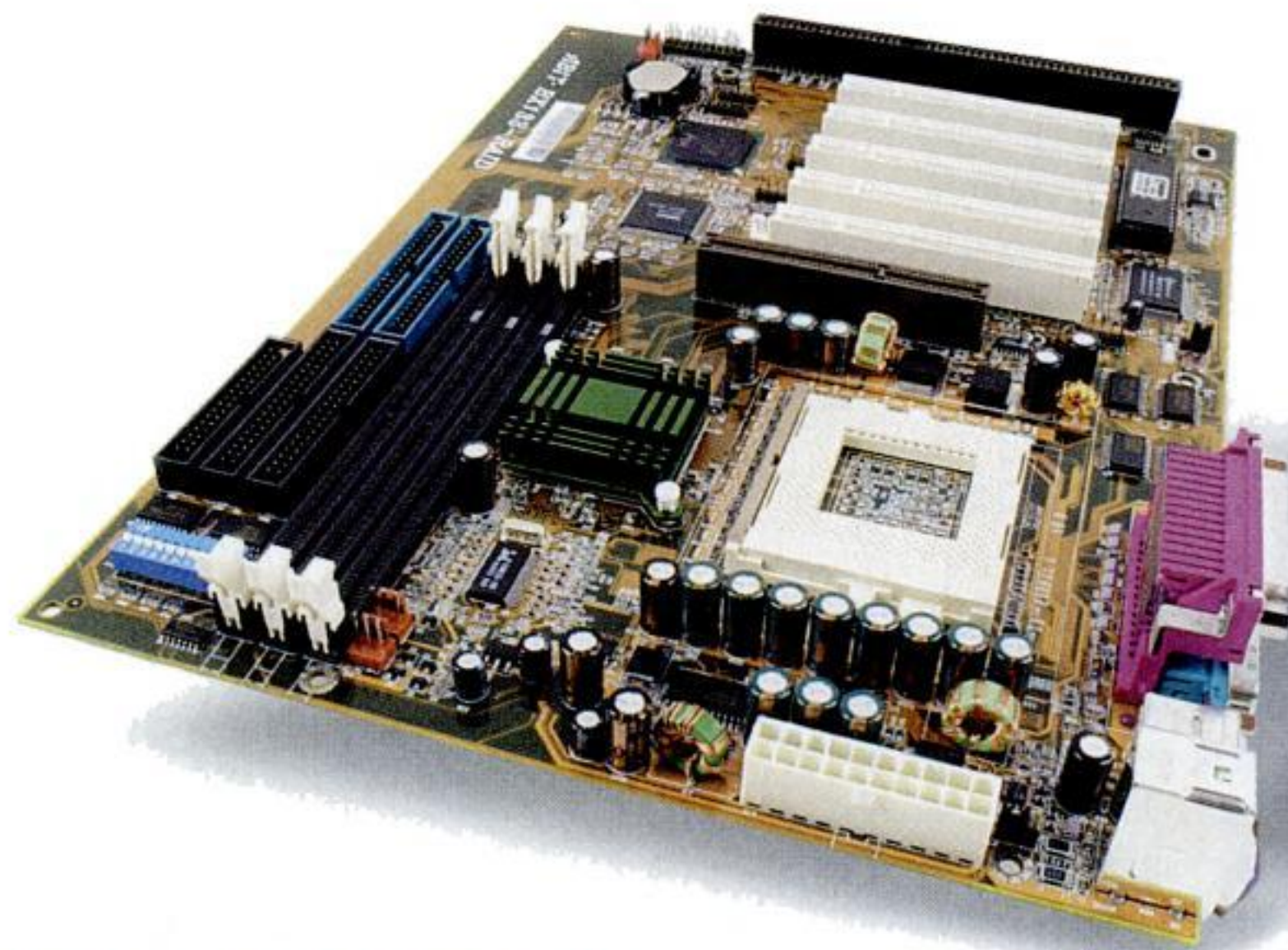
### Abit BX133-RAID

With its initial BH6 board, Abit was one of the first vendors to push the envelope in BX overclocking. The Abit overclocking pedigree bloomed when the BX6 board arrived. With its BX133-RAID, Abit offers numerous new frontside bus speeds and support for both [ATA/100](#) and [RAID](#).

The BX133-RAID supports socket 370 procs and sports one AGP slot, five PCI slots, and one ISA slot in standard [ATX PCB](#). Nothing new in terms of expansion, but Abit's crown jewel is its Soft Menu III BIOS, the easiest overclocking BIOS ever. Soft Menu III allows you to clock your FSB up to 200MHz in 1MHz increments. The BIOS allows tweakage of voltage settings, cache latency timings, and memory settings, while multipliers go to 11x, giving the BX133-RAID



As long as you don't want spectacular RAID throughput, Soyo's board will overclock as well as Abit's.



### With [ATA/100 RAID](#) built in, Abit's newest BX133 boosts the company's rep as the overclocking king.

future-proof headroom.

The Abit board turned in respectable numbers during benchmarking. It stole the show in *Photoshop* by beating the nearest competitor, Soyo's SY-6BA+100, by eight full seconds. In Sisoft's *Sandra Streaming Integer* and [FPU](#) tests, the BX133-RAID edged out the Soyo board and stomped on Iwill's WO2-R (which boasts the 815).

Benchmarks aside, the big news for this mobo is that it supports [ATA/100](#) and [RAID](#), care of an onboard HighPoint 370 RAID controller. To test the motherboard's RAID capability, we set up two IBM 75GXP drives in RAID 0 for performance-enhancing, disk-striping madness. In *HD Tach*, the onboard RAID/75GXP combo pumped more throughput than a single, 15,000rpm Seagate X15 SCSI drive, turning in outstanding scores of 43MB/sec for average read speeds and 83.8MB/sec for bursts.

This Abit board does indeed have a design flaw—the LED block located next to the ISA slot blocks the installation of large ISA cards. This is a minor gripe, considering how few people actually use ISA cards, but

don't come crying to us if you have an ISA card that is longer than the ISA slot itself.

With its BX133 board, Abit demonstrates that it can turn a graying chipset into a modern contender. The BX133-RAID is a fine addition to any overclocker's case, and we recommend it highly.

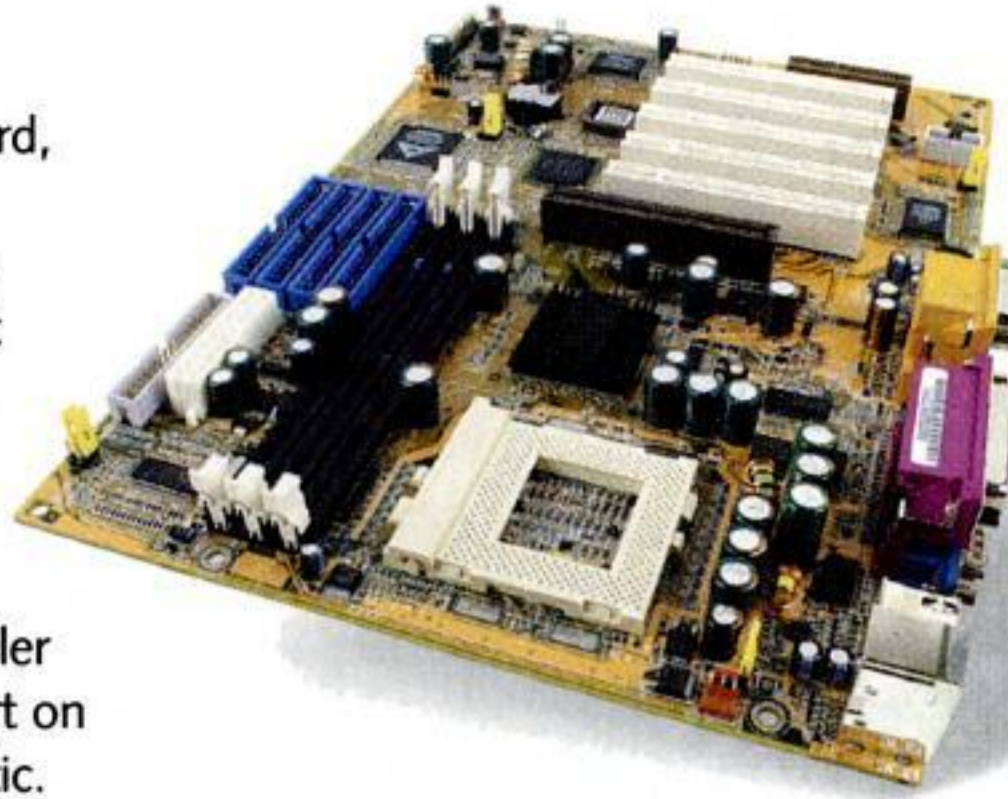
### Soyo SY-6BA+100

The SY-6BA+100, the latest in Soyo's line of BX mobos, distinguishes itself with support for [ATA/100](#) and [RAID](#). And while the Abit BX133-RAID supports Socket 370, this Soyo board supports Slot 1 processors and features an extra DIMM slot.

Like most BX boards, the SY-6BA+100 offers the standard one AGP/ five PCI/ two ISA slot configuration. While this Soyo doesn't offer the 1MHz bus speed increments of the Abit board, it does allow 29 different bus speeds, 21 of which exceed 100MHz. Unfortunately, this board won't allow you to tweak the voltage, and has an 8x maximum multiplier.

Luckily, the +100's raw performance compensates for its inherent overclocking limitations. In *Quake III*, the Soyo board thrashed the competition by more than 6fps. Moving on to *3DMark*, Soyo humiliated the competition by notching almost 200

more points than the Abit board, and almost 300 more points than the Iwill board. We were impressed with the benchmark scores turned in by the Soyo (although in *SYSmark 2000*, the Soyo edged out Abit's board by just a single point).



HighPoint's HPT370 controller provides onboard RAID support on the Soyo, but it was problematic. Once our 90GB array was up and running, the controller failed to address more than 22GB of disc space. No matter what we did, the controller wouldn't see more than that. We also experienced wacky throughput scores, marking a decided "low point" in testing. We figured the HighPoint problems must be limited to Soyo's board, since the Abit board uses HighPoint as well and suffered no such problems. Soyo says that these problems will be fixed in a firmware update.

Ultimately, Soyo has concocted a fine brew with its newest BX board. Unfortunately, with its RAID support on the flaky side and the lack of voltage tweaks in the BIOS, the SY-6BA+100 falls just shy of the mark.

**Iwill W02-R**

Representing the new guard in this roundup is the Iwill W02-R, using the 815 chipset, Intel's successor to the BX throne. The 815 ups the ante with onboard audio and video, hoping to outdo the BX in options, if not performance.

The socket 370 W02-R has the standard one AGP slot/ five PCI

The 815-based Iwill mobo surprised us with its low scores, but overclocking options are a plus.

slot config, but also includes a Communications Network Riser (CNR) in place of an ISA slot. If you've got an ISA modem, you'll want to find another option for online surfing since the W02-R ships sans a CNR modem.

The Iwill board boasts overclocking options in spades. Just like Abit's board, the Iwill mobo has FSB options up to 200MHz in 1MHz increments. But unlike Abit's board, the voltage settings aren't available in the BIOS and must be adjusted via jumpers on the board.

Installation of our RAID array went without a hitch, but the speed of the array should have been faster. Iwill says the drivers we used were spec'd for ATA/100, but our burst speeds only hit 60MB/sec, while average read speeds reached a respectable 38MB/sec. These speeds are certainly better than any *single* IDE drive, but with respect to RAID implementation, the Iwill definitely bested Soyo's RAID, although it's still not up to par.

Speaking of slow benchmarks, the Iwill board turned up sub-par in every

category. The only place it came close to the BX boards was in Sisoft's *Sandra*, which mainly tests processor speed. The memory bandwidth scores in *Sandra* were abysmal, lagging about 40MB/sec behind the other boards. In *Photoshop*, the Iwill board was blistered by Soyo's board in the completion of our action script, nevermind the beatdown Abit gave it.

Unlike the BX boards in this roundup, the Iwill officially supports FSB speeds up to 133MHz. This means the PCI and AGP busses aren't overclocked when you set the board to 133MHz. For overclockers, this is a good thing since you can realistically push the board further than the others without worrying about your peripherals freaking out.

The 815 surprised us with its benchmark scores—and that's *not* a compliment. This board is the lowest-common-denominator RAID board for the masses and shouldn't be confused with a performance board just because it has onboard RAID. We can't think of a single reason to buy this board, unless you crave the latest Intel chipset.

—Scott Tarr

**IWILL PLUSES**  
133 MHz FSB doesn't overclock AGP/PCI busses  
AGP 4x support

**MINUSES**  
Limited max RAM  
Onboard sound and video  
Slow benchmark scores  
Limited voltage tweaks

**ABIT BX133-RAID** **9**  
\$150 | Abit  
www.abit-usa.com

**SOYO SY-6BA+100** **7**  
\$145 | Soyo  
www.soyousa.com

**IWILL W02-R** **6**  
\$200 | Iwill  
www.iwillusa.com

**DARE TO COMPARE**

MODEL	ABIT BX133-RAID	SOYO SY-6BA+100	IWILL W02-R
Chipset	Intel 440BX	Intel 440BX	Intel 815
Supported processors	Socket 370 Celerons, Pentium IIs, and Pentium IIIs	Slot 1 Celerons and Pentium IIs, and Pentium IIIs	Socket 370 Celerons, Pentium IIIs and VIA Joshua procs
Expansion slots	1 AGP/ 5 PCI/ 1 ISA	1 AGP/ 5 PCI/ 2 ISA	1 AGP/ 5 PCI/ 1 CNR
Memory support	3 DIMMS for 768MB of SDRAM	4 DIMMS for 1GB of SDRAM	3 DIMMS for 512MB of SDRAM

BENCHMARKS	ABIT BX133-RAID	SOYO SY-6BA+100	IWILL W02-R
<i>Quake III</i> timedemo 1	57.8	<b>64.5</b>	58.5
Sisoft <i>Sandra</i> MFLOPS	1342	<b>1344</b>	1337
Sisoft <i>Sandra</i> Streaming Integer	410MB/sec	407MB/sec	396MB/sec
Sisoft <i>Sandra</i> Streaming FPU	448MB/sec	443MB/sec	409MB/sec
3D Mark 3D Marks	5295	<b>5464</b>	5171
<i>Photoshop 5.5</i>	117 secs	125 secs	135 secs
<i>HD Tach</i>	43MB/sec	25MB/sec	38MB/sec

Notes: Best scores are bolded. Settings for *Quake III Arena*: 1.17n 1024x768, 32-bit color, trilinear filtering, maximum textures, 32-bit textures, demo 1. Test bed: Windows 98 SE, two IBM 75GXP ATA/100 in RAID 0, 1GHz Pentium III, Elsa Erazor X2 DDR GeForce, Crucial Technology PC133 CAS2 SDRAM. Compatibility Equipment: 3Com 3C905B 10/100 NIC, Diamond Dual V.90 Shotgun ISA modem, Diamond 12MB Voodoo2, Sound Blaster Live! X-Gamer, Adaptec 2940U2W.

# Dolby Donnybrook, Part Deux

## 5.1 TITANS DO BATTLE—AGAIN

In October, we took a look at “budget” 5.1 speaker systems from S4 MidiLand and VideoLogic. Now that the dust has settled, it’s time to take a look at the “high end” offerings from both companies. Luckily, just before going to press, we received Cambridge Soundworks’ latest 5.1 speakers, the DTT3500, so we tossed them into the tussle with the other two. As the verdicts show, the results weren’t pretty for the latecomer. The good news is that the 5.1 speaker market has changed drastically since last year, with several vendors vying for top honors in a category formerly dominated by Creative Labs. Competition is heating up, and audiophiles are reaping the rewards.

### S4 MIDLAND

#### PLUSES

Ample power  
Above-average sound quality  
Complete sound customization

#### MINUSES

Decoder’s LCD is too small to read  
Decoder is difficult to configure  
Slight lack of midrange

### VIDEOLOGIC

#### PLUSES

Movie theater-quality sound  
Plenty of power  
Intuitive controls  
AC-3 and DTS decoding

#### MINUSES

Speakers don’t produce popcorn

### S4 MidiLand 8200

The MidiLand 8200s got the nod in November as the “budget alternative” to a full-blown \$5,000 home theater speaker set, but the only thing “budget” about these speakers is the price.

The system is composed of five 20W satellites, a 100W subwoofer, a Dolby Digital 5.1 decoder, and a credit card-sized remote control. All five of the satellites contain a 3-inch full-range driver, while the sub houses a beefy 6.5-inch long-throw driver as well as the unit’s 200W amplifier. Measuring just 13 inches tall by 10 inches deep, the sub is one of the smallest we’ve seen, yet it’s capable of pushing extremely deep bass. During testing, a staffer scolded



The DigiTheatre DTS blew us away with impeccable sound reproduction. They’re expensive, but worth every penny.



### The MidiLand 8200s produce outstanding AC-3 audio for a mere \$300.

us for the speaker’s volume—not because it was bothering him, but because he thought we would damage our eardrums! Take it from us: These speakers can maintain their composure at extremely loud volumes.

The AC-3 decoding is handled by the ADS-2000, a breakout box that offers *too many options*. Adjustable options include individual channel volumes, amount of delay to center and surround speakers, number of speakers being used for output, input mode, master volume, bass management, testing, mute, and surround mode selection. Inputs include standard analog as well as coaxial and optical S/PDIF. We love features-a-plenty, but the ADS-2000’s controls have to be seriously tweaked to obtain optimum sound. It’s annoying, but once you get the sound dialed in, you’re all set.

For DVDs, this system completely rocks. The 8200s offer surprising clarity and richness, but are slightly

lacking in midrange due to the exclusion of a dedicated midrange driver. For music, they’ve got enough punch to compete with the best of the best, but are less suited toward gaming due to the lack of a separate rear channel. If you have a digital soundcard like the SBLive!, you can get five-channel surround sound, although it’s a subtle effect.

Overall, this system is extremely competent given its low, low price. For \$300 we didn’t expect much, and we came away pleasantly surprised.

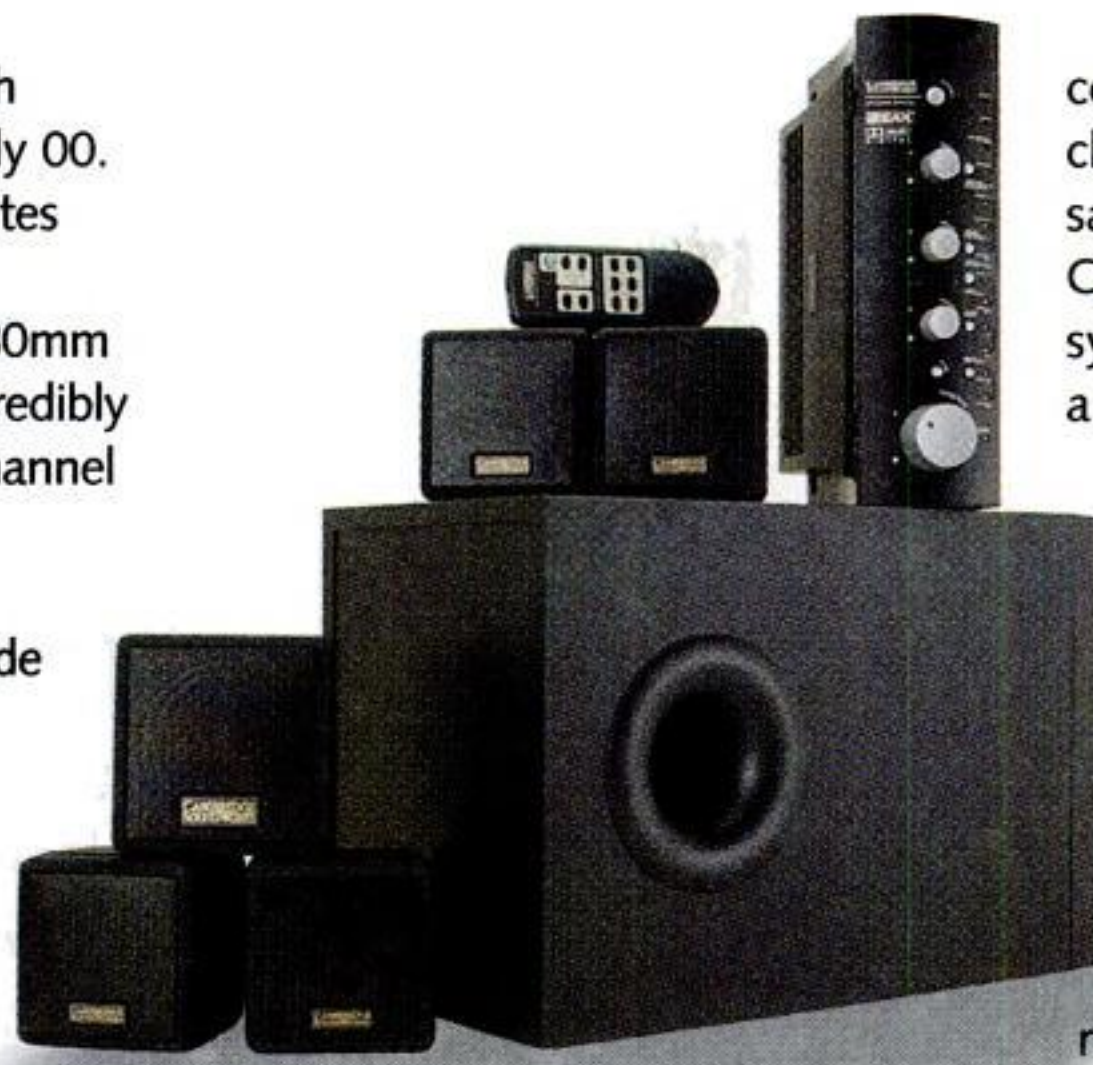
### VideoLogic DigiTheatre DTS

Remember “The Simpsons” THX parody in which the theater starts shaking and Grandpa’s teeth shatter? That’s how we felt listen-

ing to these speakers at full tilt. The DigiTheatre can get very loud, but in a movie theatre-like fashion, with subtle rumbles and wall-to-wall sound that left us breathless. After testing, we unanimously decided that the DigiTheatre DTS are the best speakers we’ve ever heard for DVD playback.

This 220W system consists of the same remarkable satellites that come

with the Sirocco Crossfire, which received a Kick Ass Award in July 00. The mica-loaded polymer satellites use high-quality audax drivers, including 10mm tweeters and 80mm midrange cones that deliver incredibly crisp sound. The 30W center channel is good for dialogue in movies, but not much else. The 70W subwoofer is a work of art. Made of medium-density fiberboard, the subwoofer houses an 8-inch long-throw driver that's perfect for movies, music, and games. It's not boomy whatsoever, and it delivers tight, clean bass with almost imperceptible crossover to the satellites.



The Cambridge Soundworks DTT3500s offer sparse improvements over their predecessors.

The center channel houses the unit's controls as well as the Dolby Digital 5.1 and DTS decoders. The controls are the best we've seen, allowing easy modification of settings, and the bundled remote control is just as simple to use. Inputs include S/PDIF (coaxial and optical) as well as analog.

With AC-3 and DTS decoding on tap, these puppies rock for movies. Like the photo caption says, they're the best we've ever heard (yes, better than the Klipsch). They're also excellent for music, but lack a separate input for rear-channel gaming (as with the MidiLands, this hurdle can be overcome with a digital soundcard).

If you want the best gaming speakers, the Klipsch ProMedia get the nod. But if you want superlative power and simply incredible DVD playback, the DigiTheatre DTS system is speaker nirvana.

**Creative Labs DTT3500**

After knocking Cambridge Soundworks' DTT2500 5.1 speakers for the greater part of last year, we were really hoping Creative would impress us with the next rev of its

maligned top-tier speaker system—the DTT3500. Sadly, this is not the case.

We've had certain "issues" with Cambridge speakers for the past two years: A severe lack of power, poorly matched subwoofer and satellites, distortion at high volumes, plastic enclosures that produce below-average sound quality, and reliance on unpowered subwoofers have all left us unenthused.

These problems were present in every previous Cambridge speaker system, and they've shown up once again in the DTT3500. Back when Cambridge was the only game in town, this system might have flown, but times have changed.

Check out the system's specs. The four satellites (which are the same sats as the FPS2000 Digital) emit 7W each. Seven watts. The unpowered sub (it's the only speaker system we've seen all year in this price range with an unpowered sub, by the way) pushes 35W. At lower volumes, the sub overpowers the satellites, and, at higher volumes, the sub drops out

completely. The 21W center channel is essentially the same satellite used in the original Cambridge Soundworks speaker system from two years ago. It's a decent center channel, but sound quality is only average.

It's not all bad, however. A new control unit with an infrared remote control has been added—a nice touch. There's also a new control box that can be mounted either horizontally or vertically—a well thought-out concept. As with the previous rev of this system, the box houses a Dolby Digital Decoder.

The other new additions to the DTT3500 involve connectivity options, allowing these speakers to be hooked up to everything from a MiniDisc player to a Playstation 2. Its bevy of ports includes an optical S/PDIF as well as a 6-channel Digital DIN and analog connections.

