

50 hardware tips

KEEPING YOUR
PC IN TIP TOP
CONDITION OFTEN
COSTS MONEY, BUT
GORDON LAING
HAS COME UP
WITH A MULTITUDE
OF SUGGESTIONS,
MOST OF WHICH
YOU CAN IMPLEMENT
WITHOUT DIPPING
INTO YOUR WALLET.

MAYBE YOUR PC ISN'T working as well as it used to. Perhaps you can't help thinking that a little tweak here and there will have your system once again firing on all thrusters. The truth is that a PC is just like any other piece of machinery, and requires regular maintenance to keep it in the best of health. But where do you start?

The answer is right here! Over the following pages we've got no fewer than 50 top tips to keep your PC hardware happy, and possibly running better than ever. Better yet, the vast majority of them are absolutely free! That's right, the best performance from your PC with no costly upgrades. So don't grind your PC into the ground. With our tips you'll have the smoothest system on the block!

ILLUSTRATION ANDY BAKER



Let's get physical

1 Screwed up

Before you start digging into the innards of your PC, you should note that the hardware enthusiast's best friend is the Philips-head screwdriver. Virtually everything in a PC can be loosened or tightened

using this. So get hold of a good one that preferably has a magnetic head to prevent those pesky screws from falling into your case and becoming forever lost. If you find yourself regularly crawling under desks to perform PC surgery, then a small Maglite torch can also prove invaluable.

2 Static electricity

The hardware enthusiast's worst enemy is static electricity, which can destroy a precious internal component in a flash. The particularly wary (or sparky) should always use an anti-static wrist strap, while the carefree may be content by regularly grounding themselves with a tap of the internal power supply. Certainly upgrading components on a highly charged carpet, or after rubbing a balloon against a furry jumper is not recommended (Although we're not sure why you would want to do that in the first place!).

3 Motherboard installation

When fitting a new motherboard, there's no need to lean into your case and struggle with screws. The side panel of most PC cases can be unscrewed and removed from the main chassis, allowing you to mount your motherboard in comfort. Make sure you use all the motherboard's mounting holes to prevent it from flexing when you insert cards.

4 Jumper settings

It's a good idea to set the jumpers on the back of drives before you screw them into your case. Believe us, it's a lot less fiddly than trying to do it when they're properly mounted. And speaking of which, don't skimp on screws when mounting drives, as otherwise you could experience irritating vibrations.

5 More power

Most PC cases are supplied with 230w power supplies. While this is adequate for a basic system, once you start adding more and more drives, fans to keep them cool, not to mention power-hungry CPUs and graphics cards, then perhaps it's time for an upgrade. Consider swapping your power supply for a higher-rated 300w version.

Brave BIOS

6 Quick warning!

Almost every PC user will have to enter their BIOS at some time, but you should always act with caution, as an incorrect setting could render your system unstartable. While enthusiasts may tweak BIOS settings for the best performance, less experienced users should only go in when they absolutely have to.

7 Easy OS install

In the old days, we installed everything from a floppy disk – indeed, most operating system installations still require a start-up floppy disk to load CD-ROM drivers in order to continue any further. A modern BIOS, however, may have the option to boot directly from an appropriate 'bootable' CD. If your BIOS supports this option, it's well worth activating, as a bootable OS CD makes installation a breeze, particularly for Windows 2000, which, like NT, otherwise requires three floppies before it'll talk to your CD-ROM drive.

8 Parallel peripheral problems?

Before the advent of USB, the PC's venerable parallel printer port won many new friends, including numerous scanners and even a handful of MP3 players. However, almost every new device demanded that the parallel port was working in the enhanced EPP or ECP modes. Sadly it's not enough that your parallel port is EPP- and ECP-compliant – it has to be set as EPP or ECP in the BIOS, so if you're experiencing trouble with a parallel port scanner, your BIOS is the place to look.

9 Don't interrupt me!

The BIOS is responsible for snatching most of your PC's precious resources, such as IRQ interrupts. If you've run out of IRQs and are experiencing device conflicts, consider disabling unused devices or ports in your BIOS. Exclusively SCSI users could disable their onboard IDE controller, while anyone with a USB keyboard or mouse could disable their PS/2 ports. Make sure the BIOS is set up for supporting a USB keyboard at boot, though.

10 BIOS updates

Sometimes an update to your BIOS is necessary to support new CPUs, bigger hard disks, or even modern OSs – Windows 2000, for instance, requires BIOS updates on many systems. Updating or 'flashing' your BIOS normally entails downloading the required data image file and a suitable flashing utility from your motherboard maker's website, copying it onto a bootable floppy, and starting your system with it. The updating process takes about a minute. If everything's working fine on your system there's no need to update your BIOS.

