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very once and awhile a lucky reviewer (such as myself) comes across a product so phenomenal, so satisfying and true to expectations that the review practically writes itself. The Power 3D card is just such a product. In fact, if the old cliché about pictures being worth a thousand words is true, then the following image does a far better job of describing this card's features than I ever could:

[insert Start Comparison pict]

There. Now go buy one.

Thought You Were Getting Off Easy, Huh?

Well, I can't let it go with just that, of course —a certain employer would wring my neck via e mail. But it really is just that simple: the Power 3D card makes properly enabled games (3Dfx or QuickDraw 3D RAVE compliant) run fast, look incredible, and play great. On the PC side there have been dozens of 3Dfx cards to choose from for almost a year now, so they are a bit jaded, of course. But this is my first look at serious gaming power, and I can't take my

eyes off it!

Getting to the Point

Here it is, in black and white: an Apple Power Macintosh 7200/90 with one of these cards can play Quake in hi-resolution (640x480) faster and smoother than a 8600/200 without one—and get transparency, 16-bit color, and texture smoothing to boot. On my 7600/120, I get 9.2 fps at 640x400 for Demo 2 of Quake; with the Power 3D card I get 25.5 fps. Even better, the performance of the card scales with your machine —so the faster your Mac, the more power you get out of your Power3D card. Users of 200 MHz machines have been reporting frame rates in excess of 29 fps —almost as fast as broadcast video.

How Fast is Fast?

If you've been playing Quake, MechWarrior, and Actua Soccer with just software you haven't experienced the eerie smoothness of dedicated 3D hardware, no matter how fast your machine is. The 3Dfx chip, still considered top of its class within the crowded PC 3D market, has the ability to bi-linear filter, mip-map and perspective-correct 1 million triangles per second according to TechWorks specs. This means that 3D games aren't just sped up, they are enhanced and refined on the fly, for deeper textures, less pixelization, sharper perspective and smooth edges. The result is gameplay so slippery-smooth that it inspires vertigo.

The Package

The Power3D card comes with a special pass-through cable, an anti-static wrist strap, a quickstart manual (all you will need), four games on CD-ROM including Quake First Episode (levels 1-8, networking enabled), VR Soccer (a.k.a. Actua Soccer), MechWarrior II, and Weekend Warrior. Also included is a CD-ROM with the card drivers, QuickDraw 3D and some very slick (but RAM hungry) demo applications.

Installation was literally a snap, with the card fitting neatly into a PCI slot on my machine. The card itself looks very cool, jam-packed with chips and 3Dfx logos. The pass-through cable goes from your original video-out port to the TechWorks card, which you then connect to your monitor. Several adapters are provided. Those with hairy arms (like myself) might want to beware the adhesive-backed wrist strap; I now have a 1-inch-wide bald strip around my wrist. Besides some minor depilation, the installation was swift and painless.

The Limitations

TechWorks makes it very clear on the box that this is a card designed for gaming, not for CAD work or VRML browsing. In fact, it is utterly useless for anything besides full-screen 3D applications. The peculiarities of the 3Dfx chip demand that the card must take over the entire screen to do its magic (hence the pass-through cable) and all 2-D graphics are totally ignored. This means, in short, that any QuickDraw 3D-savvy application you have that uses windows to display information will most likely crash and burn. It also means that games have to be specifically patched or designed for this type of card, or the 2-D graphics (radar screens, weapons readouts, scoring) will not function.

That might seem like a pretty brutal limitation, but it really isn't so bad when you consider a few details. First, this card gives game performance far exceeding the \$1,699 (formerly \$3000+) Radius 3D card for a fraction of the price. Second, there is a literal flood of 3Dfx and RAVE accelerated titles coming up, from Unreal to Hornet: Korea to Myst: The Forgotten Realms to Dark Vengeance. Third, most of us need just a gaming card —we already have fast 2-D video in our Macs, and unless you do professional-level 3D work, a RAVE accelerator wouldn't be very cost-effective. And the truth is, you could spend \$3000 upgrading your current system with a processor card, cache, and RAM and still not achieve the game performance you would get with this card alone.

Another limitation: the recommended 32 MB of RAM is a joke. I wouldn't use this card with anything less than 48 MB, and get more if you can. Most of the RAM is actually used up by the QuickDraw 3D driver, not the card itself. You can use Virtual Memory to make up for any deficit, but your game speed will definitely suffer. The recommended memory setting for 3Dfx Quake is 40 MB; I was able to play using RamDoublor 2.0.2 with a negligible (1.2 fps) frame rate loss, at a gain of greater stability and faster loading time. 32 MB DIMMS are around \$119 these days, and are a great investment for your entire system.

The Eye Candy

I spent the first three hours after installing this card babbling incoherently, cramping my fingers with non-stop game playing and taking laps around the room to work off excess adrenaline. Unfortunately, due to the limitations of the card and the Mac OS, I was totally unable to get screen shots of any games or demos besides Quake —every such attempt resulted in a crash, as the Mac tried to draw a cursor after the snapshot. Never mind, the Quake screen shots are plenty of evidence of this card's power.