Connectivity options are surely appreciated, but we're baffled by Creative Labs decision to put such changes ahead of more fundamental improvements. This system needs a lot more power, sound quality that's more crisp with definitive mid-bass response, and a powered sub. Cambridge Soundworks has the power to put such a system together, the only question is, will they?

—Josh Norem

**CAMBRIDGE**  
**PLUSES**  
 Plethora of connection options  
**MINUSES**  
 Insufficient power  
 Unpowered sub  
 Average sound quality  
 Overpriced

**\$4 MIDLAND 8200** **9**  
 \$300 | S4 MidiLand  
 www.midiland.com

**VIDEOLOGIC DIGITHEATRE** **10**  
 \$600 | VideoLogic  
 www.videologic.com

**CAMBRIDGE DTT350** **5**  
 \$350 | Creative Labs  
 www.creativelabs.com

**SPEAKER SPECS: RMS VERSUS PMPO**

When ogling speaker specifications, one inevitably come to the most important spec of all—wattage. This number can be a good indication of a system's overall power output, or it can be an inflated figure that's meant to make the speakers seem more powerful than they really are. We're talking, of course, about the difference between RMS and PMPO.

Both numbers are quoted by speaker manufacturers in watts, so which should

you believe? The answer is RMS, which stands for "root of the mean of the square." To get this number, the signal value (amplitude) is squared and then averaged over a period of time. The square root of that average is then calculated, which returns a value. When that value is squared, it's proportional to the average value of the signal. In layman's terms, RMS watts are average, continuous power.

PMPO stands for Peak Music Power Output, and it represents how loud a speaker can get at its peak, like the guy who says he can bench press 250lbs, but can only do it once. It's impressive, for sure, but RMS value is much more important for home users who plan to play their speakers at a continuous, loud volume. All wattage specs listed in *Maximum PC* are RMS.

For definitions of Terminator words, check out the Terminator online at www.maximumpc.com.

# Compaq iPAQ H3650

NOT QUITE A PALM KILLER—BUT GETTING CLOSER

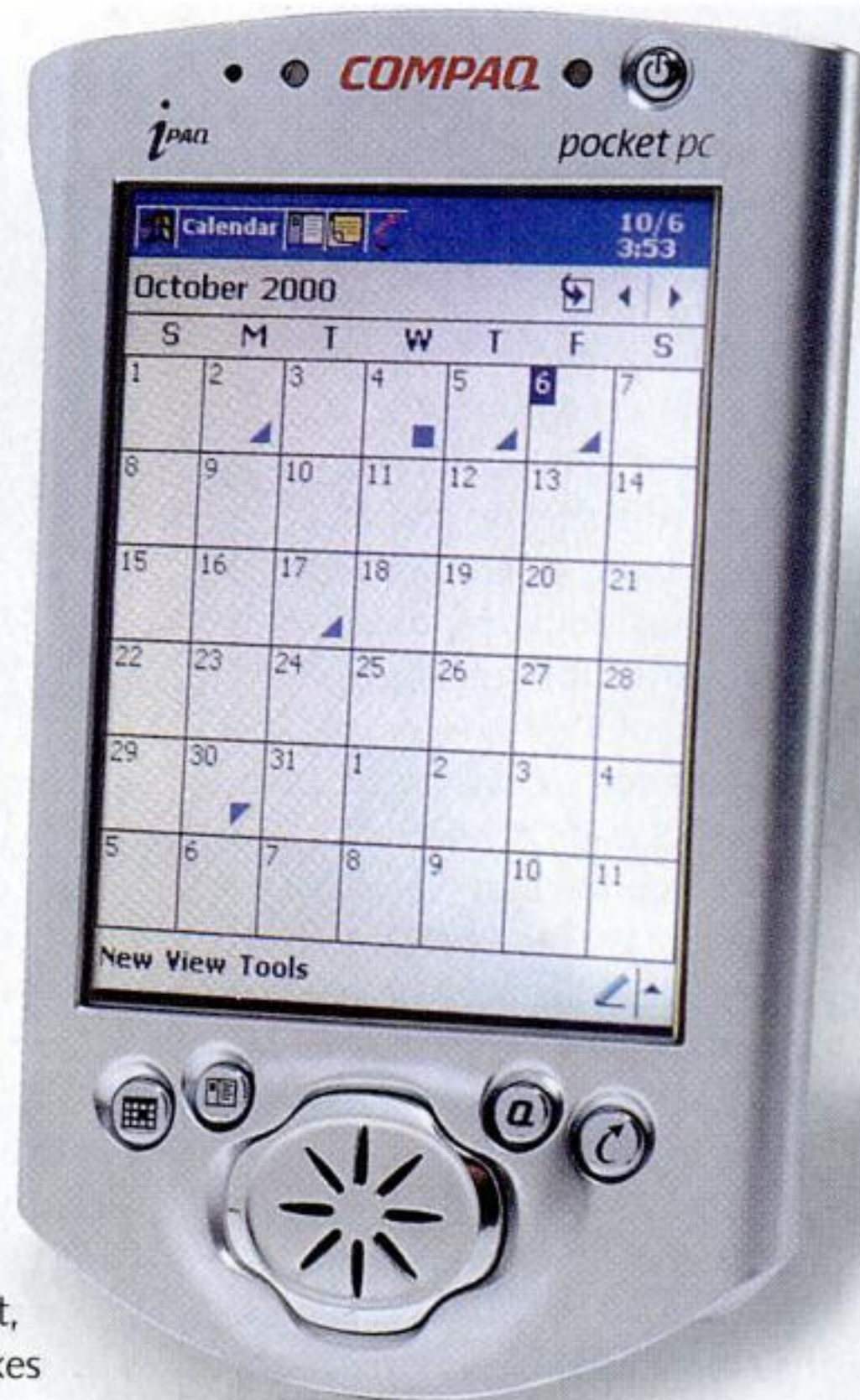
Compaq's iPaq is the first handheld we've seen that combines all the best features a CE device can offer in one slick-looking package. But some things never change, and just as we were unimpressed with many features of the last Pocket PC device we reviewed—HP's Jornada—we find the iPaq lacking too.

Though the iPaq's shiny, silver case fits well in hands of any size—and stylishly sets it apart from the more pedestrian-looking Jornada—its Quick Launch buttons are too small for even the smallest fingers to operate easily. The integration of the iPaq's external speaker with its navigator button appeals to our sense of efficiency, but the button is so small and flat we

Pocket PC-based Jornada in August 00, we were certainly impressed by its color screen and mini-MS Office applications, but its sluggish performance and poor memory management chapped our hides. The same is true of the iPaq. This PDA is more stable than the Jornada, and its transfer rates are respectable, but some aspects of Pocket PC just plain get on our nerves. For instance, there's no way to close out of an application from within the application itself. Why can't Microsoft give us a frickin' "Exit" button within the app?

The iPaq comes preloaded with *Outlook 2000*, *Pocket Excel*, and *Pocket Word*. You can enter text by pecking around on an onscreen keyboard or through a program that, via a "character recognizer," makes a best guess at the letter you've scrawled in your own writing. Though the character recognition is pretty accurate, and there's an undeniable attraction to looking at a *Word* document on your handheld, you'll definitely want to pick up an optional keyboard accessory if you plan to do much work in *Word Jr*.

Installing applications on the iPaq is trouble-free, but the device slowed noticeably once we added all the apps needed to perform the miracles Compaq is pimping. The company says that with its 32MB of RAM, the iPaq can view images, play MP3s, stream video, and run an *Excel* spreadsheet, all at the same time. Shyeah, right. Though it's technically possible, running that many apps simultaneously brings the system to its knees. You can allocate memory manually, using a slider, for specific apps at specific times, but who wants to constantly switch between apps and the control panel? The iPAQ's 206MHz processor is 70MHz faster than those used by the HP Jornada and Casio Cassiopeia E-115, but what this OS needs is better memory management, not



**Compaq's iPAQ Pocket PC is the best CE device we've seen to date—but we're not giving up our Palms just yet.**

more megahertz.

The iPaq earns points for pushing the envelope of handheld hardware specifications and for offering countless programs and features. But sometimes those innumerable options seemed overwhelming and we found ourselves missing the relative simplicity of the Palm OS. The Pocket PC OS clearly has potential, but in its present form, it's simply too much of a memory whore to pose any real threat to Palm's extremely efficient Palm OS. Still, the iPaq is the best Pocket PC device we've seen, and if Microsoft can ever get Pocket PC to run as well as the Palm OS, it'll have a winner on its hands.

—Kristen Salvatore

**PLUSES**

Screen is legible in direct sunlight  
Gorgeous case

**MINUSES**

Pocket PC—we just don't love it yet  
Cradle is about as sturdy as a hunk of smoked gouda

**THE SPECS**

- SCREEN RES**  
240x320/12-bit LCD
- VIEWABLE IMAGE SIZE**  
2.26x3.02 inches
- PROCESSOR**  
206MHz Intel StrongARM 32-bit RISC Processor
- MEMORY**  
32MB RAM  
16MB Flash ROM
- DIMENSIONS**  
5.11"x3.28"x.62"
- BUNDLE**  
USB cradle | IrDA infrared port | Lithium battery (up to 12hrs of life)

repeatedly pressed its middle (the equivalent of "Enter") when we meant to hit right or left. To its credit, the iPaq's 12-bit TFT display is downright gorgeous, pumping out over 4,000 colors at 240x320 resolution. And unlike some Palm displays, it's visible even in direct sunlight.

Once you get past the slick shell and colorful screen, however, the iPaq is just another Pocket PC device—which means it's a memory hog that runs substantially slower than its Palm counterparts. When we looked at the



The iPaq comes with Microsoft's mini-me *Media Player*, turning the device into a handheld jukebox.

**MAXIMUM PC VERDICT** **7**  
\$400 | Compaq  
www.compaq.com



SmartSaver

[ this is the least explicit word you use  
when you find out you could have designed  
your web pages faster, easier, and cheaper  
if you had been to **Ulead.com** first ]

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**Ulead**  
Systems



BETTER TOOLS FOR BETTER WEBSITES

**PLUSES**

ATI chip breaks new ground  
Media bay options are amazing  
True desktop power in a notebook  
Loads of new, improved features

**MINUSES**

Dell's goofy, removable, colored palm panels  
Lost to Compaq by a smidgen in four testing categories

# Dell Inspiron i8000

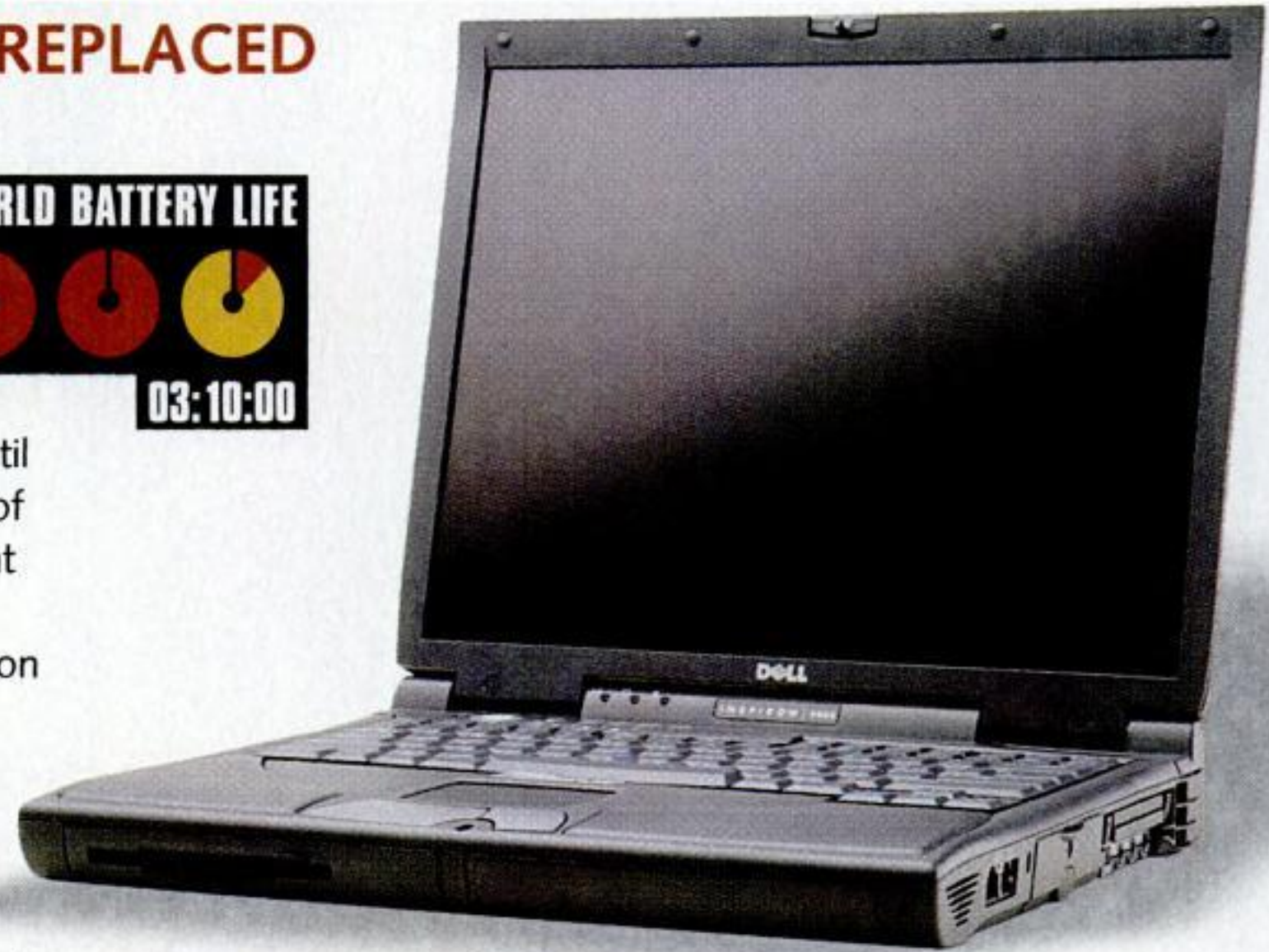
## CONSIDER YOUR DESKTOP REPLACED



Eighteen months ago, we awarded a Perfect 10 verdict to a Micron Transport NX that ran at a ponderous 366MHz. Since that time, no other notebook has deserved such accolades. Until now. Say hello to the Dell Inspiron i8000, our Gear of the Year notebook for 2000 and the worthy recipient of a Perfect 10.



Designed to replace Dell's top-of-the-line Inspiron 7500, the i8000 is a pound lighter and features a chassis redesign that's easier on the eyes and ergonomically splendid. The



**UNDER THE HOOD**

**THE BRAINS**

CPU	850/700MHz Intel Mobile Pentium III SpeedStep
RAM	128MB PC 100 SDRAM (expandable to 512MB)
I/O ports	Dual PC card   VGA and S-video out   Parallel   Serial   Two USB   PS/2   IrDA   Mic-in   Line-in/audio-in   Headphone-out   Line-out   IEEE 1394   Docking station
Modem	Onboard Lucent 56.6Kbps modem
LAN	Onboard 3Com 10/100 LAN

**DISPLAY**

Videochip	ATI Mobility M4 128 with 32MB of SDRAM
Display	15-inch Ultra XGA, active-matrix, TFT
Max res	1600x1200

**STORAGE**

Hard drive	IBM Travelstar 32GB 5,400rpm DJSA-232
CD-ROM	Teac 24x CD-224E
DVD-ROM	Toshiba 8x SD-C2402
CD-RW	Sony 8x CD-RW CRX700E

**SOUND**

Sound	ESS Maestro-3E software wavetable/positional 3D audio
Speakers	1.0W Harmon-Kardon side-mounted stereo

**TIPPING THE SCALES**

Lap weight	7 pounds, 8 ounces
Carry weight	8 pounds, 6 ounces

BOOT 1:07 DOWN 0:06

15-inch display now lies flush with the frame when the lid is closed, making it eminently portable. The coup de grace is an elegantly designed control set that includes a dual pointing device (track stick and track pad), left- and right-click buttons, and integrated CD/DVD control keys that double as Internet launch keys.

The i8000 has undergone extensive redesigns under the hood, as well. Let's face it, slap an 850/700MHz SpeedStep processor in anything and it's going to run hot. Dell, however, keeps its powerhouse cool with the HyperCool Hybrid Thermal Management System. It uses a heat pipe, a radiator-like heat exchanger, and a variable speed exhaust fan to pull

**Dell's 850MHz multimedia monster makes even desktop systems cower in fear.**

cool air into the innards and pump heat away from the processor.

The notebook uses Intel's 815 Solano chipset, abandoning the antiquated 440BX notebook chipset. The Solano, a desktop chipset, delivers increased I/O bandwidth for multimedia apps, AGP 4x support, and ATA/100 hard drive support.

The AGP 4x support is put to good use by the new 128-bit ATI Mobility M4 video controller, which sports a full 32MB of memory. In addition to phenomenal DVD playback, S-video-out support, and incredible frame rates, the i8000 includes support for two external displays (running simultaneously) in addition to its own active-matrix LCD display. This native display hits a 15-inch diagonal and can run at a whopping 1600x1200 with 32-bit color.

The 32GB hard drive is an ATA/66 drive—no ATA/100 yet, but it spins at 5,400rpm, meaning this baby is entering into true desktop replacement territory. The best part is that you can choose from a 24x CD-ROM drive, an 8x CD-RW, or an 8x DVD-ROM as your fixed optical drive. You also get two additional media bays: one for a battery and another for whatever drive you didn't select as a fixed optical drive. The dual-swap scenario offers numerous configurations not available previously.

Finally, the i8000 comes with a FireWire port, MGI's VideoWave III, an integrated 10/100 NIC for networking or broadband access, fast-charging batteries, a shock system to protect the hard drive, and easy access to any components that might need upgrading. Whew. Aside from stupid designer panels to "customize" the look of the book, and our greedy desire for another 128MB of RAM, this is Dell's most spectacular effort yet—and our new Perfect 10 notebook.

—Geoffrey Visgilio

TEST	ZERO	SYSTEM	RESULTS (%)	RANK
SYSmark	105	162	59.3	2nd Seed
Hard drive	11.4MB/sec	14.1MB/sec	23.7	LEADER
CD-ROM	15.5x	16.7x	7.7	2nd Seed
Photoshop	240sec	155sec	35.4	2nd Seed
Direct3D	14.4fps	32.7fps	127.0	2nd Seed
OpenGL	18.8fps	46.4fps	147.0	LEADER

**MAXIMUM PC VERDICT**

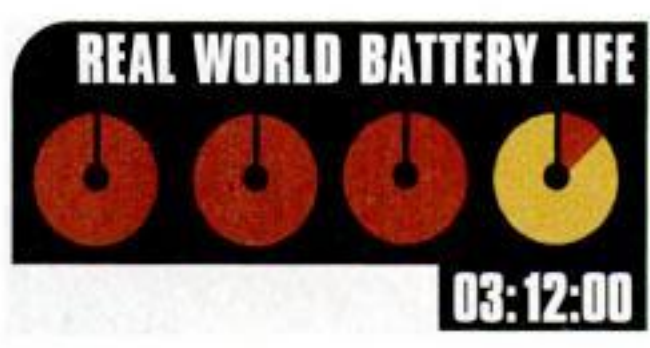
\$3,580 | Dell | www.dell.com



# Compaq Presario 1800T

## THE NEXT BEST THING

It's been 18 months since we last looked at a Compaq notebook and, judging by the 1800T, we've been missing out. This 850MHz scorcher shares a few components with the Dell i8000—same 32GB hard drive, same 8x DVD-ROM drive—and, while it doesn't boast the same cornucopia of features as the Dell, it still offers powerhouse computing in a well-designed package. Compaq wins our own informal design award for its spacious, comfortable work area layout—it's clear someone put a lot of thought into the 1800T's feng shui. The notebook not only looks pretty with its sleek lines, but the



### UNDER THE HOOD

#### THE BRAINS

CPU	850/700MHz Intel Mobile Pentium III SpeedStep processor
RAM	192MB PC100 SDRAM (expandable to 320MB)
I/O ports	Dual PC card   VGA out   Parallel   Serial   USB   PS/2   Mic-in   Headphone-out   Docking station
Modem	Onboard Lucent 56.6Kbps V.90 PCI DF modem
LAN	Onboard Intel 8255x-based PCI Ethernet 10/100 adapter

#### DISPLAY

Videochip	ATI Mobility 128 2x with 16MB of SDRAM
Display	15-inch SXGA, active-matrix, TFT
Max res	1400x1050

#### STORAGE

Hard drive	IBM Travelstar 32GB 5,400rpm DJSA-232
CD-ROM	Toshiba 8x SD-C2402

#### SOUND

Sound	ESS Solo-1 software wavetable/FM synthesis
Speakers	Front-mounted JBL Pro Audio System with Bass Reflex

#### TIPPING THE SCALES

Lap weight	7 pounds, 5 ounces
Carry weight	8 pounds, 4 ounces

BOOT 0:58 DOWN 0:07

key layout offers six one-touch Internet launch keys up by the power button for easy access, and includes Internet scrolling keys, volume control, and music control buttons just under the track pad for a tightly integrated Internet/multimedia experience. As a whole, the design is functional, unobtrusive, and very comfortable.

Like the Dell, this Compaq notebook can run two simultaneous displays in addition to the integrated display. This is due to ATI's Mobility 128 AGP 2x video controller, which provides a 1400x1050 reso-

### This Compaq has the cojones to run with the big boys.

lution at 32-bit color. The ATI chipset is AGP 2x with 16MB of video memory, which is enough to run *Quake III* at an astonishing 46.2fps. Compaq also delivers something we never thought we'd see in a notebook—incredible sound. It's not going to shatter any windows, but it's not going to drive you crazy with tinny treble and distorted bass, either. Thanks go to a pair of dual-coned JBL Pro speakers with neodymium magnets and bass reflex enclosures, an amplifier with a distortion filter, and an equalizer to normalize sounds.

The downside? Although Compaq ships this system with 192MB of RAM, it consists of 64MB of onboard memory and a 128MB module in the single DIMM slot. This has advantages—should anything happen to your DIMM, you have enough onboard memory to boot and perform basic functions while you're getting it repaired or replaced—but that one DIMM slot limits expandability. Since there's only one DIMM, the most you can have is a 256MB DIMM plus the 64MB of onboard memory for a total of 320MB. Most notebooks allow a maximum of 512MB of RAM, and the 1800T should as well.

Also, both the hard drive and the videocard are inaccessible, so you can forget about upgrading those parts. With 16MB of video memory and a 32GB hard drive, you might not need to upgrade for some time, but eliminating the option to do so is a big no-no. Plus, if something breaks, you'll have to crack open the case with a screwdriver or ship it back to the factory—and after warranty, that's a dicey proposition. But, overall, this machine is a benchmark breaker with more than enough bells and whistles to make it a worthy desktop replacement.

—Geoffrey Visgilio

**PLUSES**  
 Phenomenal sound  
 Audio and Internet controls at your fingertips  
 Ships with 192MB of RAM

**MINUSES**  
 Can't upgrade HD or video memory  
 One DIMM slot

TEST	ZERO	SYSTEM	PERFORMANCE (%)	RANKING
SYSmark	105	169	60.9	LEADER
Hard drive	11.4	13.8MB/sec	21.1	2nd Seed
CD-ROM	15.5x	17.0x	9.7	LEADER
Photoshop	240sec	147sec	38.8	LEADER
Direct3D	14.4fps	33.4fps	131.0	LEADER
OpenGL	18.8fps	46.2fps	146.0	2nd Seed

**MAXIMUM PC VERDICT** **8**  
 \$3930 | Compaq | www5.compaq.com

# Soundcards for Less

## ONE SUCKS, ONE DOESN'T

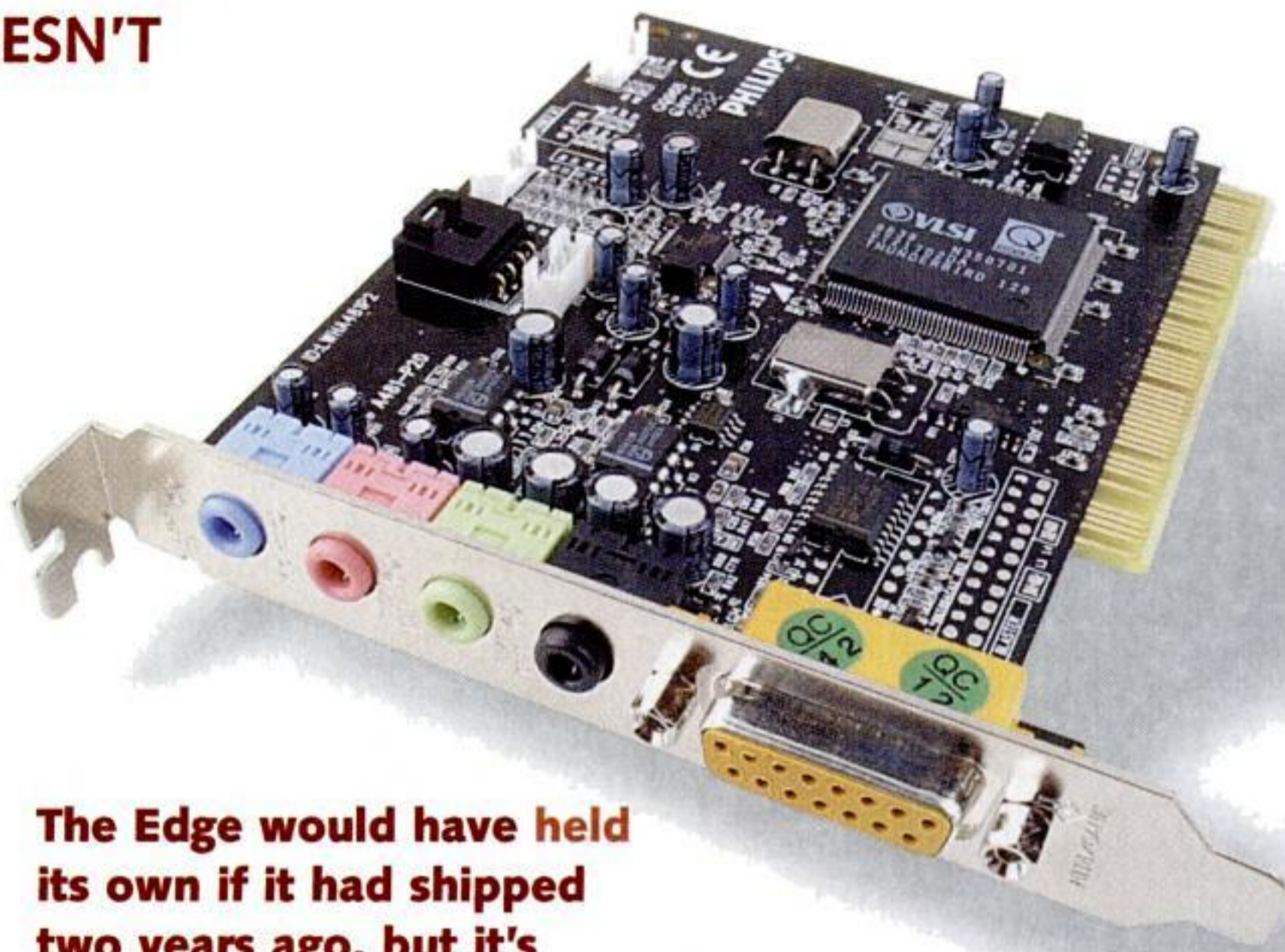
For this roundup, we pitted mid-level cards from Philips and Guillemot against each other to see which would claim dual-channel bragging rights. Stay tuned for our upcoming 5.1 soundcard battle royale—it should be a real scream.