11 SCSI BIOS updates

There's also a BIOS in decent SCSI cards, such as most of those supplied by Adaptec. Believe it or not, this BIOS, too, can sometimes need updating, as advised on Adaptec's website. For example, the popular 2940U2W card may require a BIOS update to work with several Intel 820 and 840 chipset motherboards.

12 Load default settings

It can be easy to change a setting in your BIOS that will render your PC unstartable. Sometimes you can re-enter the BIOS, and change the offending setting, or if in doubt, just load the default BIOS settings and start again. However, you may not be able to get into the BIOS to change the settings back. But as the BIOS uses a battery to remember its new settings, removing it should return it to its default state (it's usually the flat circular battery on the motherboard). The BIOS can remain quite faithful to its user settings, though, so you may have to remove the battery for a good few minutes, or even longer to be sure.

Full recovery

13 Okay, so the battery trick didn't work. Or perhaps your system lost power half-way through the BIOS flashing process. Either way, it's time to get really serious. Modern motherboards have a boot-block BIOS that doesn't get overwritten during flashing. This tiny amount of non-corruptible data has support for a floppy drive only, allowing you to boot and attempt to reflash the BIOS again. Sadly, there's no support for PCI graphics cards, so you'll either need to find an old ISA card, or instruct the Autoexec.bat file to fire up the flash utility and keep your fingers crossed. If this doesn't work, you're looking at physically swapping your BIOS chip for one that works. However, some boards have two BIOS chipsets to protect against this problem.

14 Updates and installers**Driver updates**

Manufacturers of peripherals and devices are rarely satisfied with their drivers and usually work on improving their compatibility and performance. It's always worth checking for driver updates, particularly if you own a graphics card or Windows 2000. Amazing as it seems, we even saw improved games performance after updating a driver for a sound card. So saying, don't take the manufacturer's word as gospel. If you're experiencing problems or reduced performance with a new driver, then revert to an older one.

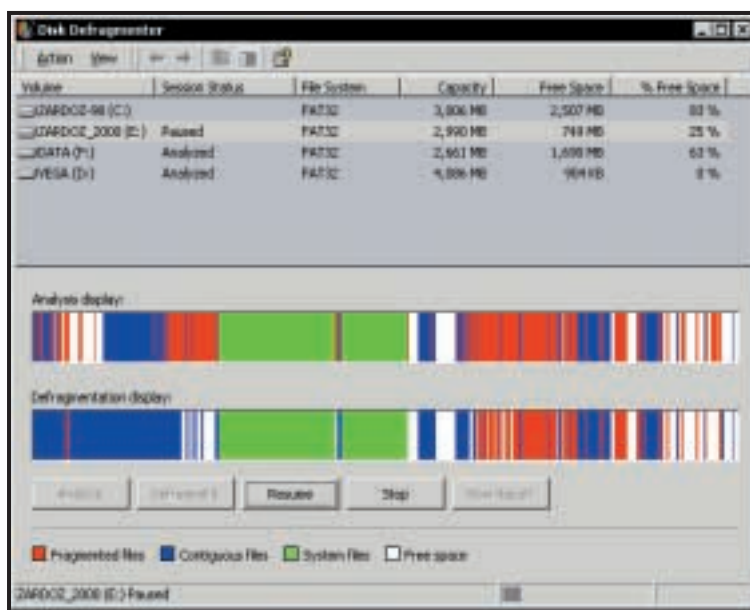
15 Order a CAB

Recent versions of Windows store their installation files and standard drivers as compressed files with a CAB extension. When you're asked to insert the Windows CD, you're

in fact being prompted to supply the appropriate CAB files. If your hard disk has plenty of free space, consider copying the CAB files from the Windows CD and pointing the request at this location instead – very convenient if you don't always have your Windows CD to hand. There's no need to copy the entire CD though: for Windows 98, just copy the 173MB Win98 folder from the CD.

16 Already installed?

Often a newly installed device will ask for the Windows CD to be inserted for some extra files. You may, however, find that you've already got the required files present in your system. If the Windows CD is not to hand and you've not copied the CAB files across, then browse the following folders: Windows/system, Windows/system/iosubsys, and Windows/system32/drivers. In many cases the installer will find the files it's looking for in these locations.

