Quiet, please

Noisy fans? David Fearon shows how to make peace and stay cool. Plus, top tips for gamers.

◀ KRYOTECH DELIVERS PCS CHILLED TO PERFECTION

I thought I'd kick off this month by talking about a subject that's not often covered: acoustic noise emissions. It's rarely given a mention in PC reviews, simply because it's very difficult to measure. A reviewer can hear if a system is particularly loud, but quantitative noise figures are impossible to provide when a PC is being tested in a busy Lab, with other systems humming away nearby. With Intel and Microsoft's initiatives to bring PCs into the mainstream and turn them into consumer devices, more attention is being paid to the subject but most of the guidelines are concerned with minimising noise when the PC is switched off, or in a sleep state.

Productivity has been an industry buzzword for ages but as far as I am concerned the best thing for productivity is a quiet place in which to work. And because most of my work involves sitting in front of a PC, the best thing for productivity is one that is quiet.

The primary reason that PCs are noisy is down to the unavoidable fact that electronic components generate heat. And in general, the faster the electronics run, the more heat they dissipate and the more cooling they need to stop them going pop.

There are essentially three ways of cooling a system: a passive heatsink (in other words a lump of metal), a fan, or an active heatsink. Only the first of these is silent, but the usual solution for cooling is a combination of the first two: a moderate-sized heatsink, with a fan clamped to it to circulate the air and increase its efficiency.

The third solution, an active heatsink, means using some kind of refrigeration unit to cool the components. As you may have guessed, this is not a common method, but if you are desperate for a 1GHz processor, then refrigeration, or thermal acceleration as it has been dubbed, is the way to get it. You can check it out at www.kryotech.com.

The faster the electronics run, the more heat they dissipate

It's a sad fact that if you want the highest performance system, you're going to need a lot of cooling. The main heat-producing elements are the hard drive and the processor, and these both get hotter the faster they are, but for different reasons.

With a processor, the extra heat comes from the higher frequency of operation. But with hard drives, most of the heat generated comes simply from the friction between the air in the case and the surface of the drives' platters. And no, contrary to the belief of many, hard drives are not sealed in a vacuum. If they were they wouldn't work, since the heads have, literally, to fly above the platters' surfaces, using the rush of air to keep them aloft.

To get maximum performance, hard drives have to spin as fast as possible, with the fastest current drives spinning at 10,000 or even 12,000rpm (at the present, Hitachi is the only manufacturer to have a 12,000rpm drive). The faster they are, the more friction there is and the more heat is generated, particularly with high-capacity drives containing multiple platters. Added to that is the fact that the faster the drive, the more acoustic noise it will produce of its own accord. It may be fun to listen to the 'jet engine' whine of a spinning 10,000rpm drive, but the novelty soon wears off.

So, big powerful systems means big powerful fans, means an inability to concentrate. But if like many people you just want a peaceful environment to be able to get your thoughts into a word processor, there are a few options.

If you are fortunate enough to have an old system lying around, you can do what I have done and set it up as your quiet system.

My system is a Pentium 166 with a 5,400rpm IBM SCSI drive. I've taken off the original CPU heatsink, which was a fairly small affair with a fan, and attached a great big thing that by dint of its size and increased surface area needs no fan to help it along. I bought some thermal bonding compound,

which you can get from outlets like Maplin Electronics <www.maplin.co.uk> for a couple of quid, and this serves to make the thermal connection to the CPU more efficient. The system is in a desktop case, so the heatsink simply sits on top of the CPU without needing anything to physically hold it in place. Although it is fairly sticky stuff, thermal bonding compound is not supposed to act as glue. If you've got a tower case you'll have to use your ingenuity here.

Having the fan-less CPU heatsink removes one source of noise but there is still the hard drive and the power supply's integrated fan with which to deal. Because it's pretty old and relatively slow, the drive is not too noisy. And because the system has the bare minimum of components, without any extra expansion cards, the strain on the power supply is not too high. Therefore, the internal fan, which is clever enough to reduce its speed in inverse proportion to the supply's temperature, is not too noisy.