### Guillemot Maxi Sound MUSE

After installing Guillemot's Maxi Sound MUSE, we began pining for the good old days of Aureal and its line of Vortex cards. Based on C-Media Electronic's new CMI-8378 sound chip, the MUSE is a woeful reminder of just how bad audio used to be.

The MUSE is supposed to offer support for Aureal's A3D 1.0 and Creative Lab's EAX 1.0. We don't know how Guillemot or C-Media can make those claims, however. Using Lucas Art's *Jedi Knight*, we enabled A3D support and were instantly treated to a filtered pot of audio goo.

Even worse is the MUSE's MIDI support, which relies on funky FM synth and makes everything sound like a busted kazoo. In its favor, the MUSE does ship with Yamaha's *XG Studio* for host-based MIDI support. *XG Studio* lives up to the Yamaha name but will sap CPU cycles from



**The Edge would have held its own if it had shipped two years ago, but it's mid-pack now.**

your system under heavy loads.

With support for 32 audio streams, the MUSE fared well in our CPU utilization tests and didn't significantly drag down the CPU when playing a combination of 16 and 32 audio streams.

Overall, the MUSE is a lesson in "you get what you pay for."

### Philips Seismic Edge

The Seismic Edge is a budget card as well, but it's miles ahead of the MUSE. Using VLSI's Thunderbird chip (which never seemed to catch on), the Seismic Edge features an impressive feature list that includes 64 3D audio streams, a hardware wavetable synthesizer, and the ability to "expand" stereo music to four channels.

At the heart of the Seismic Edge is VLSI's Thunderbird 128 DSP, which sports up to 128 audio streams in hardware. The T-bird's power was apparent in our DirectSound3D test where we toss 16 and then 32 audio streams at the soundcard. Even under the load of 32 streams, the Seismic Edge didn't break a sweat. The Edge

sounded far better than the MUSE, and its A3D emulation worked, as did its EAX 1.0 support.

Like the MUSE, the Seismic Edge ships with Yamaha's XG MIDI set, despite the fact that it has a built-in hardware wavetable. It didn't make sense until we fired up some MIDI; we realized then that the Seismic Edge hardware wavetable set is undeniably second-rate.

The Seismic Edge has other amenities, such as the ability to filter and separate normal stereo audio into four channels. It's a nice effect, but it's no replacement for true discrete audio. The Seismic Edge is a solid mid-level soundcard that would hold its own against a Vortex 2, but we'd rather spend the extra \$20 for a 5.1 soundcard from Philips or Creative Labs.

—Gordon Mah Ung

### GUILLEMOT MAXI SOUND

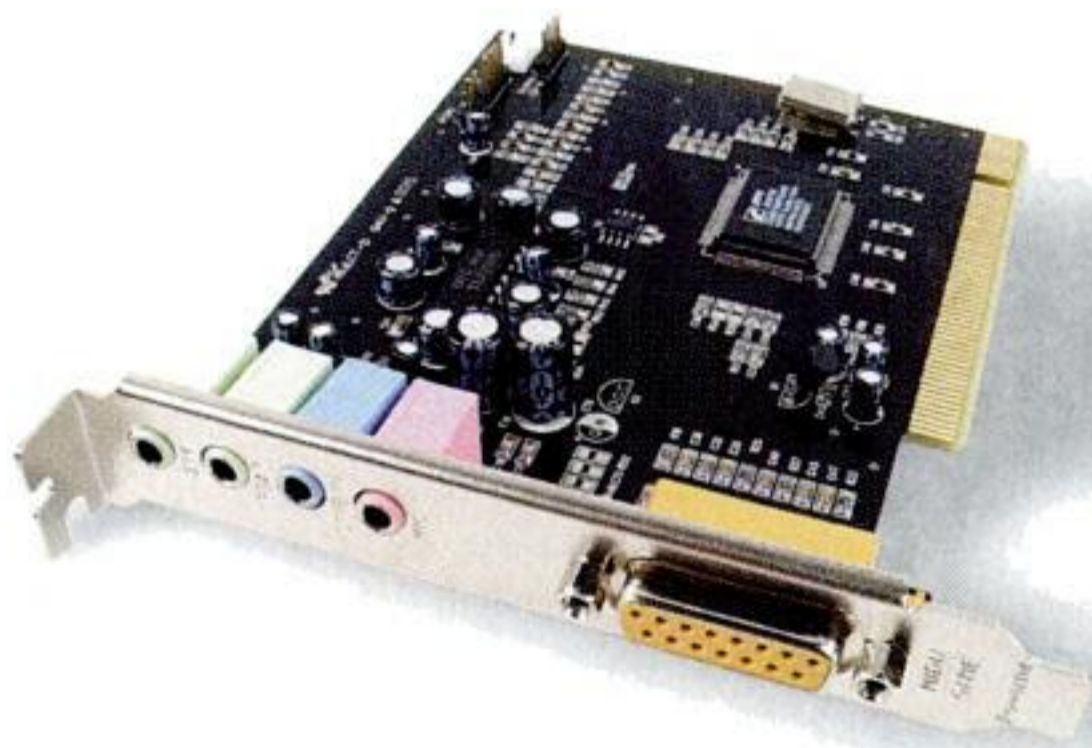
\$30 | Guillemot  
www.guillemot.com

4

### PHILIPS SEISMIC EDGE

\$80 | Philips  
www.philipsusa.com

7



The MUSE is an improvement over an ISA soundcard, but not by much.

### BENCHMARKS

FEATURE SET	DIRECT SOUND 3D	A3D	EAX	AUDIO STREAMS	CPU UTILIZATION WITH 16 AUDIO STREAMS*	CPU UTILIZATION WITH 32 AUDIO STREAMS*	DIGITAL JOYSTICK TEST**
MUSE	Yes	1.0	1.0	32	9%	17%	Pass
Seismic Edge	Yes	1.0	1.0	128	3%	7%	Pass

\* Using the DX7 SDK we played half 3D audio streams and half static audio and measured CPU utilization.

\*\* Thurstmaster Millennium 3D, Rage 3D Pro tested on joystick port under Windows 98.

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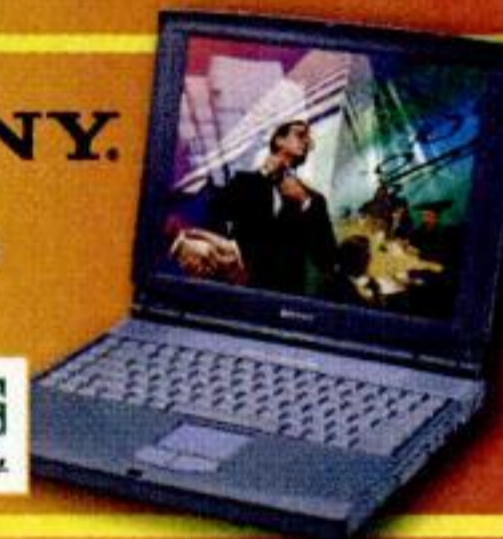
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48X CD-ROM, 56K Modem,  
10/100, Windows 98

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T650B

#951792

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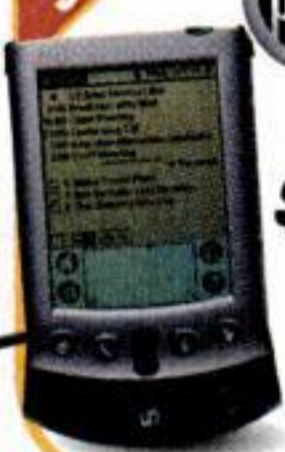
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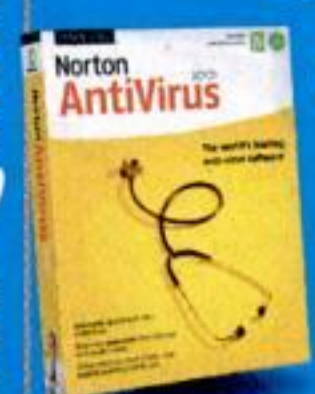
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Norton AntiVirus 2000.

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**LEXMARK.**

**COMPAQ**



### 566MHz

Intel® Celeron™ processor  
64MB RAM, 6GB Hard Drive  
24X CD-ROM, 13" HPA display

## \$1,499

Presario 14XL244 #848674



**TOSHIBA**

### 650MHz

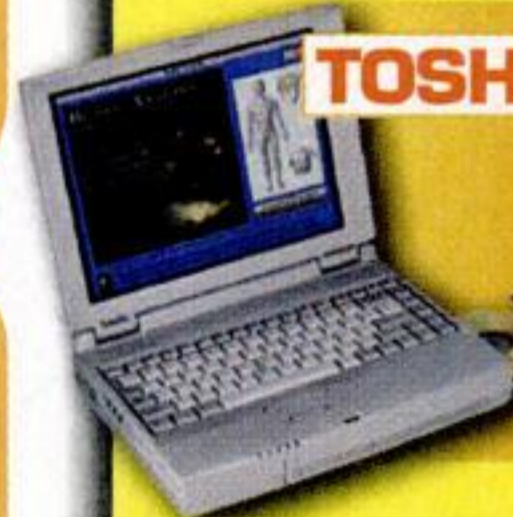
Intel® Celeron™ processor  
64MB RAM, 6GB Hard Drive DVD,  
56K Modem, 10/100 NIC  
13.3" TFT display, Windows Me

## \$1,699

Satellite 2800CT #952333



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Intel® Pentium® III processor  
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# ATA RAID Rally

MOVE OVER SCSI RAID, NOW THERE'S SOMETHING CHEAPER

**ABIT  
PLUSES**

Fast, inexpensive RAID  
Excellent throughput  
Easy installation

**MINUSES**

No RAID 5 support

**AMI  
PLUSES**

Very fast RAID performance  
Easy to install  
Extensive array customization

**MINUSES**

No RAID 5 support  
High CPU usage

ATA and RAID used to be like 3dfx and 32-bit color—they just didn't go together. ATA hard drives have always been sluggish compared to their SCSI counterparts, so it seemed pointless to put them into a RAID array. The latest batch of ATA/66/100 drives has changed all that, however. As this controller roundup proves, ATA RAID is now capable of kicking serious ass.

**Abit Hot Rod 100**

The Hot Rod 100 from Abit is a two-channel PCI card that uses HighPoint's HPT 370 chipset. Previous versions of HighPoint's chipsets have been riddled with bugs requiring firmware and driver updates. Not so with the HPT 370. In testing, HighPoint's most recent spawn proved as stable as the Rock of Gibraltar.

The Hot Rod really poured it on in *HD Tach*, besting all competitors in every category. Average read speeds were a blazing-fast 38MB/sec. In our more intensive *IOmeter* benchmark, the Hot Rod 100 lost by a smidgen to AMI's HyperDisk 100 controller, but still turned in read speeds eclipsing the 50MB/sec mark.

In real-world testing, Abit edged out the HyperDisk 100 in *Quake III* by just two-tenths of a frame. *Photoshop* scoring was just as close,



**Abit doesn't just do overclocking, it has now moved into RAID country. Yee-haw!**

with Abit showing just a one-second advantage over the AMI board.

Setting up a RAID array with the Hot Rod was a breeze, which isn't surprising given Abit's reputation for programming easy-to-use, low-level configuration programs such as SoftMenu III. Array setup options include RAID 0, 1, and 01 (a.k.a. 0+1), as well as stripe size options from 4K to 64K. Select the drives you want to include in the array, save the changes, and reboot.

Clearly, Abit's reputation for speed in motherboards has trickled down to smaller PCBs such as the Hot Rod 100. Take it from us—this Hot Rod can burn rubber.

**AMI HyperDisk 100**

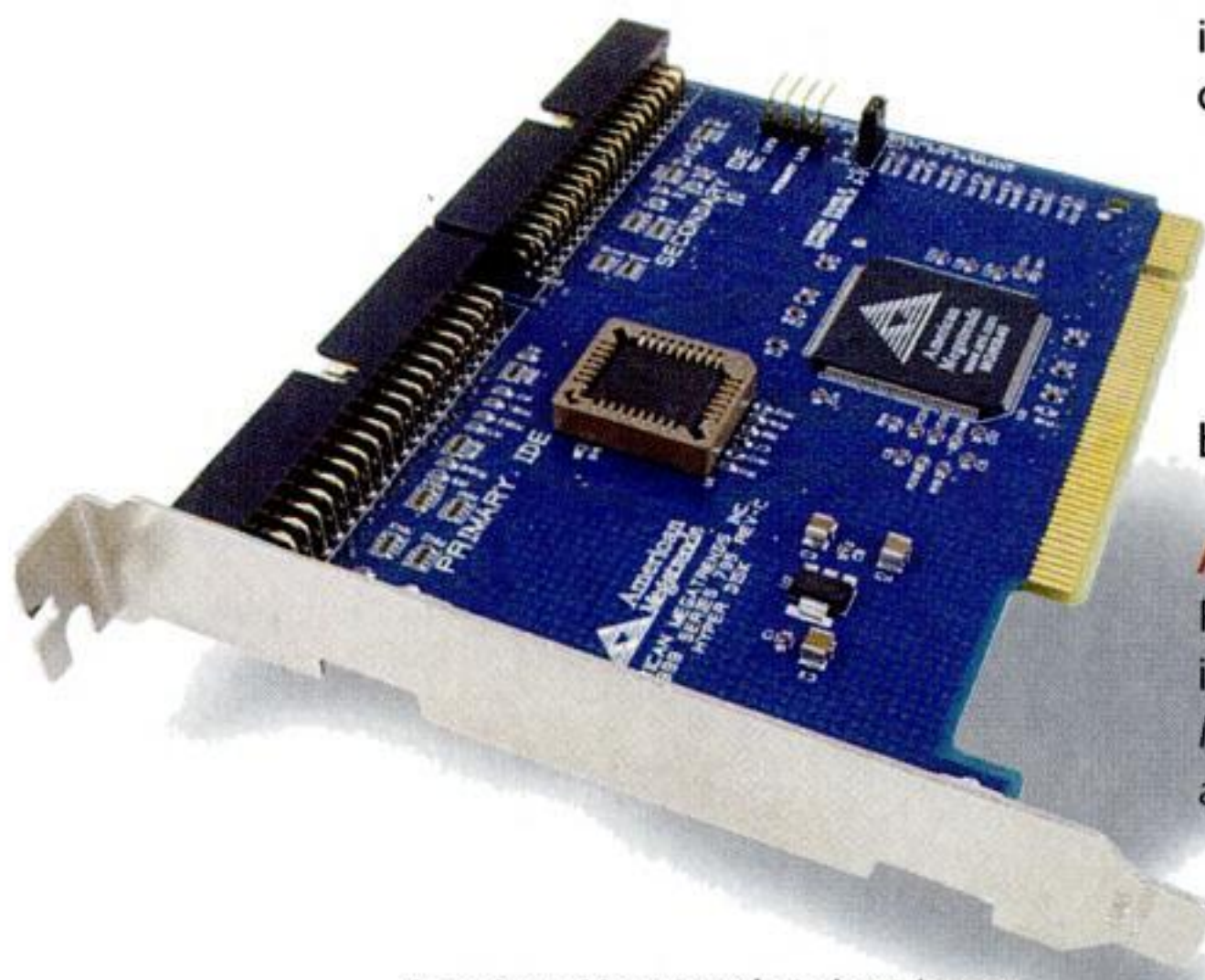
Perhaps best known for its work in the BIOS realm, American Megatrends has dabbled in the dark art of disk control for some time. We tested the HyperDisk 100's little brother, the ATA/66, back in October and found it wanting, but this board fared much, much better in our evaluation.

The AMI board stands out from

the pack of RAID controllers by using its very own RAID chipset, known as the PCI 649, rather than a licensed chipset from another vendor, such as HighPoint. The HyperDisk ships with two channels that allow four drives to share a Master/Slave relationship, but for our own two-drive testing, we stuck each IBM 75GXP on its own separate channel for maximum throughput.

Testing began with Intel's *IOmeter*, which lets you tweak settings up the wazoo to simulate almost any type of I/O environment. In its initial test spin, the HyperDisk 100 pushed our IBM drives all the way up to 55MB/sec sequential read speeds. Holy crap! It even burned through our simulated write tests, turning in speeds in excess of 21MB/sec. In fact, the HyperDisk fared admirably in all of our tests. In our real-world tests, *Quake III* and *Photoshop*, the HyperDisk performed neck-and-neck with the Abit and 3Ware offerings.

Setup was the same as with the Abit board—a snap. With stripe-size options ranging from 32K to 4MB, the HyperDisk is ready for just about any workload. And since AMI plays with BIOS innards as a full-time job, it's no surprise that the RAID configuration menu is



American Megatrends is best known for its BIOS work, but watch out—its ATA/100 RAID controller packs a powerful punch.

desktop systems | notebooks | videocard | soundcard | storage | printer | scanner | input devices | network | misc

easy to set up and navigate.

Although its benchmark scores in some tests were slightly slower than those of the Hot Rod, the HyperDisk 100 isn't a trifling RAID card. We experienced higher CPU utilization marks with this card than with the others, but AMI's card certainly has the power to stand up to the best from HighPoint's HPT 370 chipset.

**3Ware Escalade 6400**

Of the controllers tested here, 3Ware's Escalade 6400 is physically the largest and boasts only ATA/66 speeds. In fact, the Escalade 6400 is tuned more for admin-type geeks serving data from inexpensive FTP servers.

The 6400 is a full-length PCI card and therefore won't fit in smaller cases. It packs four independent IDE ports supporting one drive each, which is two more ports than the other cards in this roundup have. The best part is that with independent ports, futzing with Master/Slave settings is not an issue. A possible negative is that the card uses a relatively unknown chipset, the Xilinx Spartan.

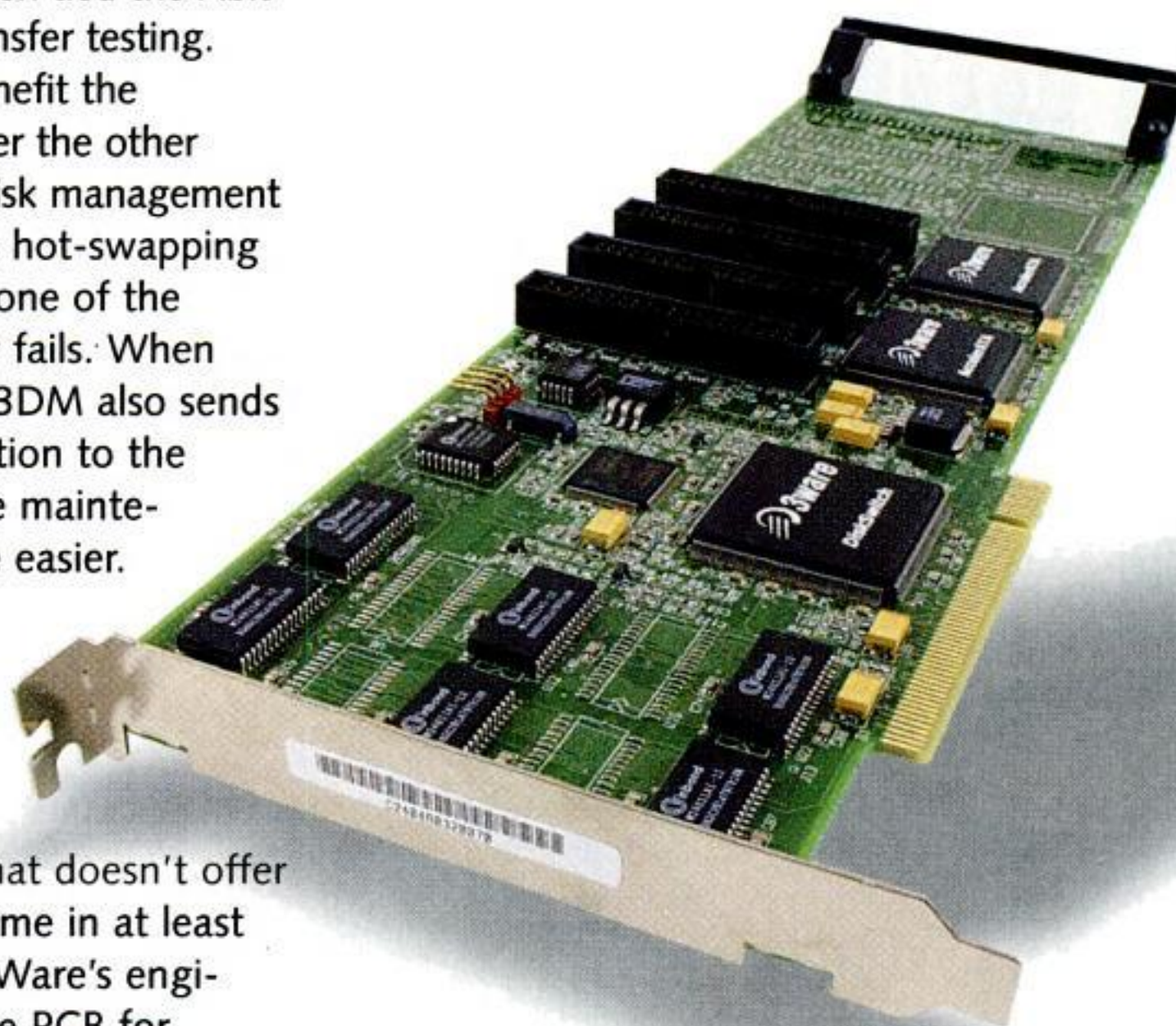
In synthetic benchmarks, the 6400 didn't stand up to the throughput of the ATA/100 cards we tested, but it wasn't exactly a beatdown. In real-world testing, the 6400 performed well. In *Quake III*, 3Ware's massive card kept up well against the ATA/100 controllers, losing by less than

2fps. The 6400 even tied the Abit card in the file transfer testing.

The biggest benefit the Escalade offers over the other cards is its 3DM disk management utility. 3DM offers hot-swapping capability in case one of the drives in the array fails. When a problem arises, 3DM also sends an e-mail notification to the sysadmin. Remote maintenance couldn't be easier.

Our biggest gripe is with the lack of onboard cache. A full-length RAID controller that doesn't offer this option is a crime in at least 27 states. Sure, 3Ware's engineers designed the PCB for adaptability by leaving room for additional Xilinx chips and IDE ports. But this design leaves no room for onboard cache, hurting the card and positioning it for only nonserious servers. (Adaptec's AAA-UDMA has the same dimensions as the 6400 and at least offers the potential for 64MB of onboard RAM.) Throw in stripe options limited to 64K stripes and you see our peeves with the 6400.

3Ware has produced a solid card that would be rock steady with a few more options. However, the lack of ATA/100 support and onboard cache makes us shiver at the thought of what could have been. For servers, the Escalade 6400 isn't a bad compromise, but home



For server-level systems, 3Ware offers solid RAID performance without the Serious Cash Sucking Interface.

consumers interested in serious speed boosts would do better looking to AMI or Abit for their RAID requirements.