The demo apps, while buggy and in need of tons of RAM, are really stunning. Especially cool is Wizard's Tower, a walk-through series of rooms beautifully textured and lit by colored point source lights. Smooth, perfectly curved surfaces, intricate models and elaborate texture maps really show off the 3Dfx chipset, yet the graphics never drop below 29 fps on a 604/120 Macintosh. Flipper "Grand Bleu," another demo app, creates an underwater scene so detailed and realistic that a few visiting friends of mine thought I was watching Jaques Costeau specials on my monitor —no joke!

There is even a Virtua Fighter-like demo, without scoring and with very limited moves. Nevertheless the visuals are a shock, and put even coin-op machines in the shade. "The Power of an Arcade on Your PowerPC," the box says, and TechWorks has delivered on that promise.

The Games

All of the games included with this card have been previously reviewed by IMG (with the exception of Quake, reviewed in this issue) so I'm not going to dwell on the game play or features of each title; I'm just going to describe how the Power3D card affects game play and graphics.

Quake, Episode One

The visuals in 3Dfx-accelerated Quake are nothing short of astounding. The designers of Quake must have had tears in their eyes when they first saw the game running with a 3Dfx card, because only with 3D hardware does this game become what it was meant to be. Hallways look deeper and longer, once-bland textures become rich and glossy, demonic beasties shred you while you are admiring their detail and smoothness of movement. The Power3D card gives Quake visuals the quality and detail of MYST —but in realtime! Graphics like these make Virtual Reality seem like a present-day possibility, rather than a far-off future. See the screen shots (accessed at the end of the article) if you don't believe me. I can't tell you what a huge difference that the addition of shadows (cast in realtime, with transparency) makes to the game —at times it feels like you are watching a hand-animated movie, rather than playing a video game. See my "Quake and the Power3D Tips" section at the end for more info.

Quake, specially designed to take advantage of many 3Dfx features such as transparency and anti-aliasing, is the ideal title to show off this card —it makes anything on the Sony Playstation or Nintendo 64 look pathetic by comparison. Crisp 640x480 graphics and fluid movement make this game totally immersive, and turn somewhat dull solo play into a visual

feast.

Network play is greatly enhanced as well by the Power3D card. By playing in hi-resolution you can see farther and shoot more accurately than those using 320x240 resolution, and there is less of a processor load on your machine, so the OS has more time to concentrate on networking. I spent a few hours going from deathmatch to deathmatch, getting my butt kicked (but racking up a few frags nonetheless!) and as I played I took an impromptu poll of the real champs, the ones with 30 frags in 10 minutes. The result? Absolutely 100% were using some form of 3D acceleration. Looks like ya gotta pay if ya want to play with the big dogs!

[MechWarrior II](#)

This game doesn't actually use many of the Power3D card's features; there is no transparent colored fog, there are no colored light sources, there is little texture-mapping and not much polygon detail. What the 3Dfx optimization does add is butter-smooth gameplay at all times, plus one neat trick — "glass" surfaces, such as Mech cockpits, reflect the smoothly-moving sky.

No matter how hard I pushed this game (though I wasn't able to try any really epic battles, due to the game's annoying ranking system) the graphics just would not stutter or slow down. From any camera angle, with 3 mechs and a burning building on screen, there was no slowdown at all, even with all features turned on —and I'm running it on a 604/120 system.

[VR Soccer](#)

Born as Actua Soccer, ported by MacPlay and then canceled just before they pressed it, this title has been reborn with the Power3D card. Again, this is a game that doesn't make very good use of the 3Dfx's special features; in fact, from what I can tell only the turf surface and the stadium walls are accelerated by the card —the players themselves seem unchanged. Much like MechWarrior II, the result of the Power3D acceleration is speed, smoothness, and more speed. The camera tracks with uncanny precision, gliding over the field like it is traveling on a carpet of ball bearings and grease. There are some strange visual bugs in the rendering of the stadium seats, and the video wall only works when a goal is scored, but otherwise the game is smooth and fast —and this is the only way to get it, for now.

[Weekend Warrior](#)

The first title for the Mac to ever be QuickDraw 3D-only, this game functions more as a graphics demo than a full-fledged adventure. The Power3D easily passes the test, giving full screen, brightly colored and crisp graphics in realtime. The camera stuttered a little bit in the corners, but overall the visuals looked great and ran without a hitch —and ran much faster than with the ATI Xclaim VR or 3D boards.

[Other Games](#)

Unfortunately, there are no other games (besides the ones above) that will currently work with this card. Descent II was patched for RAVE, but only for the ATI Rage II chipset specifically. I was able to get Reality Bytes' Havoc to run, but without the weapons indicators or radar the game was practically useless. Several applications that ran in a window, such as Gerbils, just plain crashed when I attempted to run them, which was no surprise.