It's still not ideal though, so I've been looking at other options in the quest for a completely silent PC. One of these is a company called Silent Systems <www.silentsystems.com> that makes specially engineered quiet fans, power supplies and hard drive covers to muffle noise. I haven't managed to get hold of the kit yet, but when I do you will be the first to know. But the ultimate solution would be to set up a workstation devoid of a hard drive so that the only moving part would be the PSU fan.

How do you do that? Get it to boot from a network server in another room! To do this, you need a network card with a boot PROM (programmable read-only memory) chip fitted. Most NICs have the socket but you generally need to buy the chip and fit it separately. To get the system to boot into Windows 95, you need a copy of NT Server with the Remoteboot service installed. Okay, so it's an expensive solution that only the saddest geeks would contemplate, but I fall into that category so I'll be trying it and going into more detail next month about how to do it.

Games push a system's hardware far harder than any other application

Game on

One of the less serious aspects of hardware, in which myself and others are interested, is gaming. Some might sniff at this and mutter something to the effect that a magazine like *PCW* shouldn't be covering such a trivial subject, but I'm making no apologies. Games push a system's hardware harder than any other application, and the technology involved on both the software and hardware side is incredibly advanced. Graphics cards are the main technology battleground, and with the pace of development I thought it would be helpful to give an overview of the state of things.

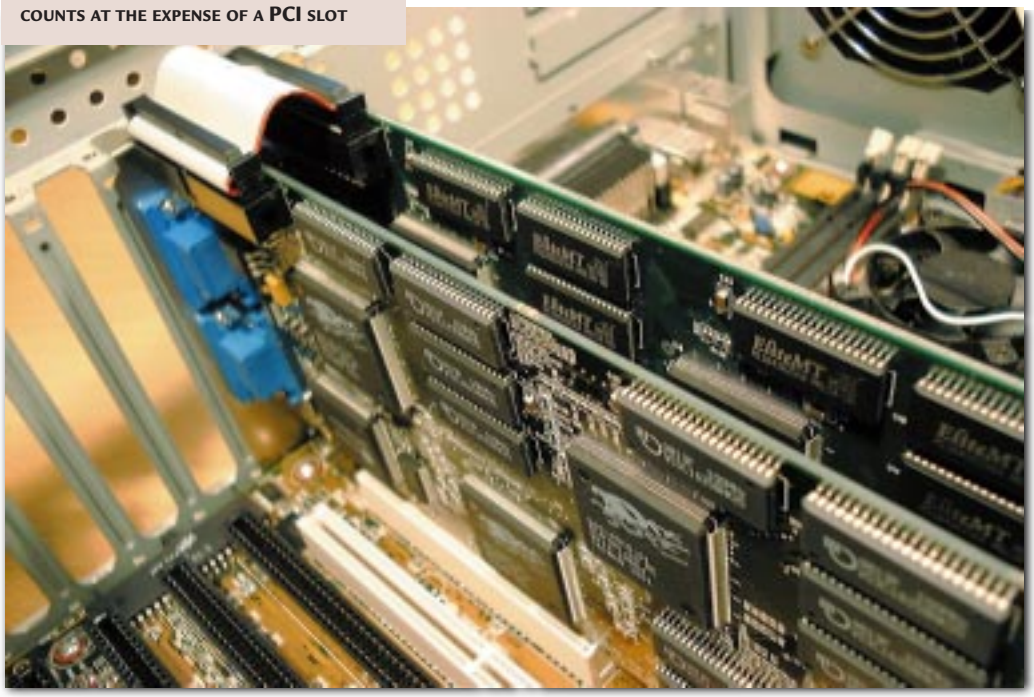
There's a glut of next-generation graphics chipsets ready to hit the scene in the coming months. A couple are already here and the first to arrive was ATI's Rage 128 (reviewed in *PCW*, May). The Rage Magnum and Fury cards both have the Rage128 and 32Mb of SDRAM onboard, which sounds completely excessive — a year ago many systems came with no more than that as their main memory. But having 32Mb onboard allows the card to cope with 3D desktop applications at 32-bit colour depth and 1,600 x 1,200 resolution, with double-buffering and Z-buffering. For games, the extra memory can be used for texture cacheing, boosting performance slightly, but with the speed of the AGP bus this is not a huge advantage.