Indeed, our benchmarks show that ATA RAID is a viable alternative to SCSI RAID. With faster drives, such as the IBM 75GXP, becoming more prevalent, RAID stands to enjoy a much greater popularity in the coming year. Just be aware of what you want out of RAID. Abit's Hot Rod 100 and AMI's HyperDisk 100 can rival lower-end SCSI RAID 0 configs, and 3Ware's Escalade proves that it's a sound alternative for low-end servers, even though it's limited to ATA/66. So, move outta the way, SCSI. ATA RAID is infringing on your turf.

—Scott Tarr

**3WARE**  
**PLUSES**  
 Good speeds for ATA/66  
 3DM utility

**MINUSES**  
 Monster size  
 No RAID 5 support  
 No onboard cache  
 Pricy  
 Stripe size limited to 64K

**DARE TO COMPARE**

MANUFACTURER	ABIT	3WARE	AMI
RAID levels supported	0,1, and 01	0,1, and 01	0,1, and 01
<i>Quake III</i> timedemo I	<b>88.4</b>	86.6	88.2
<i>HD Tach</i>			
Avg. read speed (MB/sec)	<b>38.21</b>	32.64	36.82
Random access time (ms)	<b>12.7</b>	14.2	12.8
CPU utilization %	<b>11.6</b>	16.3	19.9
<i>Iometer</i>			
Max. read speed (MB/sec)	54.94	53.33	<b>55.65</b>
Avg. write speed (MB/sec)	20.68	15.86	<b>21.69</b>
Time to copy 640MB (min:sec)	1:33	1:33	<b>1.29</b>
<i>Photoshop 5.5</i>	<b>139 secs</b>	144 secs	140 secs

\*Best scores are bolded. Tests bed: Dell B733r Pentium III 733MHz system with 128MB RDRAM, two IBM 75GXP ATA/100 drives in RAID 0 array, 3D Prophet II 64MB DDR SDRAM.

**ABIT HOT ROD 100** **9**  
 \$50 | Abit  
 www.abit-usa.com

**AMI HYPERDISK 100** **9**  
 \$110 | American Megatrends, Inc.  
 www.ami.com

**3WARE ESCALADE 6400** **7**  
 \$295 | 3Ware  
 www.3ware.com

# Budget Video Brouhaha

## BRING OUT THE WIMPS

### 3dfx

#### PLUSES

Glide support  
Fastest 2D performance

#### MINUSES

Slow 3D

### ELSA

#### PLUSES

Decent 3D  
Decent 2D

#### MINUSES

No good at high res

#### THE SPECS

### 3DFX VOODOO4 4500 RAMDAC

350MHz

#### MEMORY

32MB 166MHz SDR SDRAM

#### CORE CLOCK

166MHz

#### DRIVER REVISION

1.03

#### THE SPECS

### ELSA GLADIAC MX RAMDAC

350MHz

#### MEMORY

32MB 64-bit DDR SDRAM

#### CORE CLOCK

175MHz

#### DRIVER REVISION

4.12

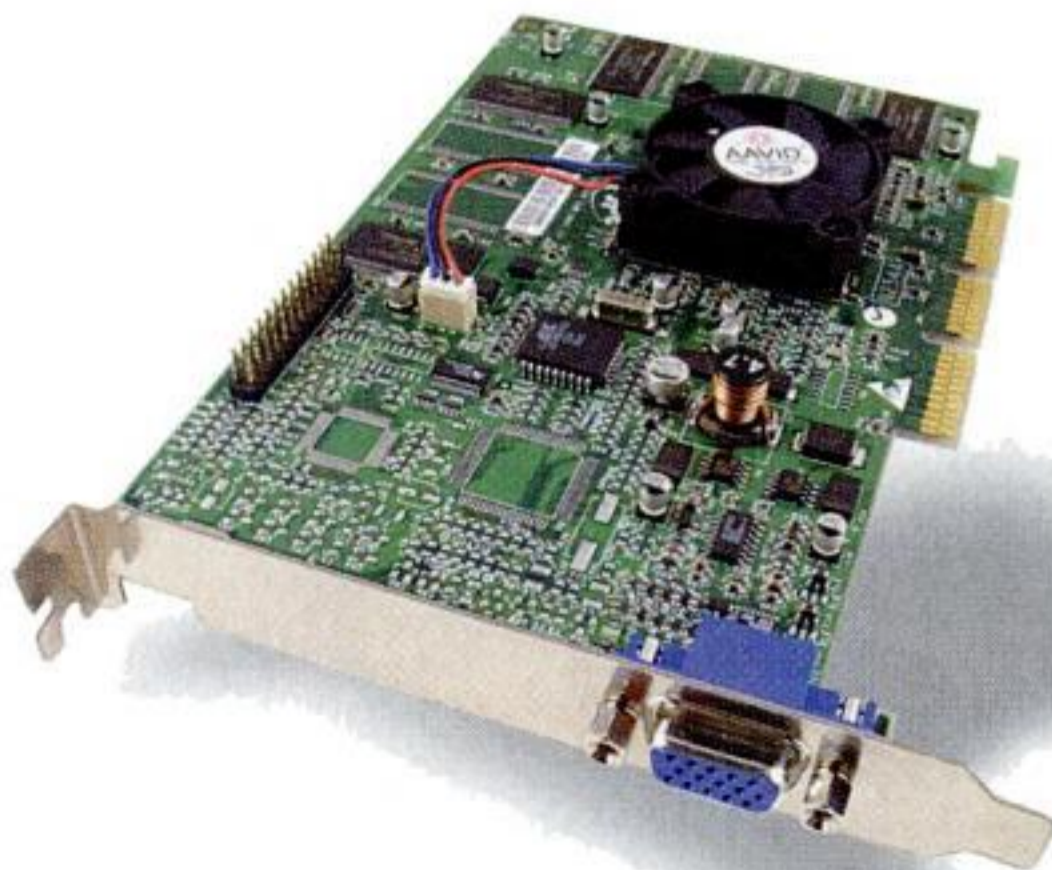
We're all-out fans of the biggest, bestest, fastest, swankiest, pimpiest hardware around, but we understand that not everyone has the budget required to crank his or her PC to maximum status. With that in mind, we rounded up four relatively modern videocards that cost less than \$150 each.

Remember, we're dealing with the wimps of the 3D accelerator world here. In order to shave the prices of their cards, these manufacturers left out important parts or even crippled parts that would otherwise work normally. Each company took a different path down the road to cheap, and some were more successful than others. Don't expect us to go soft on these "3D-challenged" videocards; we set out to review them the way we review all other products: with uncompromised candor.

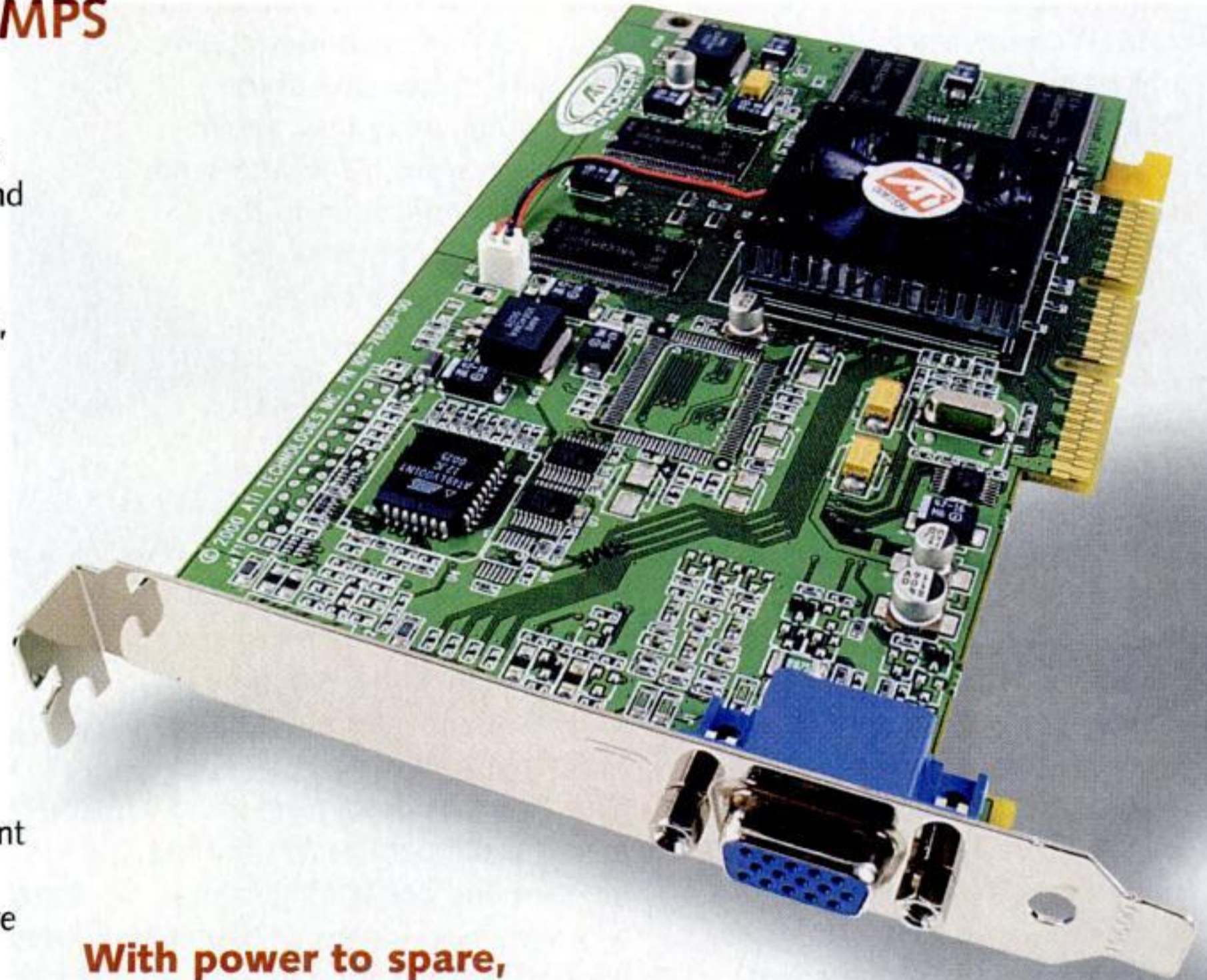
#### 3dfx Voodoo4 4500

We weren't expecting much from the Voodoo4, and we weren't disappointed. With a single VSA-100 chip and 32MB of SDRAM clocked at 166MHz, the Voodoo4 isn't much of a performer.

Without the multiple VSA-100 chip configuration found on this card's big brother—the Voodoo5



If you don't play *Tribes* or other Glide games, the Voodoo4 4500 is probably not for you.



**With power to spare, ATI's Radeon made a mockery of our budget card roundup.**

5500—the 4500 is incapable of 4x FSAA and is limited to AGP 2x. And in case you haven't heard, this card doesn't support hardware T&L either.

The good news is that the 4500's performance is adequate at lower resolutions. Even in our demanding *Quake III* "quaver" benchmark, the 4500 approached 40fps at 800x600, which is entirely playable. If low-res 16-bit gaming or Glide titles are your thing, the Voodoo4 is a decent choice despite the fact that the card is stymied by its anemic fill rate. In other words, if you don't really require Glide support, you should pass on this card.

#### Elsa Gladiac MX

The Elsa Gladiac MX is based on nVidia's GeForce2 MX chipset and is made primarily for budget gamers and corporate cubicle-dwellers. While normal GeForce2s use 128-bit DDR SDRAM, the MX uses 64-bit DDR SDRAM. Because of this, the MX can only move half as much information to memory per clock cycle, kneecapping the Gladiac's performance to GeForce1 SDR levels. As you might expect, the performance

hit was especially evident in fill-rate-intensive benchmarks, such as *Quake III* demo001. With a memory bus this slow, playable frame rates are attainable only at 800x600 or lower.

There are lots of MX-based cards from various manufacturers available, and many can be found online for around \$100. They all offer performance comparable to the Gladiac. So why'd we choose the Gladiac for this roundup? Because this card offers support for the nifty Revelator shutterglasses from Elsa.

#### Matrox G450

The poorest overall performer of this roundup is the Matrox G450. It posted abysmal scores in almost every benchmark and lacks hardware T&L, so we see no reason to even consider the G450 unless you do serious 2D work. The innovative DualHead feature, which allows a user to connect two monitors to one videocard, is a standard feature on the G450. DualHead coupled with the fastest 2D performance in our roundup makes the G450 a great choice for graphic designers, hard-core word processors, and anyone who can use more than one monitor at a time—at least until GeForce

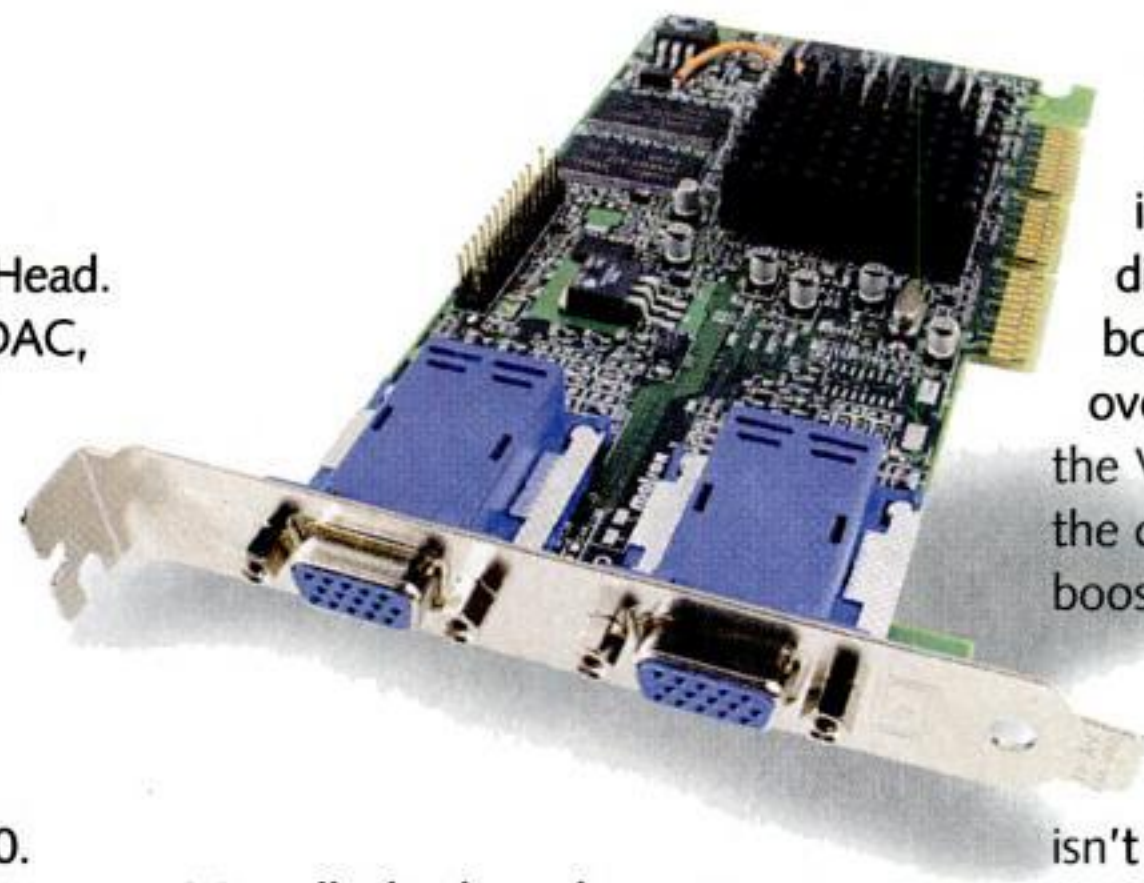


MX- based cards supporting TwinView (a similar feature) are available.

We can't get enough of DualHead. With the G450's 350MHz RAMDAC, independent resolutions of up to 1600x1200 (on the primary display) and 1280x1024 (on the secondary) are available. Unfortunately, all the multi-monitor goodness isn't enough to save this card. We'll wait for the (hopefully) forthcoming G800.

**ATI Radeon 32MB DDR**

When we set a \$150 price cap on our entrants, we didn't expect to see any fantastic performers, but the kids at ATI decided to play hardball and are offering a \$50 rebate to consumers, making the Radeon 32MB DDR eligible for this roundup. With 32MB of 166MHz DDR SDRAM and an advanced hardware T&L engine, the other boards didn't stand a chance. As with the 64MB version of the Radeon, the kick ass HyperZ z-buffer optimizations kick in when resolutions are cranked up above 800x600 and 16-bit color, meaning this card can play in 32-bit at resolutions the other cards can't match.



memory path hampered any real-world speed increases. Although we didn't test other MX-based boards, we'd expect similar overclocking ability. With the Voodoo4 4500, increasing the core clock speed will boost the theoretical fill rate, but the card is still constrained by its sluggish SDRAM. The G450 isn't even worth considering as an overclocking card, since no amount of overclocking can help its embarrassing 3D performance. The Radeon, however, is promising. Our test board ran from 166MHz stock all the way up to 183MHz, giving us a nice 6fps boost. As always, your overclocking results may vary.

Buying a budget card doesn't have to be a painful experience. With 3dfx's Rampage and nVidia's NV20 expected in the spring, it may not even be a bad idea. If you really need to upgrade your video now, the price of three games can put a board in your machine that's dangerously close to kick ass performance.

—Will Smith

We really dig the multi-monitor support that DualHead offers, but you shouldn't even consider this card if you plan on ever playing a 3D accelerated game.

The Radeon isn't all wine and roses, however. With only 32MB of local memory, it doesn't have the firepower for the massive amounts of textures that games like *Giants: Citizen Kabuto* and *Sacrifice* are capable of tossing at it. But what do you expect from a budget card? As evidenced by its *SYSmark* scores, the Radeon's 2D performance is the worst in the bunch. Although it isn't the best for desktop application work, it's by far the best for 3D gaming, and we all know which is more important, right?

**The Bottom Line**

Even with its faults, the Radeon takes the cake in this price range. Penny pinchers should also be on the lookout for GeForce1 DDR-based boards, which should be in this price range and perform somewhere between the Radeon and the Gladiac.

The only thing left to talk about is overclocking these puppies. Since they're just crippled versions of speedier boards, they should overclock well, right? Yes and no. The Gladiac overclocked just fine with additional cooling, but the 64-bit

**THE SPECS**

**MATROX G450**

**RAMDAC**  
360MHz

**MEMORY**  
32MB 64-bit DDR SDRAM

**DRIVER REVISION**  
6.03

**THE SPECS**

**ATI RADEON 32MB DDR**

**RAMDAC**  
350MHz

**MEMORY**  
32MB 166MHz DDR SDRAM

**CORE CLOCK**  
166MHz

**DRIVER REVISION**  
4.12

**MATROX**

**PLUSES**  
DualHead  
2D speed

**MINUSES**  
Pathetic 3D

**ATI**

**PLUSES**  
Best performance  
Runs 3D at 1024x768  
Great DVD playback

**MINUSES**  
Slow 16-bit  
Slow 2D

**3DFX VOODOO4 4500** **5**

\$150 | 3dfx  
www.3dfx.com

**ELSA GLADIAC MX** **6**

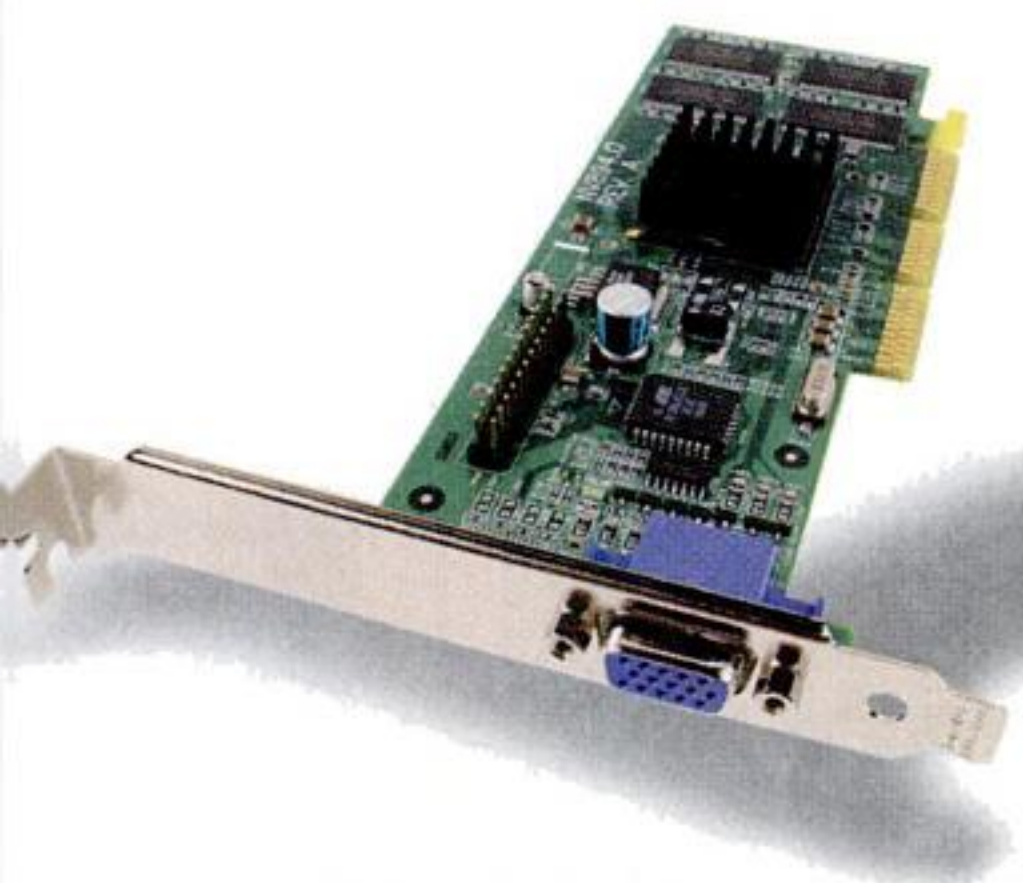
\$130 | Elsa  
www.elsa.com

**MATROX G450** **5**

\$130 | Matrox  
www.matrox.com

**ATI RADEON 32MB DDR** **8**

\$150 (w/rebate) | ATI  
www.ati.com



The Gladiac was a distant second choice, thanks to its narrow 64-bit memory.

**DARE TO COMPARE**

MANUFACTURER	VOODOO 4	RADEON	GLADIAC	G450
Quake III demo001 1024x768	30.6	56.5	30.3	17.0
Quake III quaver 800x600	37.8	69.7	43.1	24.9
3DMark 16-bit	43.3	44.7	58.8	34.4
3DMark 32-bit	28.2	43.8	38.5	24.9
MDK2	56.9	85.0	61.4	41
Expendable	45.4	71	61.9	38.6
SYSmark 2000 (score)	618	581	606	608

All cards were benchmarked using our Dell 733MHz test systems. All benchmarks were run with vsync off. Sound was enabled in all games to more accurately mimic a real-world environment. Quake III was run in 32-bit color with everything set to maximum. If you actually read this, send an e-mail to wsmith@maximumpc.com.

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# Upgrading for the Lazy

## PLUG-IN CARDS MAKE FOR ONE-STEP UPGRADES

If you've got a piece-of-crap computer that you just can't let go of, and you're lazy, Evergreen's "CPU upgrade cards" are for you. With all the components of a mini-system soldered to the PCB, these plug-in cards make for a painless and peppy upgrade.