The Power3D is a bleeding-edge card: it exists before there are even games available to properly exploit it! Even Quake doesn't take full advantage of some of the really wizzy 3Dfx features, like environment-mapping (reflective surfaces that change with the surrounding environment), colored light sources, glowing objects, colored fog and haze, or 800x600 resolution.

Thankfully, there are dozens of games coming out soon that will use this time-tested chipset to the fullest. Unreal, being ported by Mark Adams (formerly of Lion) uses all the features mentioned here and more. As the installed base of 3Dfx cards on the Mac becomes larger and larger, more and more games will be ported or patched to take advantage of it. By January, Power3D owners will also have Myth, Hornet: Korea, Fighter Squadron: Screaming Demons, Shattered Steel and Dark Vengeance to play with —no small titles here! There are even rumors about a QuickDraw 3D RAVE version of Starfleet Academy, as well as a 3Dfx version of Carmageddon.

Caveats

There were a few disappointments in the Power3D package. Most noticeable was a lack of documentation for the games included; in fact they didn't even come with jewel cases. A game with the depth and complexity of MechWarrior II can't really be enjoyed with just a quick reference card for instructions. Luckily there are lots of fan pages on the web to give you info about strategies, tactics, and Mech models.

3Dfx Quake is just amazing overall, but it does have very noticeable slowdowns in odd places where you wouldn't expect it, making some maps (especially home-made maps downloaded off the net) difficult to play. This also happens on the PC version (called GLQuake) as well, so it may be due to limitations in the engine itself, or poor map design. In any case, the faster processor you have, the less noticeable these slow parts are. The 3DfxGlide driver is also in early revision numbers, so it will most likely get faster with time just as the ATI Xclaim VR and IMS Twin Turbo drivers have.

Several people (including myself) have experienced very strange changes to their monitor resolution settings. Having a somewhat atypical monitor (a Radius Precision Color Pivot) I expected a few snags, but I was pretty disappointed to realize that I had lost 832x624 resolution completely, and now have 11 choices in my Monitors and Sounds control panel, 4 of which will crash the display when selected. Not only that, but the Pivot software that came with my monitor now crashes on startup.

I talked to a very helpful TechWorks representative and he explained that this is due to the limitations of the SVGA port on the Power3D card, which doesn't support proprietary Mac-only "sense pins" that tell the computer what the monitor is capable of. Those with PC monitors requiring several chained adapters or AppleVision monitors may experience trouble with the TechWorks cards, as well as those with very large (1280x1024) monitors. Currently TechWorks is working on a solution for this, so we shall see. In the meantime the problem may be solvable by swapping adapters, or by installing a switch box so that you can leave the card out of the loop when you aren't using it.

If you have the Apple 3D Acceleration card installed in conjunction with the Power3D and you attempt to run a program that draws QuickDraw 3D in a window, that program will almost certainly crash. To fix this, you must remove the "3Dfx RAVE" extension from your startup set, but you lose the added speed of the Power3D for RAVE games such as Weekend Warrior. If you have either of the ATI cards installed (Xclaim VR or Xclaim 3D) or an ATI-using system like the PowerCenter Pro series, then the card will take over when a QuickDraw 3D-using application is loaded, robbing you of the extra speed of 3Dfx RAVE. This is solved in a similar fashion, by disabling the "ATI 3D Accelerator" and "Apple QD3D Hardware" extensions.

And finally, the version of QuickDraw 3D that the TechWorks installer places on your drive is obsolete: the latest version is 1.5.3, available on Apple's QuickDraw 3D web site (<http://quickdraw3d.apple.com/>).

In Conclusion

Finally, Mac gamers have the hardware power our PC rivals have enjoyed for over a year. Finally, you can make a slowpoke PCI Power Macintosh into a screaming game machine for under \$300! If you are a hardcore gamer who lives for 3D battlefields, then there is really no choice involved here: this is the card for you. If you are a 3D user who might have use for 3D acceleration in a window, then you may want to hold out for cards that are capable of this (such as the ATI Nexus GA), as there will be more of these by January.

I love this card. My jaw still drops every single time Quake loads and starts to play that first demo, whipping along at 27 fps without a hitch. If and when a 3Dfx version of Carmageddon is available, my friends won't see me for weeks, except in net games. If you are serious about games, this card is serious about games.

Special Power3D Tips and Tricks Section!

Here are a few performance tips and tricks for the card, discovered during the course of this review:

Add the following to your Quake autoexec.cfg file:

```
gl_finish 0  
r_shadows 1 (turns on transparent shadows, NO drag on frame rate whatsoever!)
```

Then set your Sound Output Quality (using the Monitors and Sounds control panel) to 22 KHz. Don't worry, this will not affect CD audio playthrough.

If you play lots of net games to your autoexec.cfg

```
gl_playermip 2
```

This will turn down the complexity of player textures, keeping the card from bogging down when there are several on the screen at a time.

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