When talking about the performance of any piece of hardware, it's inevitable that one or two parameters end up being the figures upon which the cards are compared. With CPUs it's clock speed, and with graphics cards the same thing is starting to happen. A year ago you'd never have heard anyone quoting the clock frequency of a graphics processor, but now many manufacturers are differentiating their products purely on this aspect.

3Dfx's newest chipset, the Voodoo3, for instance, comes on three different cards: the Voodoo3 2000, 3000 and the yet-to-be-released 3500. The difference between them is the clock speed of their graphics chips. The 2000 runs at 143MHz, the 3000 at 166MHz, and the 3500 at 183MHz.

Other manufacturers are doing the same.

▼ **Fig 1 Single Line Interleaving two Voodoo2s can provide impressive frame counts at the expense of a PCI slot**



NVidia's successor to the TNT, the thoughtfully-named TNT2, will come in two flavours: normal TNT2 with a clock speed of 125MHz, and TNT2 Ultra, clocked at up to 183MHz and possibly higher — NVidia does not yet seem to have decided how high it can reliably be pushed. And Matrox is following suit with its new G400 chipset and the G400MAX variant.

There are some things to bear in mind if you're thinking of splashing out on one of these new cards. The first is that there's not much point unless you've got at least a 350MHz CPU in your system. The performance of these cards is so high that they'll simply zap each frame onto the screen and then sit around twiddling their electronic thumbs until the CPU has managed to process all the geometry for the next frame, and then pass it out to the card for rendering.

So if, like me, you're already running something like a standard TNT card in a PII 266 system, the system is CPU-limited. Putting in a faster CPU will give a greater performance boost than installing a new graphics card.

There's another point to remember if you're a gamer with a single Voodoo2 in your system. If you have a spare PCI slot, a more cost-effective upgrade path is to get yourself a second Voodoo2 and run them in an SLI (scan-line interleave) configuration [Fig 1]. Despite all the new cards, Voodoo2 SLI continues to provide performance that is near the top of the tree: an SLI rig will manage 360 Megatexels/sec, which is only slightly lower than Voodoo3 3000's 366 Megatexels/sec.

Voodoo2 has its drawbacks, of course. First, there's the 3D image quality, which is noticeably poorer than any of the 2D/3D combo cards. Second there's the deterioration of the 2D desktop image due to it being routed via the Voodoo2's pass-through cable. There's not much you can do about the former but the latter is easy to solve if you've got a monitor with dual video inputs. To see if you have, just take a peek at the back of the display and look for the line of five round BNC connectors [Fig 2]. If you've got them, you can get rid of your pass-through.

Go out and buy a BNC video cable, and connect the output of your 2D card to the BNC inputs. Then hook the Voodoo2 up to the monitor's standard D-SUB connector. Some monitors, like Iiyama's VisionMasters, can be set to switch to the D-SUB input automatically when they detect the presence of a signal, but others need to be specifically switched via the OSD (on-screen display).

At the time of writing, neither the TNT2 Ultra nor G400MAX cards have been released, so 3Dfx currently rules the roost with the Voodoo3 3000. It's super-fast, but it has its flaws. The most important of these is the fact that 3Dfx still hasn't produced a full OpenGL ICD (integrated client driver). The only OpenGL support is the MiniGL driver, which implements a subset of OpenGL for games. This means you cannot use a Voodoo3 for 3D desktop applications which employ OpenGL acceleration, pretty much ruling it out as a card for an NT workstation.

Slightly less serious is the fact that 3Dfx has still not wholly embraced the AGP concept. And, Voodoo3s cannot use the AGP bus for texture transfer, which is the interface's primary advantage. All textures have to be stored in the card's onboard 16Mb RAM: for games with a lot of textures this will result in a performance decrease, although most current games don't stress the card too much.

▶ **Fig 2 The silver coloured BNC inputs to Taxan's ErgoVision 750 TCO95 monitor can be found right next to the 15-pin D-SUB input**

■ Hot gossip

Finally, I'll leave you with a tantalising rumour. The word is that Metabyte, producer of some of the best Voodoo2 cards, is developing a system that will allow any card to run in a dual SLI-type configuration. The company has apparently dubbed this technology PGP (parallel graphics processing), so before long we could be seeing dual Voodoo3 and TNT2 configurations, which, if they materialise, could prove terrifyingly fast.

PCW CONTACTS

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