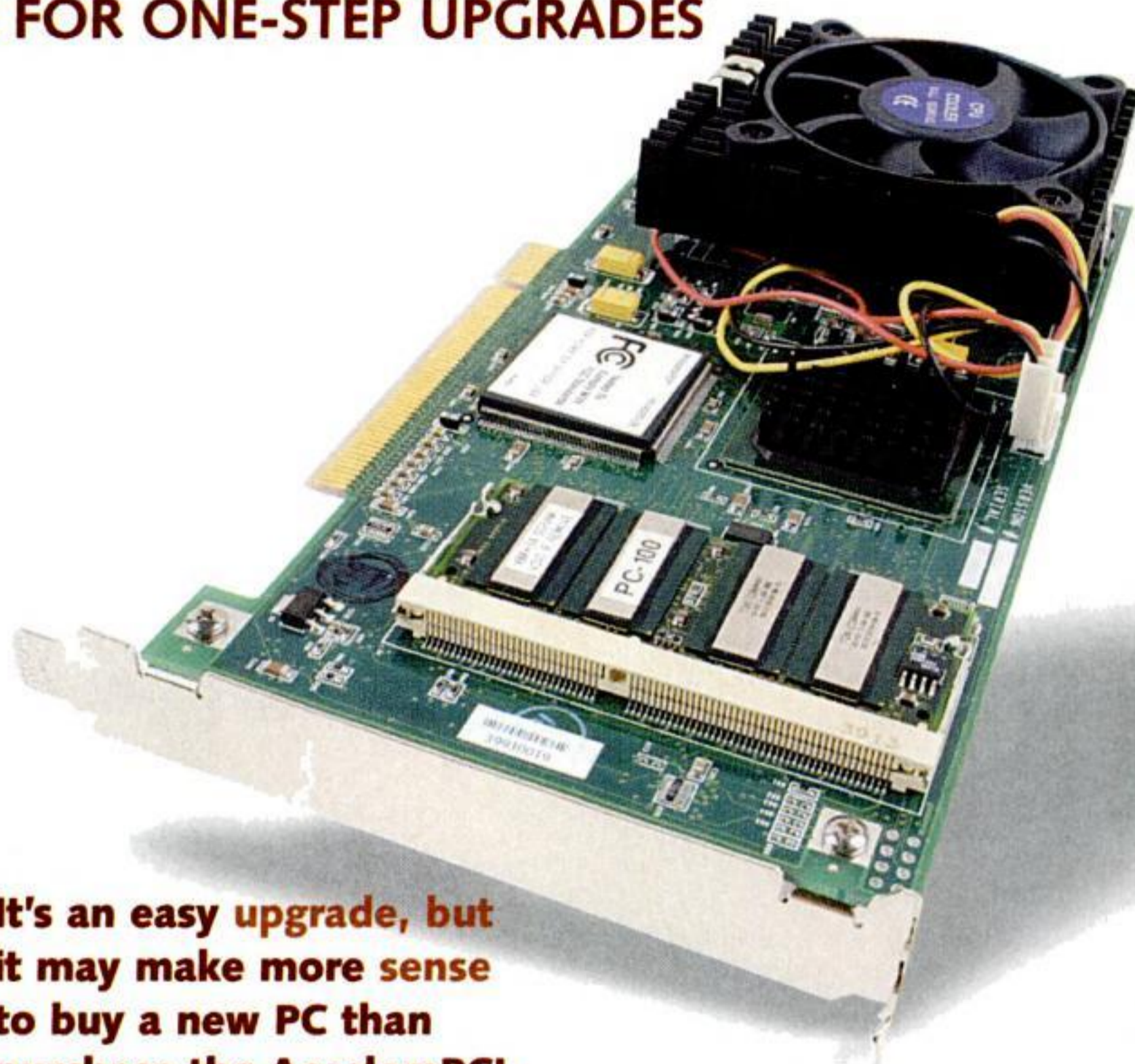
### AcceleraPCI 533

The AcceleraPCI board we tested came with a 533MHz Celeron, one 128MB Small Outline DIMM, and a 440ZX chipset. Just plug the board into a bus-mastering PCI slot, install a driver in Windows, and your PC has been upgraded.

To test the advantages of such an upgrade, we needed a vintage machine to serve as our test bed. In the outer reaches of the Lab, we unearthed a Pentium 200MMX with 128MB of EDO memory in a 430FX motherboard. We benchmarked the PC using the whetstone/drystone tests that came with the AcceleraPCI and ran the standard timed *Photoshop* script.

How did it perform? Surprisingly well. Our *Photoshop* script, which took a laborious 15 minutes to run on the Pentium 200, took only six and a half minutes with the Celeron CPU. Even though the AcceleraPCI sped up the CPU and memory, the vintage hard drive hurt performance.

Evergreen offers the AcceleraPCI in speeds up to 600MHz (with a Celeron III), and even includes adjustable voltage and FSB speeds (up to 133MHz) in its BIOS. Unfortunately, there's no FC-PGA support for faster P-III or Celerons. Our only reservation



**It's an easy upgrade, but it may make more sense to buy a new PC than purchase the AcceleraPCI.**

about the card is its price. It doesn't make sense to pay \$500 for an upgrade card when you can buy an entire system for not much more. For a no-fuss, no-muss upgrade, however, the AcceleraPCI delivers the goods.

### PerformaIII 700

We were slightly less impressed with Evergreen's PerformaIII 700. When we first unpackaged it, we thought it was just a \$20 socket. Further inspection revealed it to be a P-III Coppermine 700 attached to a FC-PGA adapter.

Evergreen said that's not the only thing you get for \$320. The company provides BIOS updates for numerous boards, should your mobo need a BIOS update to work with the card. Evergreen's tech support is also fairly responsive, something you'll never get if you try to reach one of the generic FC-PGA adapter makers.

We first tried the PerformaIII 700 on a non-Coppermine Intel Seattle 2 board based on the 440BX chipset, with a 500MHz P-III. Unfortunately, we had flashed the BIOS on our test machine with the latest BIOS from Intel. The latest iteration, we discovered, removes support for Coppermine CPUs. Doh! Evergreen's response: You're S.O.L if

you didn't keep your older BIOS handy on disk.

The second test machine had an even older Seattle motherboard with a 450MHz Pentium II. Despite Intel warnings that the board is unable to support anything higher than a 450MHz CPU, we got the PerformaIII running at 700MHz, even though it posted as a 500MHz Pentium Pro. The reason? Intel chips are clock-locked, and even if the BIOS doesn't recognize it as a 7x100, the chip will still run at that speed. We verified the speed with *WCPUID* and benchmarks showed the PC was indeed running at 700MHz Coppermine speeds.

Is the Performa worth it? For those with motherboards that will work with it, yes. If you can move from a 400MHz P-II to a 700 or 800MHz Coppermine, go for it. Just make sure the Performa is compatible with your mobo before you plunk down cash.

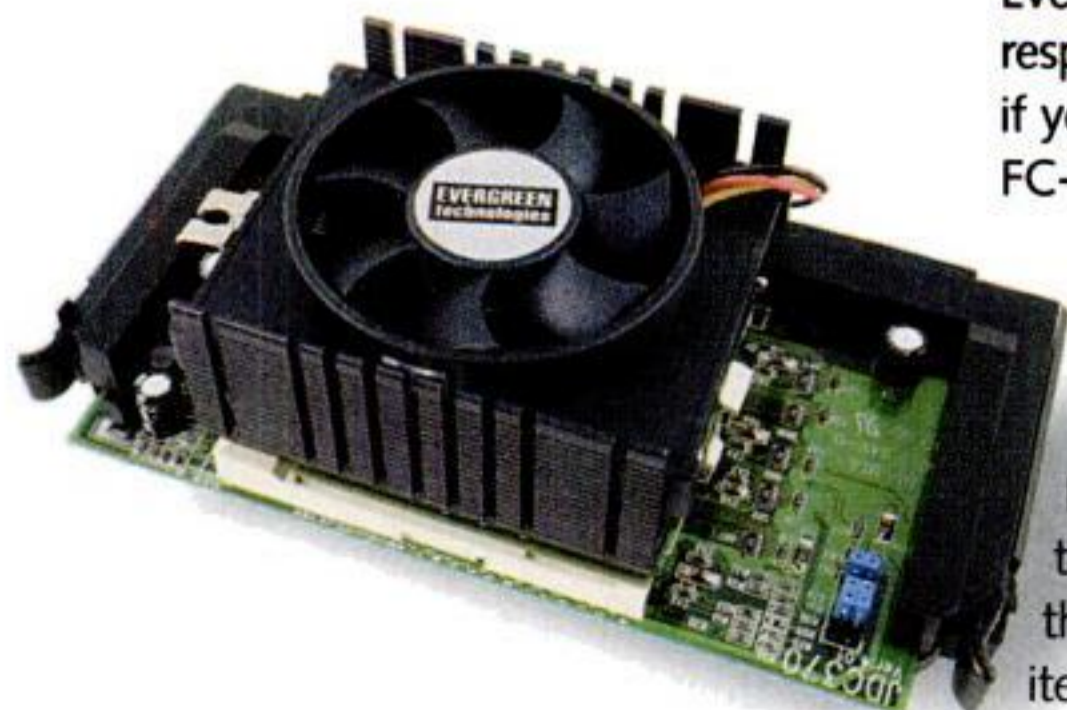
—Gordon Mah Ung

**ACCELERAPCI  
PLUSES**  
Easy install  
Good boost for dog systems

**MINUSES**  
Price almost as much as new machine

**PERFORMAIII  
PLUSES**  
Easy  
Coppermine upgrade for older systems

**MINUSES**  
Just a socket converter?  
Won't work on all Slot 1 mobos



The PerformaIII 700 promises Coppermine performance for the Katmai-bound.

**ACCELERAPCI** **7**  
\$500 | Evergreen  
www.evergreennow.com

**PERFORMAIII** **7**  
\$320 | Evergreen  
www.evergreennow.com

# MP3s and CDs Play Nice

**HYBRID PLAYERS: A GREAT IDEA, BUT POORLY EXECUTED**

You've probably got loads of MP3s on your hard drive, but figure that if you want to listen to them on the go, you're going to have to pony up the big bucks for enough SmartMedia to hold them all. Right? Wrong. Combination MP3/CD players have arrived. Unlike portable MP3 players, the capacity of MP3 CD players isn't limited by the small sizes and high prices of SmartMedia—they can play audio CDs and CD-Rs that contain MP3s. That means upward of 150 songs (depending on MP3 file sizes) on one piece of media, compared to the 20 or so MP3s that can fit on a meager 64MB SmartMedia card.

These players aren't solid-state like most portable MP3 players we've seen, and though most boast a one-minute buffer to help curtail skipping, you don't want to hit the StairMaster with one in tow. However, unlike some of the players now available with 6GB-plus of storage, these puppies are relatively affordable. If you've already got a CD burner, you're in like Flynn—whoever he is.

**Genica Tavaura/  
EasyBuy2000 MPTrip**

The Tavaura/MPTrip is the same product sold by two different distributors under different names. The core technology gets props for being the first product of its kind to hit the market, but it definitely suffers from the first-gen jitters.



The Tavaura/MPTrip isn't fancy, but it gets the job done.



**The Pine D'Music is the only MP3 CD player we've seen with an LCD that displays ID3 tag details.**

Its construction feels chintzy at best—the result of a lightweight plastic case and buttons that don't always depress properly.

Still, the Tavaura/MPTrip played five out of six of our freshly burned CD-Rs (we used TDK media and burned discs at a mild 6x). We

never figured out what the player didn't like

about the one rejected disc, but we're not surprised that this player was finicky about its

media. We were later

told that the manufacturer recommends using only brand-name media and burning CDs at a low speed.

Like most portable CD players, the Tavaura/MPTrip lacks an LCD—and

we quickly realized how much we've grown used to having one on a portable MP3 device. Without an LCD, ID3 tags are useless, making it virtually impossible to locate a particular song on a CD. For the most part, we just set the player to random and enjoyed the mix. And since the Tavaura comes with a car adapter kit, it became an immediate fixture during our morning commute.

Sound quality was sometimes inexplicably muffled, but when the Tavaura/MPTrip was working well, its tones were warmer than we expected. The bundled headphones are nothing to write home about, but the five preset EQ settings do actually yield different sounds—sometimes emphasizing highs, sometimes lows, and sometimes what seems to be background hiss. The results were occasionally pleasing.

The Tavaura/MPTrip includes ear-bud headphones (standard-issue cheapos), line-out and mic jacks, and a car adapter kit. With two AA batteries installed, it will play about

**GENICA  
PLUSES**

Great sound quality  
Car adapter kit included

**MINUSES**

Chintzy construction  
No LCD or ID3 support

**PINE  
PLUSES**

LCD and ID3 tag support  
Intuitive controls

**MINUSES**

Sound quality is a little tinny

four hours worth of music—not exactly stellar. The distributors actually recommended that we invest in some rechargeable batteries. Sage advice, indeed.

**Pine D'Music**

Unlike the Tavaura/MP3Trip's flimsy plastic shell, the D'Music's case feels solid and better able to withstand, say, being stored in a backpack. It's hardly a back-breaker, but the D'Music weighs enough to feel substantial, and its stylish silver paint-job and squared-off corners look smart. This means nothing in terms of its capabilities, but we do like cool-looking stuff.

Bar none, the D'Music's best feature is its backlit LCD that displays ID3 tag information. You can actually see the title of the track that's playing and sift through all the songs on a CD for a particular track. We admit that this feature didn't seem that important until we really, really wanted to hear a particular song that we knew was living on a CD with 172 of its friends. After that, the LCD became a must-have.

D'Music's playback lacks nothing in the volume department, which is great for those of us who expect playback of Nirvana's "Negative Creep" to result in bleeding ears. But the sound quality lacks warmth and was missing some of the pop we like to hear in highs and thump we like to hear in lows. The preset EQ settings—Jazz, Classic, Extra Bass, Pop—made a significant difference in a few cases, but we couldn't decipher any method to the madness (Prince's "Pop Life" benefited from the Jazz setting—who knew?).

The D'Music's play, fast-forward, rewind, and stop buttons all coexist on one finger-activated control pad, which we found very easy to navigate one-handed. It boasts all the standard playback options—shuffle, repeat one or all—and a scan function to preview songs. Why D'Music decided to isolate the anti-shock feature as a button-activated function didn't make much sense to us, but if you're interested in playing CDs that skip, well, the D'Music's got you covered.



The Philips eXpanium didn't exactly bowl us over.

The D'Music's bundle includes ear-bud headphones (again, discount-store quality at best), a rechargeable Ni-Cad battery, and mini-to-twin RCA cables for hooking the D'Music up to your home stereo via the unit's line-out jack. With four AA Alkaline batteries installed, the D'Music will last for about eight hours.

**Philips eXpanium**

We actually *bought* the eXpanium because Philips said it had no evaluation units to send to us. We immediately found the included headphones to be nonfunctional. Granted, most headphones bundled with MP3 players are piss-poor, but these just plain didn't work—sound regularly dropped out of the left ear. This did not bode well for the eXpanium.

Philips did endow its new toy with features that set it apart from the other MP3 CD players. For example, if you create a CD on which you've stored songs in different directories, the eXpanium recognizes those directories as different albums you can navigate to directly. You can also store up to 30 tracks per "album," essentially creating a playlist—that's a feature neither of the other players offer.

Great. Excellent. We love it, but for one teeny, weeny, little detail: The eXpanium has no LCD readout, and thus doesn't support ID3 tags. So, unless you have a list

telling you the order in which your CD is storing your 167 songs, you don't know which track corresponds to which song, or which file corresponds to which album. This effectively renders useless the two features we just described.

Unfortunately, the eXpanium's sound provides no redeeming qualities. It's able to get good and loud, but the substantial volume only serves to amplify the hiss that plagued every song we listened to. Employing the Dynamic Base Boost slider switch did make a difference—it eliminated the hiss and added muffle. Lovely.

The eXpanium's electronic shock protection—essentially a 100-second buffer—stood up admirably to our shaking test, but this was hardly enough to appease our abused ears. The eXpanium has one line-out and comes with an AC adapter and a car adapter kit. The included rechargeable batteries deliver 10 hours of playing time when fully charged.

There's no question that, if you already own a CD burner, the price of an MP3 CD player is way more affordable than that of the multi-gig MP3 players currently hitting the market. On the other hand, these aren't going to replace current solid-state players such as the Diamond RIO, since you can't exercise with them. And we missed being able to look through tunes organized into playlists. In fact, it's the D'Music's ability to read and display information from ID3 tags that makes it our choice among the players we reviewed.

—Kristen Salvatore

**PHILIPS PLUSES**  
 Playlist feature  
 Reads branching file structure from CDs

**MINUSES**  
 Sound quality is skank-o-riffic  
 No LCD or ID3 support renders pluses almost useless

**GENICA TAVARA** **6**  
 \$100 | Genica/EasyBuy 2000  
 www.genica.com  
 www.easybuy2000.com

**PINE D'MUSIC** **8**  
 \$200 | Pine Technologies  
 www.pine-dmusic.com

**PHILIPS EXPANIUM** **5**  
 \$200 | Philips  
 www.philips.com

# Sanity: Aiken's Artifact

LITHTECH GOES OVERHEAD, BUT NOT OVER THE TOP

*Sanity: Aiken's Artifact* is a comic book-like, third-person adventure game that comes complete with superhuman police, super villains, and themes ripped out of X-Men comics. It's an interesting concept that's pulled off with a modicum of beauty, a small amount of innovation, and, sadly, some glaring flaws.

*Sanity's* story concerns the exploits of Dr. Joan Aiken, who discovers a serum that unleashes latent psionic powers in people's brains. Test subjects don't react well to their newfound powers and consequently go insane—a PR nightmare for the doctor, who retreats underground and creates a small race of psionically talented individuals. Predictably, some choose to use their powers for evil deeds and wreak havoc until the government forms a police group called Department of National Psionic Control (DNPC).

The game's hero, Cain, is one such cop, and his character is portrayed via voiceovers by rapper Ice-T. The performance is true to the rapper's acting career, ranging from decent (*New Jack City*) to awful (*Tank Girl*).

Fortunately, the graphics are much better than the O.G.'s voice acting. *Sanity* uses Monolith's Littech 1.5 engine to create, of all things, an overhead-view game. The engine, which has appeared in *Shogo* and *KISS: Psycho Circus*, isn't cutting-edge by any means. Resolutions peak at 1800x1600, which is impressive, but the poly counts are very low. Chalk



**Using the Littech 1.5 engine, *Sanity* takes the game's camera overhead with some success.**

up about 700 to 900 polygons for Cain, and only 300 to 400 for the game's enemies. Littech could easily support a lot more detail according to *Sanity's* producer Kevin Lambert, but the design team opted for speed over beauty; the game doesn't feature 32-bit textures and colors, and most textures are flat and drab. However, *Sanity's* cheesy appearance actually serves the overhead perspective and 1980s comic book sensibility well. Truly impressive spell effects during psionic combat demonstrate the intent of the designers—the engine is obviously being held back on the environment, leaving the grandiose graphical effects for the meat of the game: combat.

The top-down perspective and adjustable camera put the game in the same company as overhead adventure games such as *Diablo II* and *Nox*, which makes the gameplay both familiar and fun, but also leads to a host of problems. Visible distance is limited, and there's a darkness effect obscuring the view (it can be removed, but you've got to do it every time you load). This would be forgivable if *Sanity* featured hand-to-hand combat within the small visible

area, but there are a lot of projectile-based weapons, which is a foolish design decision given how difficult it is to aim your weapon into areas you can't see properly.

At least the "super-powers," excuse us, "psionic powers," are interesting. Cain collects card-shaped icons that give him powers such as lightning bolts, fireballs, spinning saw blades, sanity drain, etc. The idea is that if Cain uses his powers too often, he runs the risk of temporarily going nuts and losing control, which in turn may cause him to whack a bunch of civilians. If that happens, the game ends, so careful monitoring of his sanity is critical. The psionic abilities (or talents) can even be traded during multiplayer. This is a good idea in theory, but ultimately falls flat. The variety of magical attacks that make the single player game more interesting don't translate well in the multiplayer arenas, which are too small to make this kind of combat appealing to deathmatchers.

The result is a game that features an interesting story and a lot of cool powers, but the fun is somewhat hampered by the limited viewing areas and the difficulty that creates in combat situations.

—Andrew S. Bub



Psionic powers are granted by collecting card-shaped icons throughout the game and result in stunning effects when unleashed upon opponents.

## PLUSES

Cool story and comic book theme  
Ice-T, boyeee!  
Interesting concept

## MINUSES

Too short viewing distance  
Weak multiplayer

## THE SPECS

### 3D CARD SUPPORT

Direct3D, Glide

### 3D AUDIO SUPPORT

EAX, DirectSound 3D

### MULTIPLAYER

TCP/IP, IPX, LAN

### TOTAL PLAYERS

(ONLINE)

8

## MAXIMUM PC VERDICT

\$40 | FOX Interactive  
www.sanitygame.com

7

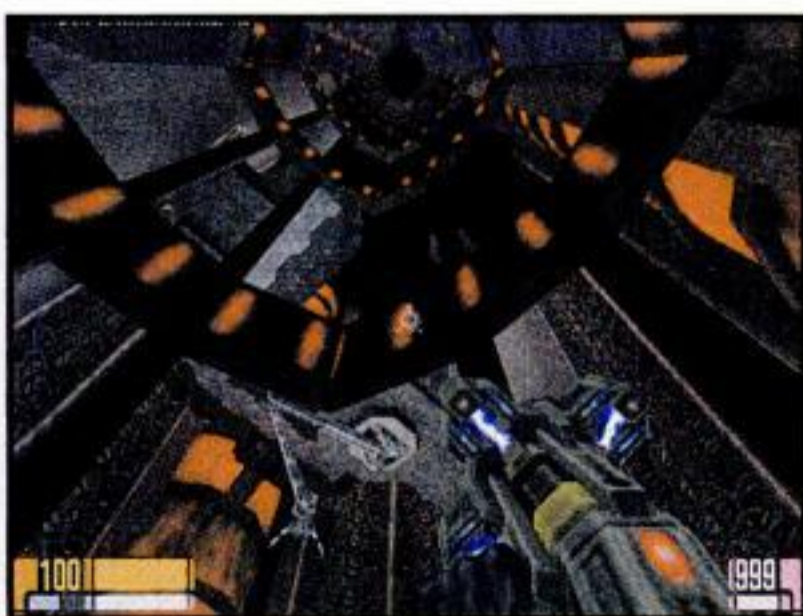
# StarTrek: Voyager—Elite Force

## THE BEST TREK GAME EVER

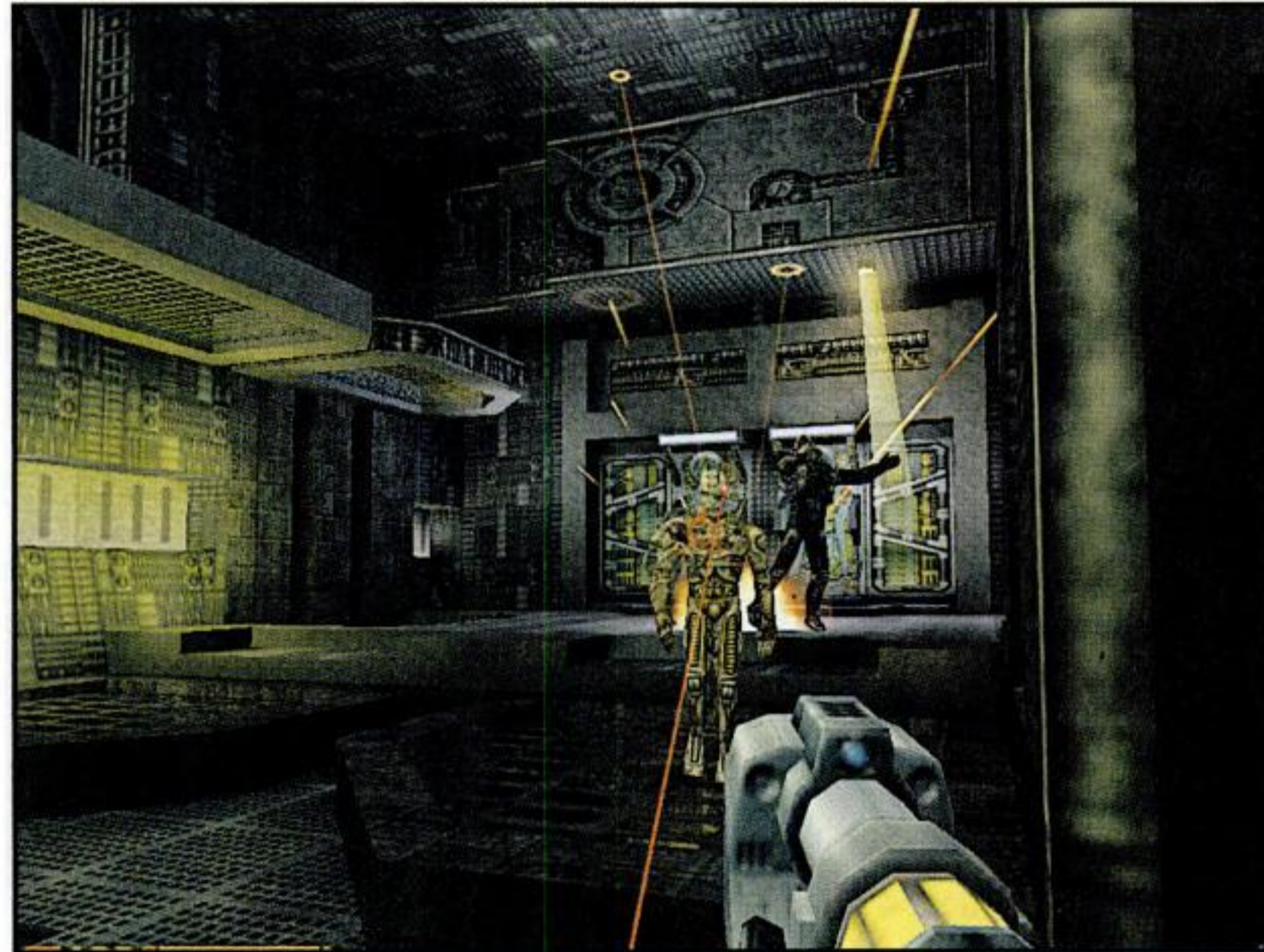
As a general rule, the only things that Star Trek games have in common are their abuse of the franchise and their penchant for sucking. Trek games can be found polluting every major genre, from RTS to FPS to adventure. Shockingly, *Star Trek: Voyager—Elite Force* manages to rise above this legacy of shame. This is an amazingly well-executed, if not entirely original, first-person shooter.

*Elite Force* is designed to play like a mission of the popular "Star Trek: Voyager" series, and it follows the formula closely. You're a member of the Voyager's Hazard Team, a group of crewmen trained to handle dangerous situations that plague an embattled starship. Since you're part of a team, missions generally require several team members to be present to accomplish an objective. This is where *Elite Force* truly shines. Unlike the notoriously stupid "buddies" that are present (or absent, depending on how you look at it) in John Romero's *Daikatana*, the Hazard Team members are extremely well behaved and do exactly as they're supposed to throughout the game. They function using node-based AI and are smart enough to walk around obstructions, follow you to elevators, and attack hostiles without shooting you in the back.

The developer, Raven, claims that *Elite Force* marks a step forward in gaming with its treatment of scripted events—the player is able to interrupt scripted sequences at a whim. In most games with heavy scripting, players can't interfere with scripted sequences. The system Raven created to handle these on-the-fly script changes is



The alien ships are well textured and amazingly expansive. The dominant motif, in our opinion, is flashy and organic.



**In *Elite Force*, you team up with the crew of the Starship Voyager to kick all kinds of alien butt. Luckily, the bots are helpful and never get in your way or piss you off.**

called ICARUS, and it allows NPCs to simply follow commands from the script code and also interpret changes and reroute commands accordingly. For example, if Seven of Nine is accessing a console, you can interrupt her and have an exchange with her, after which she'll return to the task at hand. It certainly works, but we've seen similar scripting in *Half-Life* and *Soldier of Fortune*, leaving us to conclude it's not the magnificent AI feat Raven claims it is.

While we were impressed with the AI, we do have a few minor bones to pick. The game uses skeletal animation, but you wouldn't know it from watching the jerky player movement. This is especially evident during in-game cutscenes, which highlight the lack of synchronization between mouth movements and voice-over. Because of the low poly counts and jerky animation exhibited by most of the models (Seven of Nine was a notable exception) we find it difficult to believe

that Raven used a skeletal animation system, but they swear to it.

We also encountered several situations in which all of our mission objectives were listed as completed but we still hadn't triggered the proper switch for the next event to begin. Minor flaws like these lead us to believe that Raven pushed this one out the door before it was sufficiently polished.

We'll give Raven credit for efficiently managing its polygon budget by deciding to make levels that are very large and moderately detailed, rather than small and insanely detailed, like those found in other *Quake III* engine games such as *F.A.K.K. 2*. Some of the levels inside alien spaceships are the size of a 10-story building and have massive open areas. With clever use of textures, detail brushes, and many destructible fixtures, *Elite Force's* levels are much more immersive than other shooters.

Despite a few minor glitches, we really dug *Elite Force*. It's a solid, fun single player game that combines with juiced up technology for a great gaming experience.

—Will Smith

**PLUSES**  
Huge maps  
Excellent AI  
Holomatch online play

**MINUSES**  
Sub-par animation  
Star Trek license  
Amateur story

**THE SPECS**  
**3D CARD SUPPORT**  
Open GL  
**3D AUDIO SUPPORT**  
EAX, A3D, DirectSound  
**MULTIPLAYER**  
LAN, TCP/IP  
**TOTAL PLAYERS**  
64

**MAXIMUM PC VERDICT** **9**  
\$50 | Raven  
www.ravensoft.com

For definitions of Terminator words, check out the Terminator online at [www.maximumpc.com](http://www.maximumpc.com).

# Office Suite Superslam

## MCAFFEE VERSUS NORTON: FIGHT!

Microsoft has been charged with tying every product known to mankind into its Windows operating system, yet it has never included a robust utility suite. If you want to play *Solitaire* or surf the web, you're all set. If you need antivirus protection or have to recover lost data, you're totally screwed. Thankfully, every year Network Associates and Symantec release their all-in-one utility suites—*McAfee Office* and *Norton SystemWorks 2001*—which offer a veritable smorgasbord of system optimizers and preventative maintenance tools. Last year, *SystemWorks* received a 9 verdict while *McAfee* got a 7. For 2001, the *McAfee* package has a wider assortment of problem-solving applications than ever before, and *Norton* has grown leaner and meaner. Ding, ding—let's get it on!

### MCAFFEE PLUSES

Good disk repair and system maintenance apps

Loaded with additional utilities: firewall, cookie manager, file encryption

### MINUSES

Complex, redundant menus

Minor glitches in some modules

### NORTON PLUSES

Well-integrated, logical menus

Consistently dependable performance

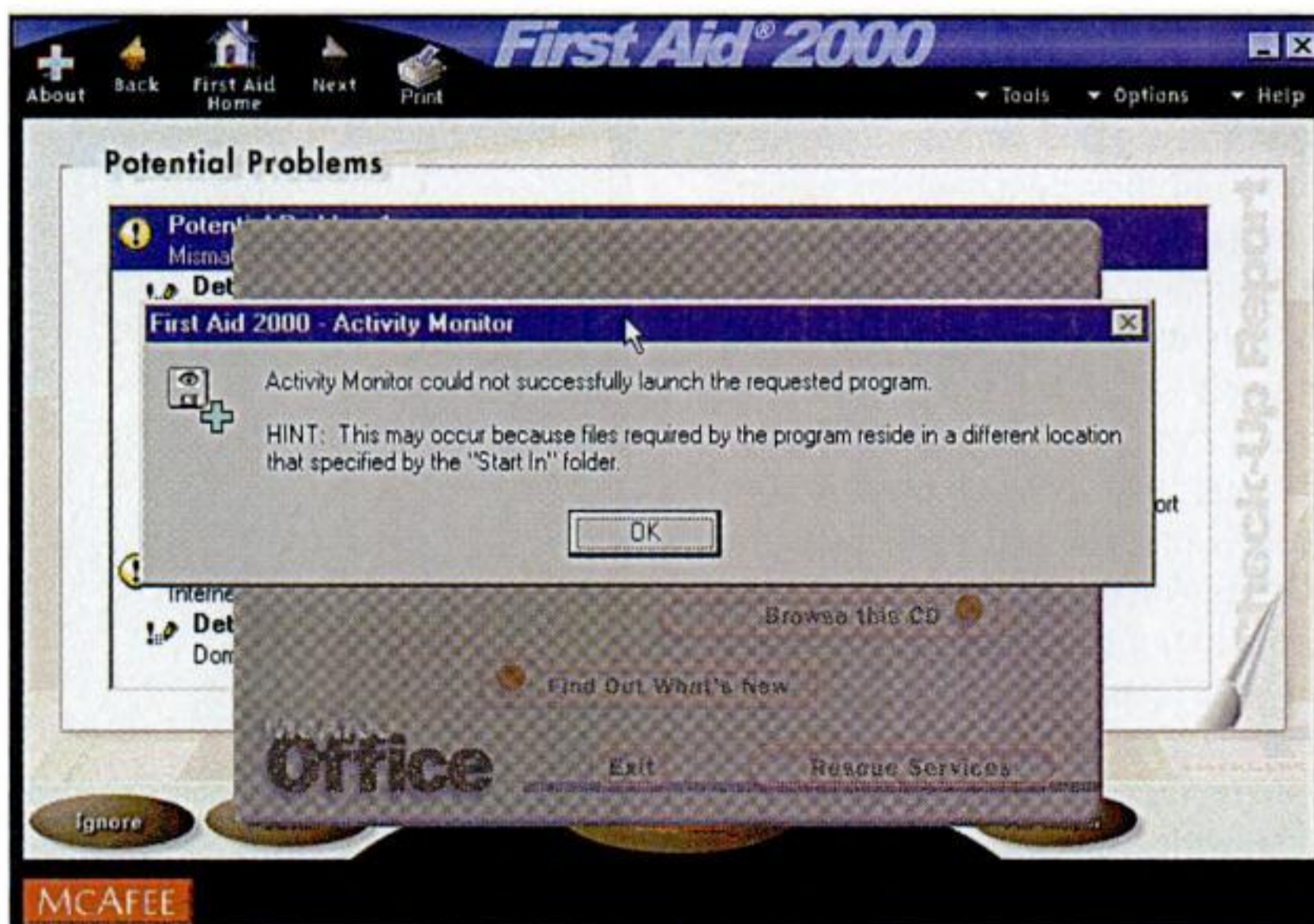
Useful disk repair and system maintenance applications

### MINUSES

Not much different than the last version

### McAfee Office v3.11

*McAfee Office* is typically the dark horse in these competitions, a situation Network Associates has tried to remedy by purchasing every utility ever made and adding it to the *Office* bundle. Previously, this resulted not in increased functionality, but in widespread confusion due to the similarity between programs and a wack interface that included only some of the programs that were available. In the new 3.11 version of *Office*, the biggest change is a new, integrated interface, which is intended to address complaints that the "Office 2000" version was too confusing.



**Unfortunately, several McAfee Office features, such as this one, won't run when you try to use them.**

We were still a bit confused, however, by the duplicate features offered in separate menus. For instance, *First Aid 2000* and *McAfee Utilities* menus offer the same disk checkup utility. And *VirusScan* and *Internet Guard Dog Pro* contain differently worded menus that turn on the same protection against hostile Active-X and Java applets.

Configuring the daily operation of the utility's monitoring programs has gotten a lot easier, fortunately. The Office Interview feature, which is similar to the Q&A sessions used

in most tax preparation packages, now handles this laborious task. It's easy to follow and works well, but omits settings for *Internet Guard Dog* and *PGP*, which were apparently added to the package at the last minute.

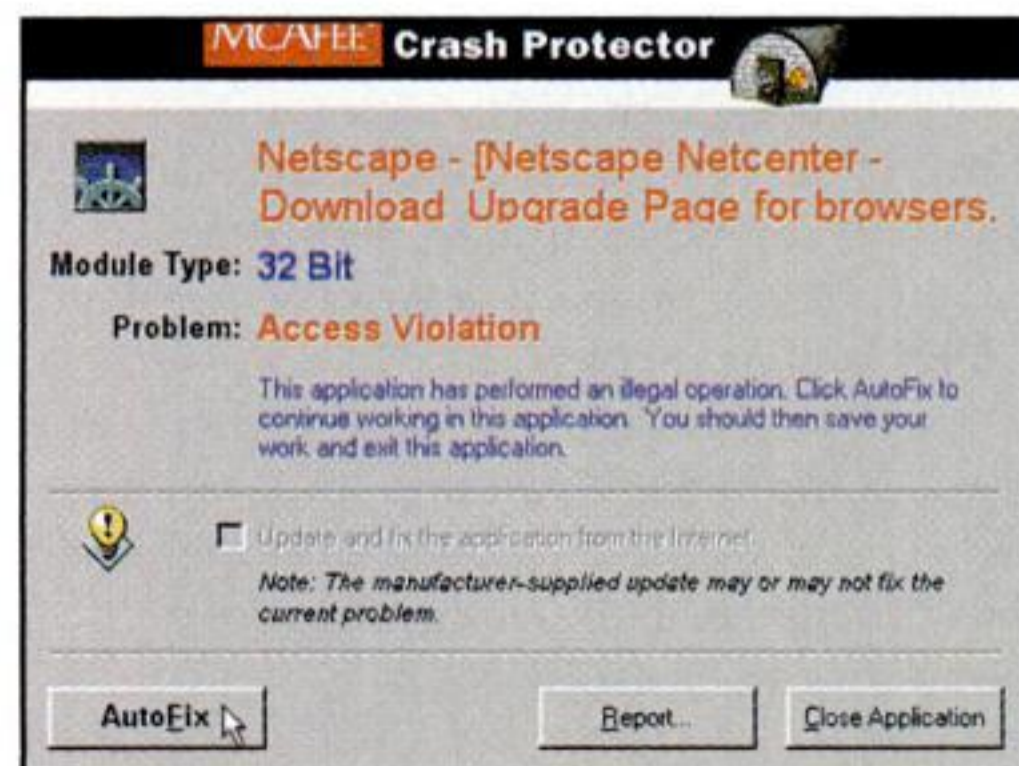
In spite of this handy helper, installation was less than pleasant. We had trouble installing *Office* on a system loaded with *Microsoft Plus*, *Dr. Solomon's Anti-Virus*, and an old version of *Norton Utilities*. In fact, we had to manually uninstall

*Anti-Virus* to get *Office* to install.

Unfortunately, after the programs were all installed and purring happily, we began to experience other problems. To avert constant glitches after installation, we had to manually disable *Norton Unprotect* and uninstall the older version of *VirusScan* bundled with our copy of *Microsoft Plus*. As it turned out, the newer *VirusScan* ignored the settings we chose, and rather than alerting us to infectious entities, it simply disinfected them (which ruined our collection of virii used for testing).

Setting these details aside, we found things to like about some of the modules. *DiskMinder* and *DiskTune*, repair/optimization programs in the *McAfee Utilities*, are on par with *Norton's Disk Doctor* and *Speed Disk*. *Safe and Sound* (which was known as *Retake* when *McAfee Utilities* was called *Nuts & Bolts*) is a convenient automatic backup utility—we used it to protect a selection of "critical" documents and folders.

*Internet Guard Dog*, a new, not completely integrated module, combines Internet filtering with cookie blocking/management and banner-ad blocking options. *Guard Dog's Identity Protector* and *Financial Protector* components let you block your web browser from sending personal contact and credit card information over the Internet. Internet newbies who get spooked by invasion-of-privacy issues



*McAfee Office v3.11* still contains a crash interceptor (*Norton* has discontinued its *Crashguard*), which can occasionally rescue programs and data before they disappear from memory.



will appreciate these features, but more savvy web users will prefer to use their own common sense while surfing. When we combined *Guard Dog* with McAfee *Firewall*, the Internet traffic inspection worked like a clunkier version of Zone Lab's free-ware firewall, *Zone Alarm* (which is still our instant-firewall of choice).

Our overriding feeling about the McAfee *Office* suite is that the product would be stronger if it had less overlap and had undergone more extensive testing. The disk utilities and other modules in the McAfee *Utilities* work well and are worth having around for emergency file recovery and system repair. But if you choose this package over *Norton SystemWorks*, you'll have to comb through the chaff to activate the good stuff and ignore the rest.

**Norton SystemWorks 2001**



Compared to the latest McAfee *Office* release, *Norton SystemWorks 2001* is a lean, clean diagnostics machine. Instead of cramming more and more applications into the suite, Symantec has streamlined the package to deliver core functionality in three basic modules: Norton *Utilities* (disk maintenance and software/hardware diagnostics), Norton

updating drivers and seeking answers to technical support questions.

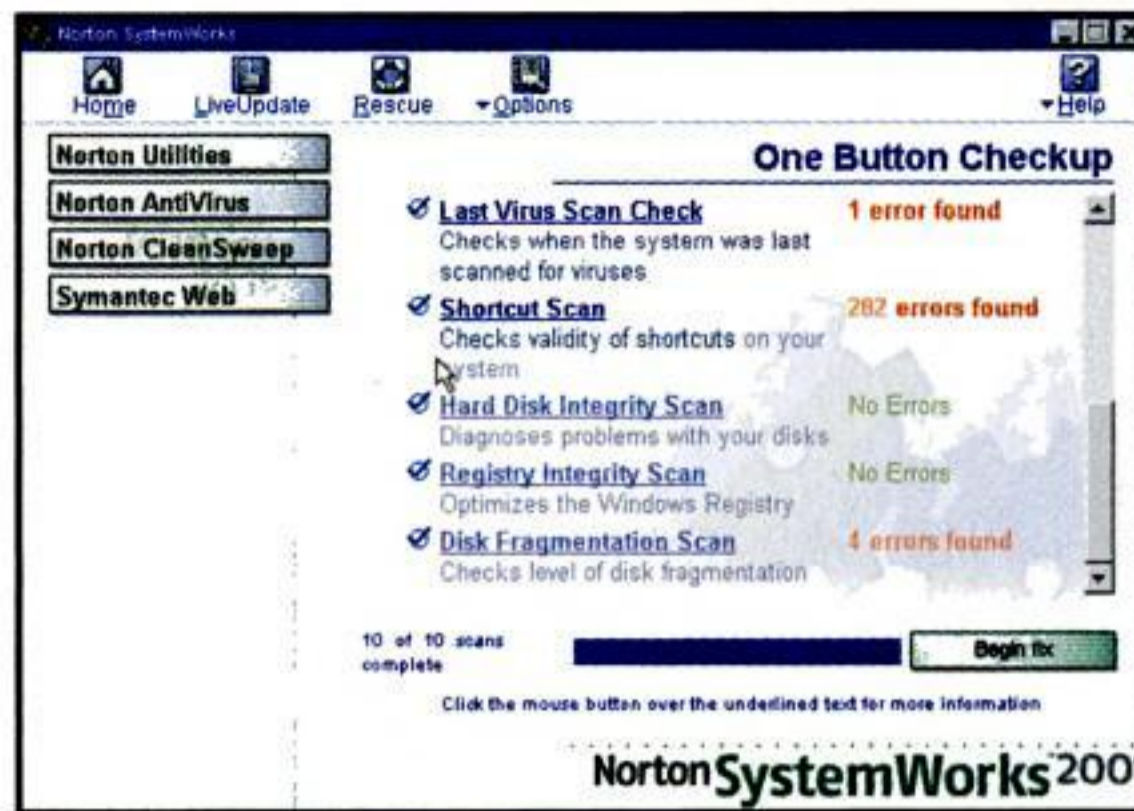
Symantec Web is the most interesting new feature of *SystemWorks 2001*. It connects you to a web site that takes a software inventory of your PC and then lists URLs for available application and driver updates. It can also connect you to sites that analyze PC security and virus risks and provide online tech support. In testing, we discovered there were patches available for several applications on our hard disk and that new upgrade versions were available for others.

New features aside, *SystemWorks 2001* is still the easiest of the office suites to install and use without confusion or hassles. Instead of losing the user in a maze of submenus, the *SystemWorks 2001* main menu gets right to the point and offers a One Button Checkup option to perform complete system diagnostics and repair. Entry points to the four application modules are clearly indicated, and the top of the menu contains

shortcuts to critical maintenance options—*Live Update* and *Rescue Disk*.

Norton's *Rescue Disk* feature is the best we've seen, allowing you to create a single- or multi-floppy disk set for DOS-prompt rescues or an Iomega Jaz/ZipDisk Windows rescue set (if you have one of these drives installed on your computer).

The rest of the package is standard Norton, and it's our favorite for times when Lab testing gets a little out of hand. The *Utilities* module of the suite includes the classic Norton *Disk Doctor* and *Speed Disk* repair and optimization utilities, which are much faster than Microsoft's *ScanDisk* and *Defrag*, and at least as good as corresponding applica-



*Norton SystemWorks* includes a One Button Checkup that automatically analyzes your PC, allowing you to implement all fixes globally.

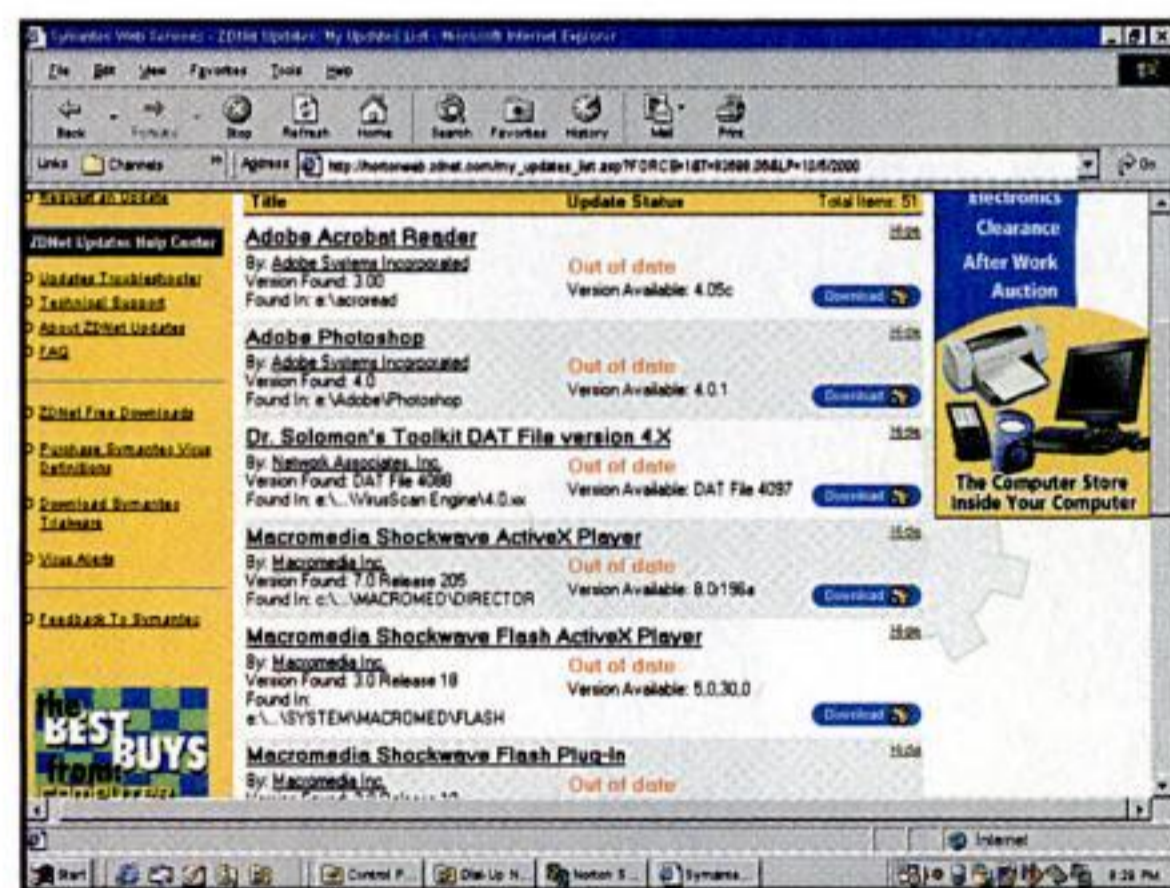
tions in McAfee *Office*. We think Norton's *Unerase* file-recovery feature has a slight edge on McAfee's *Trashguard*, as it performs more detailed hard disk searches, letting you recover deleted files by filename, filetype, and text strings in files, as well as by directory location.

Norton *WinDoctor* checks the configuration of your Windows system and application files. The part of this operation devoted to Registry maintenance is roughly equivalent to McAfee's *Registry Wizard*. But Norton has a useful bonus feature in the *Registry Tracker* that allows you to compare two or more versions of the Windows Registry and inspect step-by-step configuration changes.

We found Norton *AntiVirus* in this version of *SystemWorks* to be easier to work with than McAfee's latest *VirusScan*. However, we didn't like the way the NAV e-mail protection feature reconfigures the POP3 e-mail settings in your mail clients without a warning. Fortunately, this version has a "Reset" button that will bring back your real POP3 address if you've accidentally misplaced it.

*Norton SystemWorks 2001* is a winner. It enhances Windows with reliable disk repair, system maintenance, antivirus protection, and uninstaller utilities under a well-integrated interface. The web-based diagnostic tools are useful, too!

—Lenny Bailes



*Norton SystemWorks'* new Symantec Web feature analyzes your program installation over the Internet, recommending available driver fixes and program upgrades.

*AntiVirus* (antivirus protection), and Norton *CleanSweep* (an application uninstaller and disk cleaner). Formerly included programs that were essentially worthless have been 86ed as well, including the *Y2K Compatibility Checker*, *For Your Eyes Only*, and Norton *Crashguard*. In their place, Symantec offers Norton Web Services, an online Windows support system for

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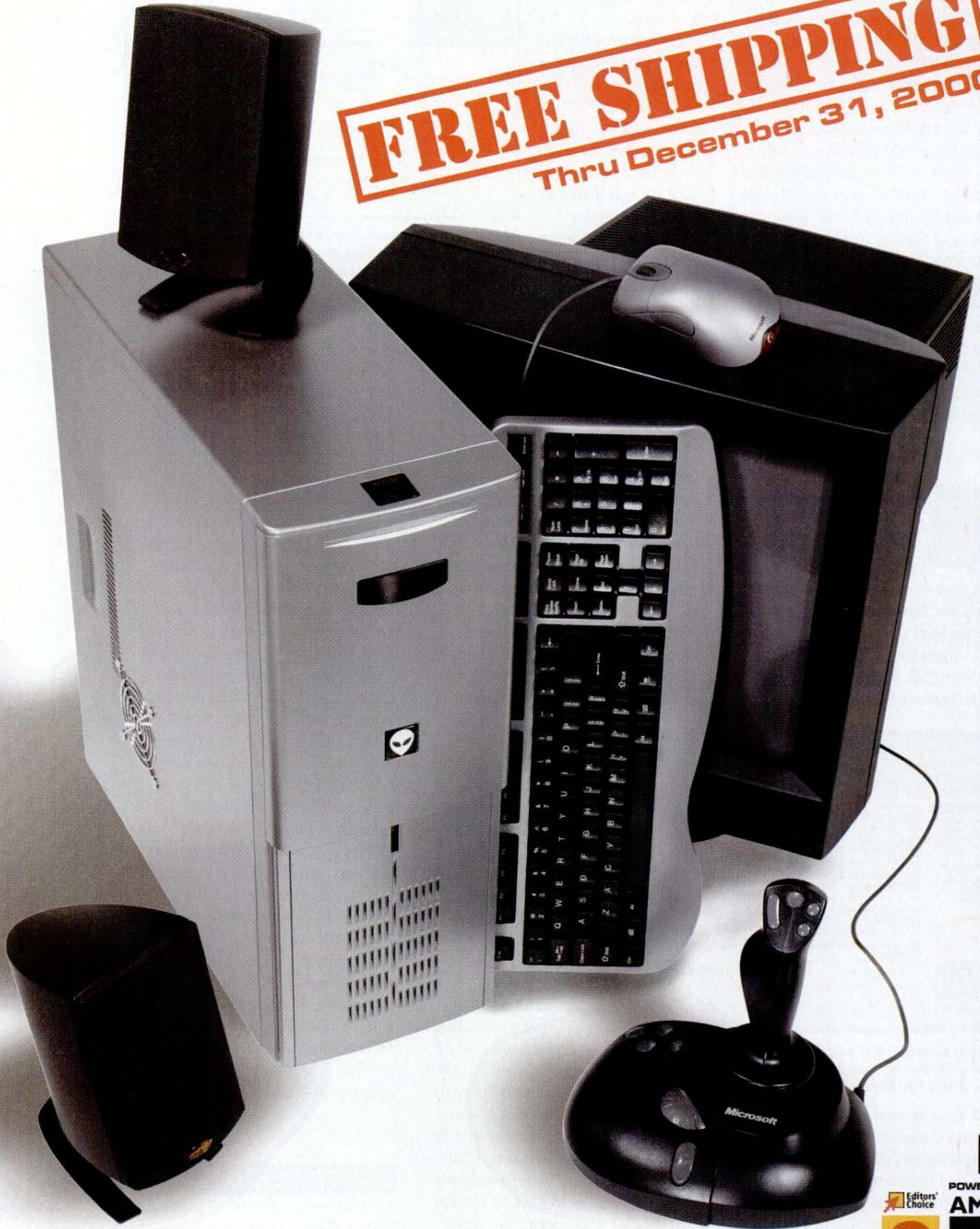
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Part Number	Chip Set	L2 Cache (KB)	Maximum Memory (MB)	166-pin DIMM Sockets	72-pin SIMM Sockets	Flash BIOS	Integrated Audio	Integrated Controller	PCI Slots	ISA Slots	AGP Slot	Format	Manufacturer's Warranty	Motherboard Only	w/AMD-K6-2/500	w/AMD-K6-2/550	w/Intel® Pentium® MMX™ 233MHz
EPoX EP-MVP3G5	MB5405 VIA Apollo MVP3	2048	384	3	Award	UltraDMA/66	5	2	1	ATX	2 Yrs.	\$110	\$170	\$198	\$170		
FIC VA-503+	MB5211 VIA Apollo MVP3	1024	512	2	4	Award			3	3	1	Baby AT	1 Yr.	\$76	\$136	\$164	\$136
Shuttle HOT-591P	MB5611 VIA Apollo MVP3	512	256	2	2	Award			3	3	1	Baby AT	1 Yr.	\$80	\$140	\$168	\$140
Tyan S1590S Trinity 100AT	MB5006 VIA Apollo MVP3	1024	384	3	2	Award			4	4	1	Mini AT	3 Yrs.	\$99	\$159	\$187	\$159

## Slot A

Part Number	Chip Set	Maximum Memory (MB)	166-pin DIMM Sockets	Flash BIOS	Bus Frequency	Integrated Controller	PCI Slots	ISA Slots	AGP Slot	Format	Manufacturer's Warranty	Motherboard Only	w/AMD Athlon™ 800MHz	w/AMD Athlon 650MHz	w/AMD Athlon 900MHz	w/AMD Athlon 950MHz	w/AMD Athlon 1000MHz	w/AMD Athlon 1100MHz
ABIT KA7-100	MB7503 VIA Apollo KX133	2048	4	Award	200/133	UltraDMA/100	6	1	1	ATX	1 Yr.	\$165	\$370	\$390	\$455	\$500	\$605	\$745
Asus K7V	MB7703 VIA Apollo KX133	1536	3	Award	200/133	UltraDMA/66	5	1	1	ATX	1 Yr.	\$145	\$350	\$370	\$435	\$480	\$585	\$725
EPoX EP-7KXA	MB7850 VIA Apollo KX133	768	3	Award	200/133	UltraDMA/66	5	1	1	ATX	2 Yrs.	\$120	\$325	\$345	\$410	\$455	\$560	\$700
Shuttle Ai61	MB7901 AMD-750	768	3	Award	100	UltraDMA/66	5	1	1	MicroATX	1 Yr.	\$93	\$298	\$318	\$383	\$428	\$533	\$673
Tyan S2380 Trinity K7	MB7000 VIA Apollo KX133	768	3	Award	200/133	UltraDMA/66	6	1	1	ATX	3 Yrs.	\$119	\$324	\$344	\$409	\$454	\$559	\$699

## Socket A

Part Number	Chip Set	Maximum Memory (MB)	166-pin DIMM Sockets	Flash BIOS	Bus Frequency	Integrated Controller	PCI Slots	ISA Slots	AGP Slot	Format	Manufacturer's Warranty	Motherboard Only	w/AMD Duron™ 600MHz	w/AMD Duron 650MHz	w/AMD Duron 700MHz	w/AMD Duron 750MHz	w/AMD Athlon™ 800MHz with Enhanced Cache	w/AMD Athlon 850MHz with Enhanced Cache	w/AMD Athlon 900MHz with Enhanced Cache	w/AMD Athlon 950MHz with Enhanced Cache	w/AMD Athlon 1000MHz with Enhanced Cache	w/AMD Athlon 1100MHz with Enhanced Cache
ABIT KTV	MB7503 VIA Apollo KT133	1536	3	Award	200/133	UltraDMA/66	6	1	1	ATX	1 Yr.	\$159	\$230	\$244	\$259	\$289	\$364	\$384	\$449	\$494	\$599	\$739
ABIT KTV-RAID	MB7504 VIA Apollo KT133	1536	3	Award	200/133	DMA/100 RAID	6	1	1	ATX	1 Yr.	\$179	\$250	\$264	\$279	\$309	\$384	\$404	\$469	\$514	\$619	\$759
ASUS A7V	MB7704 VIA Apollo KT133	1536	3	Award	200/133	UltraDMA/100	5	1	1	ATX	1 Yr.	\$171	\$242	\$256	\$271	\$301	\$376	\$396	\$461	\$506	\$611	\$751
EPoX EP-8KTA+	MB7852 VIA Apollo KT133	768	3	Award	200/133	UltraDMA/66	6	1	1	ATX	2 Yrs.	\$127	\$198	\$212	\$227	\$257	\$332	\$352	\$417	\$462	\$567	\$707
FIC AZ11	MB7402 VIA Apollo KT133	1536	3	Award	200/133	UltraDMA/66	5	1	1	ATX	1 Yr.	\$128	\$199	\$213	\$228	\$258	\$333	\$353	\$418	\$463	\$568	\$708
Microstar K7T Pro	MB7203 VIA Apollo KT133	1536	3	Award	200/133	UltraDMA/66	5	1	1	ATX	1 Yr.	\$137	\$208	\$222	\$237	\$267	\$342	\$362	\$427	\$472	\$577	\$717
Tyan S2390 Trinity KT	MB7001 VIA Apollo KT133	1536	3	Award	200/133	UltraDMA/66	6	1	1	ATX	3 Yrs.	\$137	\$208	\$222	\$237	\$267	\$342	\$362	\$427	\$472	\$577	\$717

## Slot 1

Part Number	Chip Set	Maximum Memory (MB)	166-pin DIMM Sockets	Flash BIOS	Integrated Audio	Integrated Controller	PCI Slots	ISA Slots	AGP Slot	Formaw	Manufacturer's Warranty	Motherboard Only	w/Intel® Pentium III® 567 256K OD 133MHz FSB	w/Intel Pentium III 733 256K OD 133MHz FSB	w/Intel Pentium III 850 800/EB 256K OD 100/133MHz FSB	w/Intel Pentium III 850 256K OD 100MHz FSB	w/Intel Pentium III 933 100MHz FSB	w/Intel Pentium III 933 256K OD 133MHz FSB	w/Intel Pentium III 1000 256K OD 133MHz FSB	w/Dual Intel Pentium III 800 256K OD 100MHz FSB	w/Dual Intel Pentium III 800 256K OD 100MHz FSB	w/Dual Intel Pentium III 850 256K OD 100MHz FSB	w/Dual Intel Pentium III 850 256K OD 100MHz FSB	
ABIT BE6-II	MB6508 Intel 440BX	768	3	Award		UltraDMA/66	5	1	1	ATX	1 Yr.	\$142	N/A	N/A	\$382	\$442	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ABIT BX133-RAID	MB6513 Intel 440BX	768	3	Award		DMA/100 RAID	5	1	1	ATX	1 Yr.	\$146	N/A	N/A	\$386	\$446	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ABIT VT6X4	MB6510 VIA Apollo Pro 133A	768	3	Award	AC-97	UltraDMA/66	5	2	1	ATX	1 Yr.	\$104	\$309	\$344	\$344	\$404	\$534	\$679	N/A	N/A	N/A	N/A	N/A	N/A
ASUS P2B-DS (Dual)	MB6707 Intel 440BX	1024	4	Award			4	2	1	ATX	1 Yr.	\$509	N/A	N/A	\$749	\$809	N/A	N/A	N/A	\$989	\$1109			
ASUS P3V4X	MB6723 VIA Apollo Pro 133A	1024	4	Award		UltraDMA/66	6	1	1	ATX	1 Yr.	\$133	\$338	\$373	\$373	\$433	\$563	\$708	N/A	N/A	N/A	N/A	N/A	N/A
Intel L440GX+ (Dual)	MB6917 Intel 440GX	2048	4	Intel/Phoenix		Adaptec 2-Ch U2W	6	1	1	ATX	3 Yrs.	\$545	N/A	N/A	\$785	\$845	N/A	N/A	\$1025	\$1145				
Intel SE440BX-2 "Seattle"	MB6921 Intel 440BX	768	3	Intel/Phoenix			4	2	1	ATX	3 Yrs.	\$120	N/A	N/A	\$360	\$420	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Shuttle AV64	MB6309 VIA Apollo Pro 133A	768	3	Award		UltraDMA/66	5	2	1	ATX	1 Yr.	\$89	\$294	\$329	\$329	\$389	\$519	\$664	N/A	N/A	N/A	N/A	N/A	N/A
SuperMicro PIIIDR3 (Dual)	MB6157 Intel 840	4096	4	AMI	AC-97	Adaptec Ultra3/160	6	1	1	ATX	1 Yr.	\$617	\$822	\$857	\$857	\$917	\$1047	\$1192	\$1097	\$1217				
SuperMicro P6DGU (Dual)	MB6122 Intel 440GX	2048	4	AMI		Adaptec U2W	5	2	1	ATX	1 Yr.	\$485	N/A	N/A	\$725	\$785	N/A	N/A	\$965	\$1085				
SuperMicro P6SBA	MB6120 Intel 440BX	768	3	AMI			4	3	1	ATX	1 Yr.	\$103	N/A	N/A	\$343	\$403	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SuperMicro P6SBU	MB6126 Intel 440BX	1024	4	AMI		Adaptec U2W	4	3	1	ATX	1 Yr.	\$343	N/A	N/A	\$583	\$643	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tyan S1834 Tiger 133 (Dual)	MB6020 VIA Apollo Pro 133A	2048	4	Award		UltraDMA/66	6	1	1	ATX	3 Yrs.	\$159	\$364	\$399	\$399	\$459	\$589	\$734	\$639	\$759				

## Socket 370

Part Number	Chip Set	Maximum Memory (MB)	166-pin DIMM Sockets	Flash BIOS	Integrated Audio	Integrated Video or IDE/SCSI Controller	PCI Slots	ISA Slots	AGP Slot	AMR or CHR Slot	Format	Manufacturer's Warranty	Motherboard Only	w/Intel® Celeron™ 600 128K OD 66MHz FSB	w/Intel Celeron 700 128K OD 66MHz FSB	w/Intel Celeron 733 128K OD 66MHz FSB	w/Intel Pentium® III 667 256K OD 133MHz FSB	w/Intel Pentium III 733 256K OD 133MHz FSB	w/Intel Pentium III 800/EB 256K OD 100/133MHz FSB	w/Intel Pentium III 850 256K OD 100MHz FSB	w/Intel Pentium III 866 256K OD 133MHz FSB	w/Intel Pentium III 933 256K OD 133MHz FSB	w/Intel Pentium III 933 256K OD 133MHz FSB	w/Intel Pentium III 1000 256K OD 133MHz FSB	w/Dual Intel Pentium III 800 256K OD 100MHz FSB	w/Dual Intel Pentium III 800 256K OD 100MHz FSB	w/Dual Intel Pentium III 850 256K OD 100MHz FSB	w/Dual Intel Pentium III 850 256K OD 100MHz FSB	
ABIT SE6	MB6512 Intel 815E	512	3	Award	Intel 815E	Intel 815E	6	1	1	1	ATX	1 Yr.	\$162	\$262	\$282	\$307	\$367	\$402	\$402	\$462	\$462	\$592	\$737	N/A	N/A	N/A	N/A	N/A	N/A
ABIT SA6R	MB6514 Intel 815E	512	4	Award	Intel 815E	Intel 815E	6	1	1	1	ATX	1 Yr.	\$181	\$281	\$301	\$326	\$386	\$421	\$421	\$481	\$481	\$611	\$756	N/A	N/A	N/A	N/A	N/A	N/A
ABIT VH6	MB6511 VIA Apollo Pro 133A	768	3	Award	AC-97		5	1	1	1	ATX	1 Yr.	\$112	\$212	\$232	\$257	\$317	\$352	\$352	\$412	\$412	\$542	\$687	N/A	N/A	N/A	N/A	N/A	N/A
ABIT VP6 (Dual)	MB6515 VIA Apollo Pro 133A	2048	4	Award		IDE RAID	5	1	1	1	ATX	1 Yr.	\$179	\$279	\$299	\$324	\$384	\$419	\$419	\$479	\$479	\$609	\$754	\$659					
ASUS CUBX	MB6726 Intel 440BX	1024	4	Award	AC-97		6	1	1	1	ATX	1 Yr.	\$150	\$250	\$270	\$295	N/A	N/A	\$390	\$450	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ASUS CUC2 (uses RDRAM)	MB6730 Intel 820E	1024	2	Award			6	1	2	1	ATX	1 Yr.	\$219	\$319	\$339	\$364	\$424	\$459	\$459	\$519	\$519	\$649	\$794	N/A	N/A	N/A	N/A	N/A	N/A
ASUS CUSL2	MB6727 Intel 815E	1536	3	Award	Intel 815E	Intel 815E	5	1	1	1	ATX	1 Yr.	\$174	\$274	\$294	\$319	\$379	\$414	\$414	\$474	\$474	\$604	\$749	N/A	N/A	N/A	N/A	N/A	N/A
ASUS CUR-DLS (Dual)	MB6728 ServerWorks LE	4096	4	Award		RAGE-XL	7				ATX	1 Yr.	\$599	\$699	\$719	\$744	\$804	\$839	\$839	\$899	\$899	\$1029	\$1174	\$1079					
ASUS CUV4X	MB6725 VIA Apollo Pro 133A	1536	3	Award	AC-97		5	1	1	1	ATX	1 Yr.	\$133	\$233	\$253	\$278	\$338	\$373	\$373	\$433	\$433	\$563	\$708	N/A	N/A	N/A	N/A	N/A	N/A
EPoX EP-3VCA2	MB6856 VIA Apollo Pro 133A	768	3	Award	AC-97		5	1	1	1	ATX	2 Yrs.	\$107	\$207	\$227	\$252	\$312	\$347	\$347	\$407	\$407	\$537	\$682	N/A	N/A	N/A	N/A	N/A	N/A
Intel D815EEA "Easton"	MB6922 Intel 815E	512	3	Award	Intel 815E	Intel 815E	5	1	1	1	ATX	3 Yrs.	\$152	\$252	\$272	\$297	\$357	\$392	\$392	\$452	\$452	\$582	\$727	N/A	N/A	N/A	N/A	N/A	N/A
Shuttle AV14	MB6311 VIA Apollo Pro 133A	768	3	Award			5	2	1	1	ATX	1 Yr.	\$89	\$189	\$209	\$234	\$294	\$329	\$329	\$389	\$389	\$519	\$664	N/A	N/A	N/A	N/A	N/A	N/A
Shuttle ME21	MB6312 Intel 815E	512	2	Award	Intel 815E	Intel 815E	3	1	1	1	Micro ATX	1 Yr.	\$144	\$244	\$264	\$289	\$349	\$384	\$384	\$444	\$444	\$574	\$719	N/A	N/A	N/A	N/A	N/A	N/A
SuperMicro 370SEA	MB6140 Intel 810E	512	2	AMI	Intel 810E	Intel 810E	6	1	1	1	ATX	1 Yr.	\$142	\$242	\$262	\$287	\$347	\$382	\$382	\$442	\$442	\$572	\$717	N/A	N/A	N/A	N/A	N/A	N/A
SuperMicro 370SSA	MB6143 Intel 815E	512	2	AMI	Intel 815E	Intel 815E	6	1	1	1	ATX	1 Yr.	\$162	\$262	\$282	\$307	\$367	\$402	\$402	\$462	\$462	\$592	\$737	N/A	N/A	N/A	N/A	N/A	N/A
SuperMicro 370DLE (Dual)	MB6154 ServerWorks LE	2048	2	AMI			6	1	1	1	ATX	1 Yr.	\$342	\$442															

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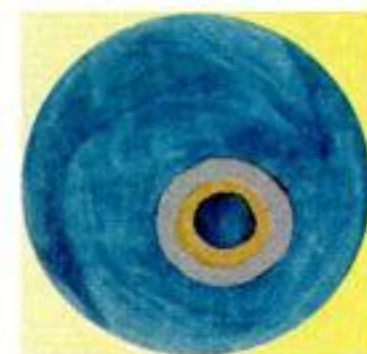
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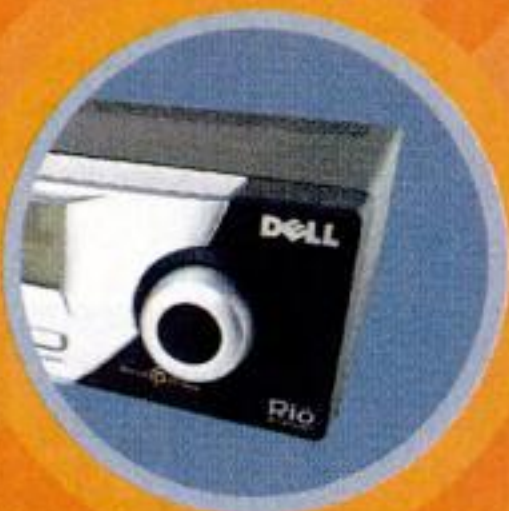
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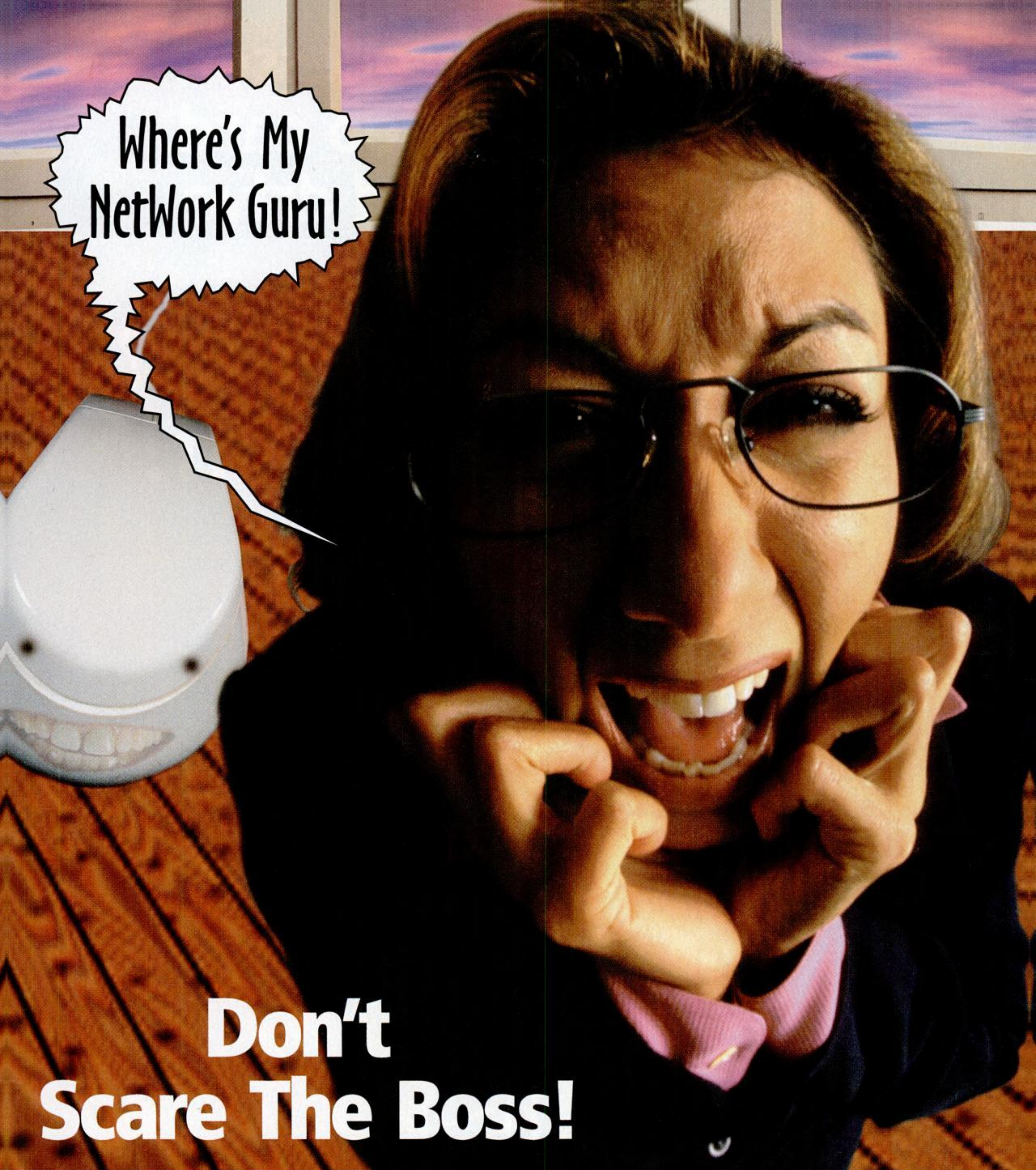
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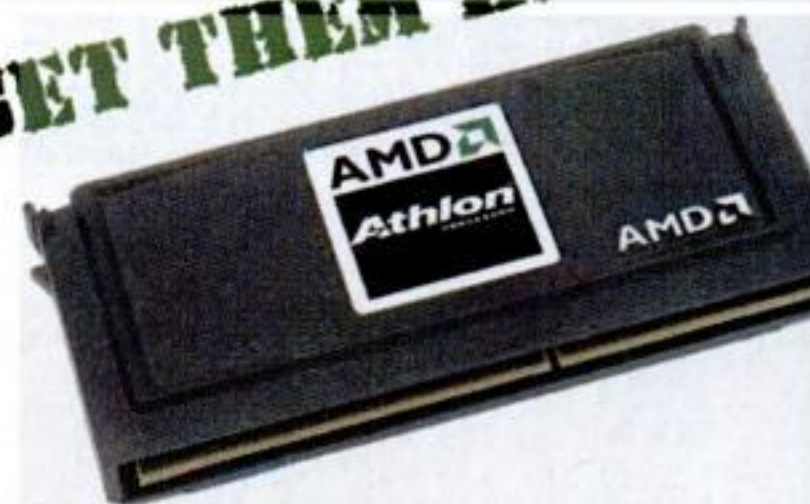
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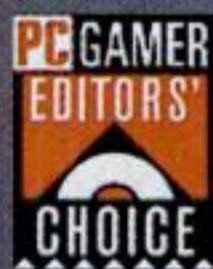
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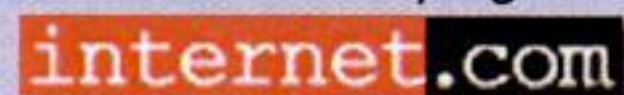


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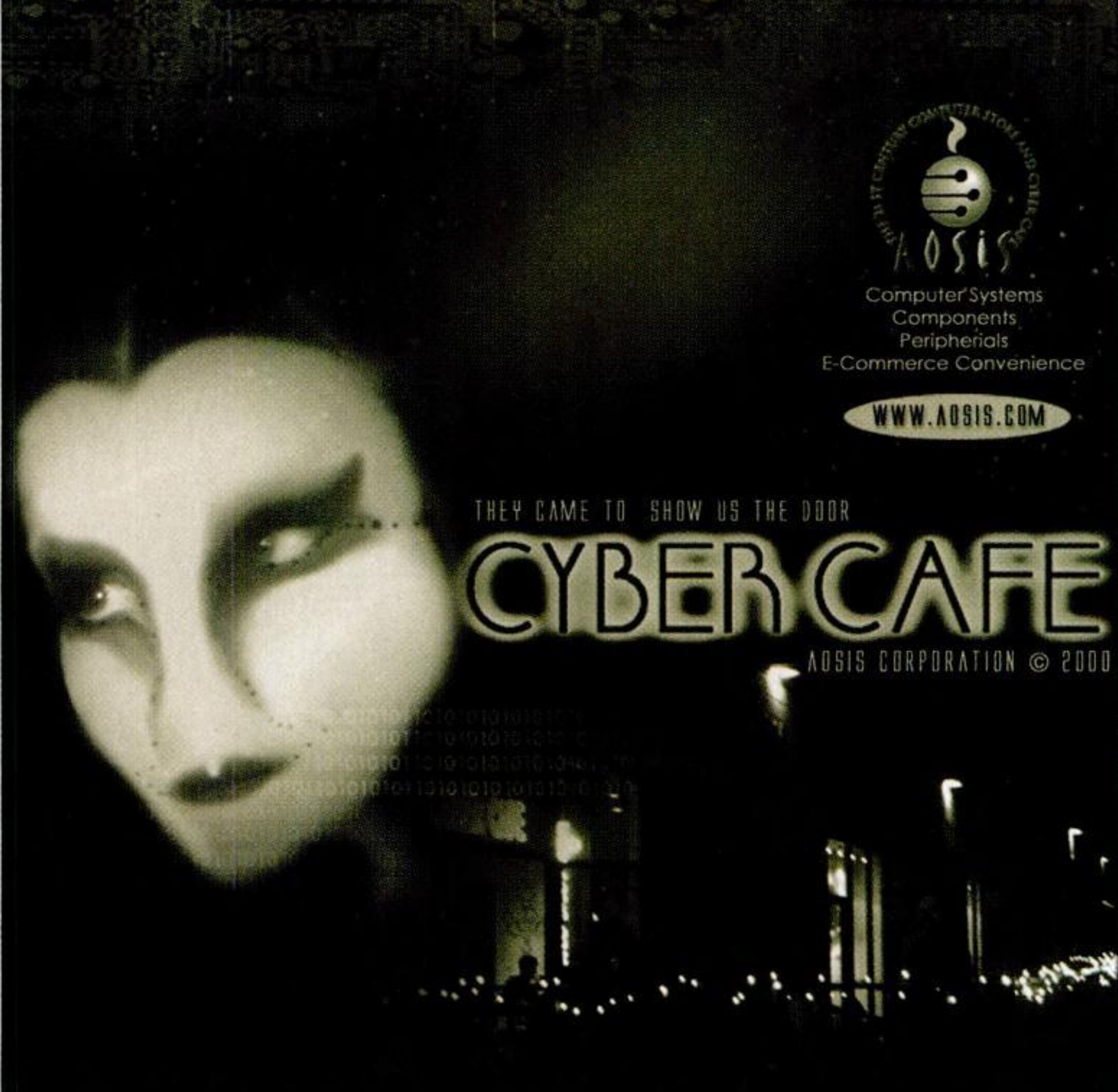
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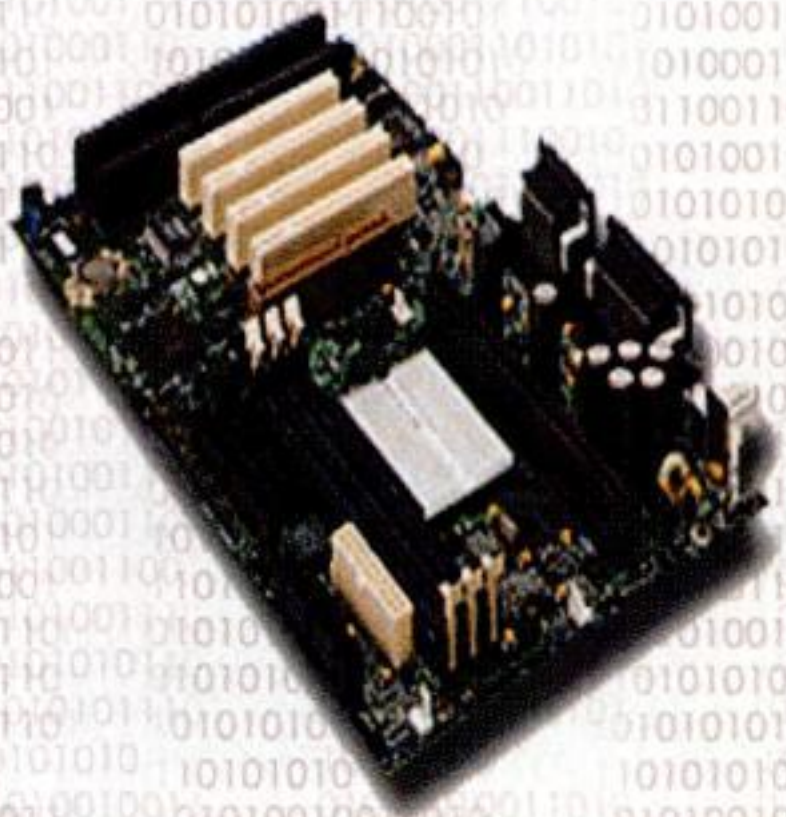


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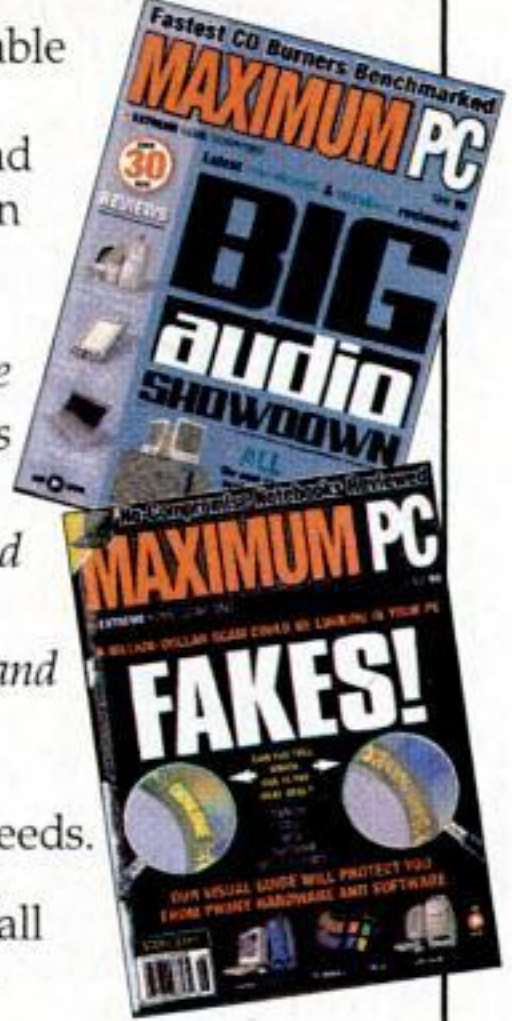
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# PERSONALS

## MEN SEEKING WOMEN

### Do You Speak the Language of Love?

ME: 38-year-old Funyons aficionado who can write COBOL with his left hand whilst downloading hard-to-find animatronic hentai with his right hand. I'm cute, cuddly, and comfortable just being floppy old me. YOU: A Xeon-grade workstation with at least 384MB of RAM, a Registry with a clean bill of health, and NO driver issues (that means no ATI silicon for you, pretty lady... I've been there, done that, and have the therapy bills to prove it). Have an open mind and a penchant for 1st millennium Vulcan folklore. Mailbox #23678

### Let's Get Ready to Rumpusssss!

Lord Rumpus is looking for an ultra-violent grrl gamer who can shadow him in Unreal Tournament and frag the small-fry grommets who make life such a tedious bore when what Lord Rumpus really wants to do is gore, decapitate, and eviscerate one Martin Weinstein of Great Neck, NY (a.k.a., Rizzo-the-Knife), that slovenly, cowardly punk who has made a virtual career of camping out and sniping Lord Rumpus when Lord Rumpus is temporarily distracted and therefore experiencing a brief window of vulnerability, for which he has paid dearly in many a midnight deathmatch. For your ser-

vices rendered, Lord Rumpus will reward you, fair psycho-chick, with hot, passionate, Rumpus-riddled sex—and Lord it's good! (Just bail out the window if Miz-oms knocks on the diz-oor.) Mailbox #47698

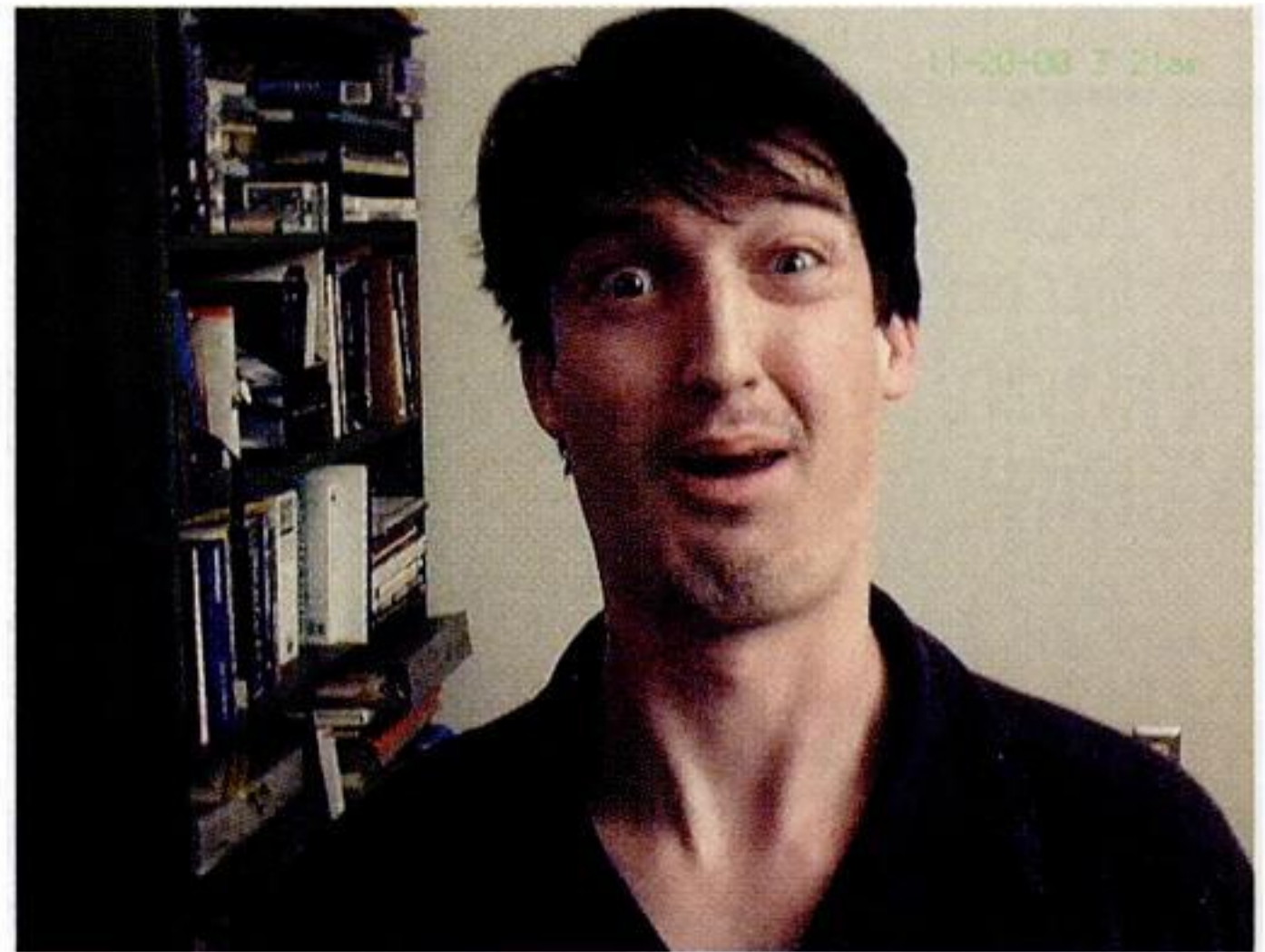
### Will You Be My Friend?

Unattractive but not entirely spooky 48-year-old phone support technician looking for comely 18- to 22-year-old knockout who resembles Britney Spears, Christina Aguilera, or any one of the fine talents who have image archives posted on TeenHoochieMama.com. You should be as beautiful as I am ugly and as confident as I am insecure. In fact, this will only work if you really, really, REALLY want to experience a "last man on earth" scenario. I can't emphasize this strongly enough. Mailbox #67905

### Run Away with Me, Binary Avenger!

Do you prefer open-source to open sores? Do you think all software should be manufactured in sweatshops staffed by the ruling class, then distributed freely to the wretched refuse of our teeming shores? Do you think Bill Gates should be strapped to a chair with nylon cord and force-fed a puree of his own vile greenbacks, \$1,000-spoonful after \$1,000-spoonful, until his liver

## YOUR WILDEST DREAMS



**Webcams Don't Lie** Yes, I really am THIS sexy. I haven't left my office since 1996, but care to meet me in cyberspace? Point your webcam at my webcam, and let's see what computes. Mailbox #65489

is fat, bloated, and ready to be processed into "beady-eyed dweeb patê," the profits from the sale of which would be returned to all the innocent people he's so unjustly wronged? If you answered yes to all three questions, then I am the geek for you. Federal law does not allow me to use the telephone, so meet me at the Tuesday night Open Mic Contest at the Cockroach Lounge. I'll be the skinny guy in the black satin cape.

### Help Me Grow My Vertical

I've got the core—do you have the competency? 28-year-old, nouveau riche dot-com mogul looking for over-achieving, brittle-boned bulimic to help me actuate my

vertical. My properties include a pair of retro-style, horn-rimmed glasses, a closet full of 50s-era bowling shirts, a 1999 Porsche Boxster, and 50,000 travel mugs emblazoned with the logo for eFishFood.com (still in their original packaging). ROI guaranteed! Mailbox #65489

## WOMEN SEEKING MEN

### Do You Think I Should Have My Own Amateur Site?

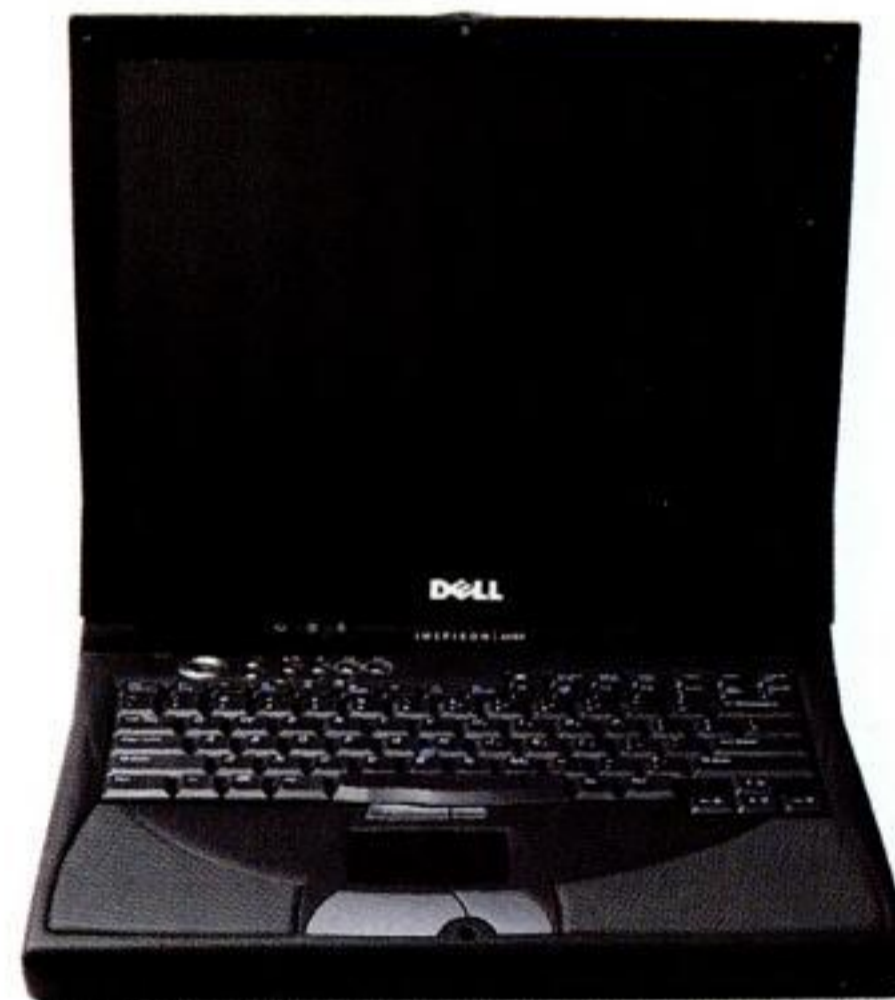
Hi, <Daily Glitch Classifieds Manager>! Here are the pictures you asked about: <http://www.farmanimalsexwhore.com/members/jennaxxx>. Tell me what you think! Kisses —Jenna Mailbox #27890



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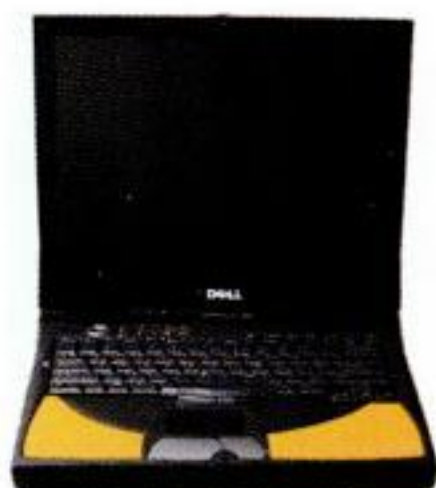
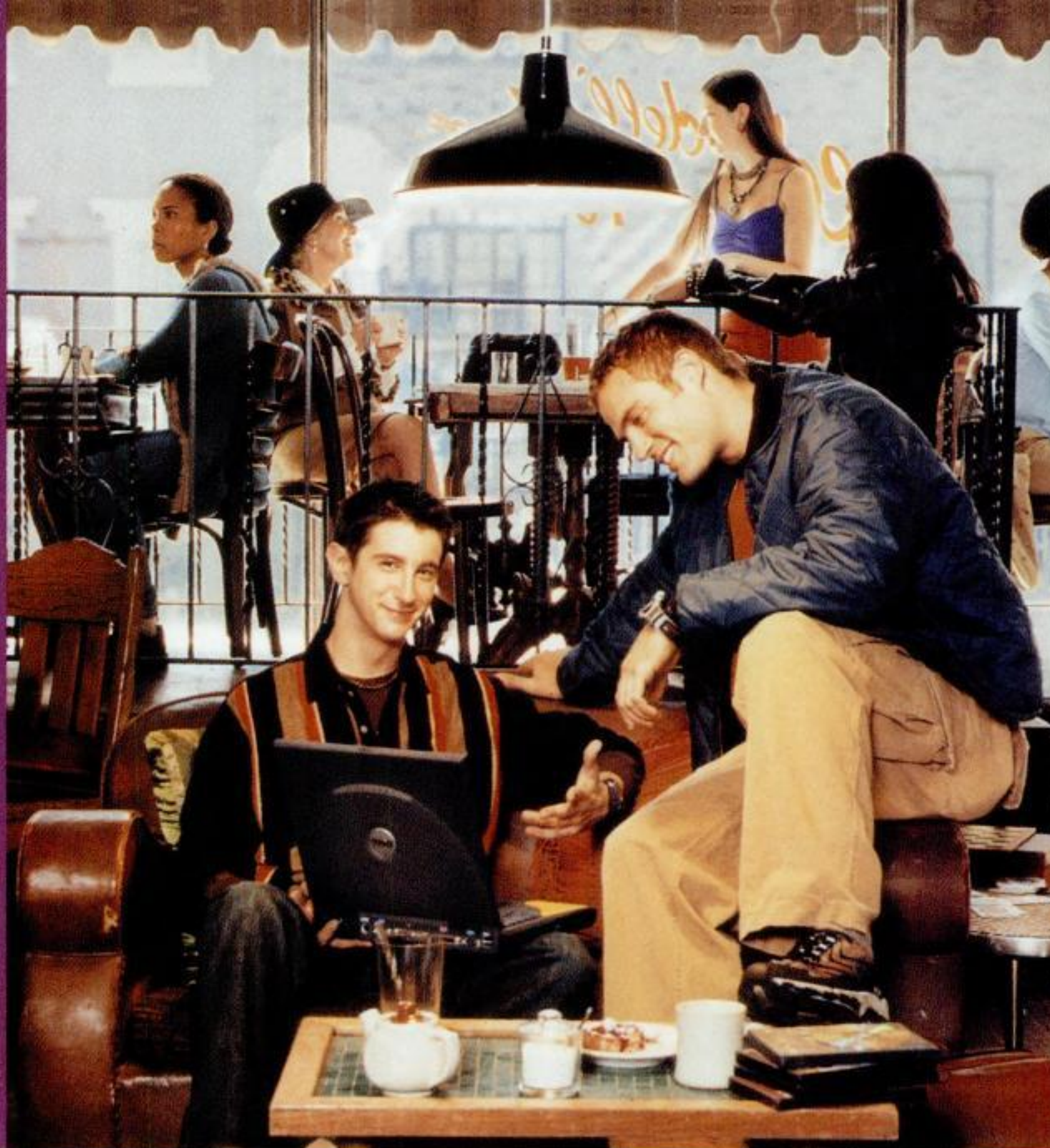
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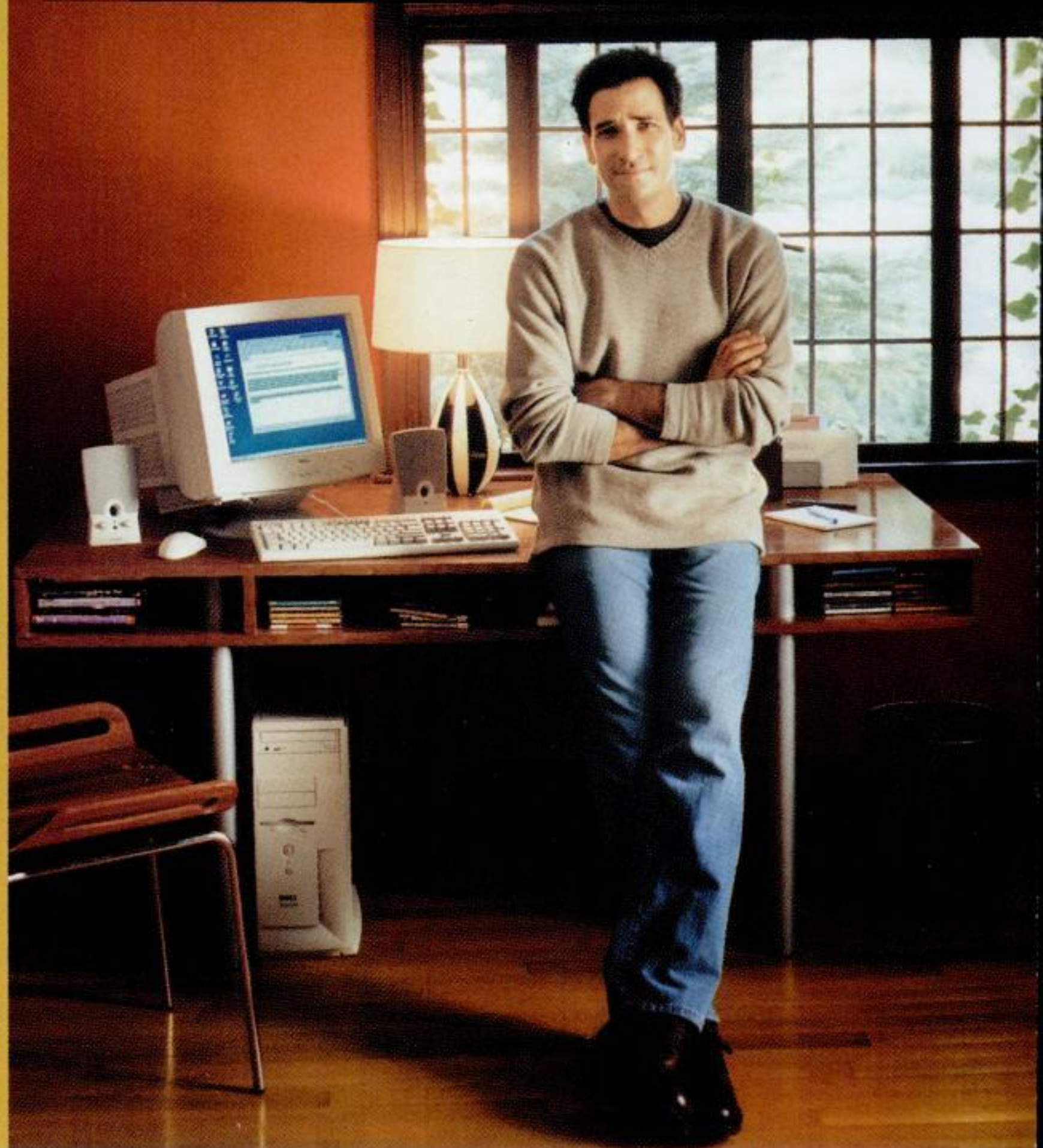
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