**Drive tips****17 Defrag your disk**

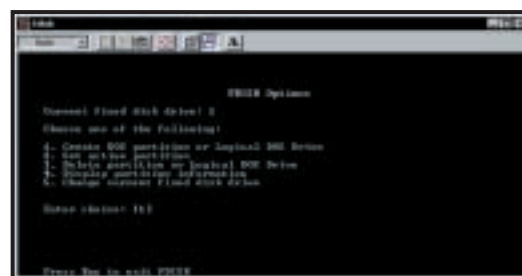
As you spring clean your hard disk, files are removed from all over the place, leaving lots of little gaps. To group them back together into one big useful area, use Windows' defrag tool. Simply bring up the properties of a drive in My Computer and choose Defragment from the Tools tab.

Bring all your files back together again with Windows' defrag tool

18 Formatting is not enough

It's well worth reinstalling your entire operating system and applications at least every year, especially if you install and remove lots of software and

Exorcise the ghosts and create new partitions with Fdisk



devices. While the classic Format C: command may seem to get rid of everything, many OSs still leave bits behind. The only way to really exorcise the ghost is to restart in DOS, use Fdisk to delete your pesky partition and create a new active partition. You'll still need to format it afterwards of course.

19 Keep up with the IDE

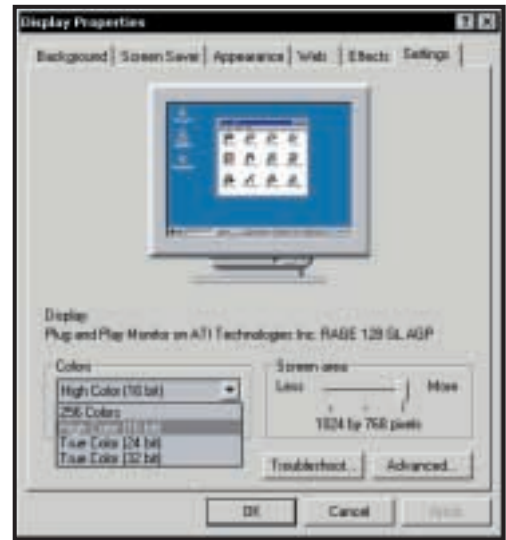
The IDE interface that's standard on almost every PC motherboard typically features two connectors: one for the Primary channel and the other for the Secondary. Each channel can support two devices as Master and Slave, but it's not advisable to mix drives of very different performance. A CD or DVD-ROM drive will slow a hard disk if placed on the same channel, so keep them apart. Put hard disks on your Primary, and CD/DVD/Zip/LS-120 drives on your Secondary.

20 Choices, choices: 66 and 33

Following on from the point above, try not to mix UltraDMA66 drives with UltraDMA33 drives on the same channel, or the bandwidth on that channel will be fixed at 33Mbytes/sec. While this is still sufficient for most pairs of drives, disks are getting steadily faster. A new IBM model already delivers 35Mbytes/sec.

21 LVD, yeah, you know me!

The latest two SCSI interfaces, U2W and U160 use a Low Voltage Differential (LVD) connection. U2W and U160 SCSI cards normally feature at least two channel



Try 16bit colour mode if you're looking for speed

connectors: one labelled LVD and the other as SE. In order not to compromise the performance of high-speed LVD hard disks, you should keep them on the LVD channel and all other non-LVD peripherals on the SE channel.

22 The terminator

SCSI offers great performance and flexibility so long as you obey some simple rules. One of the most important is to terminate each end of the SCSI chain, be it on an internal drive, an external scanner, or even on the SCSI card itself. Incorrect or missing termination can cause all sorts of problems.

23 Stay on the same bus

SCSI and IDE each have their pros and cons, but for the best performance, try to stick to just one or the other in your PC. Data transfer is much faster if it doesn't have to cross from IDE to SCSI or vice versa.

Graphics and display

24 Free of flicker

A flickering display will give you eye fatigue and headaches. To avoid this, make sure your graphics card refresh rate is at least 70Hz, and ideally nearer 85Hz. If you change your refresh rate and your monitor can't handle it, wait for a few seconds and Windows will switch it back to your old setting. Note LCD monitors can get away with lower refresh rates as they have their pixels illuminated at all times.

25 Crop top?

If you don't like the black borders around your picture, then use the monitor controls to stretch or reposition the image on screen. Similarly, if it's cropped, then shrink the picture or shift it back again. Adjustments are frequently necessary when you switch resolutions or refresh rates.

Pushing components to the limit

Overclocking is the process of forcing something to go faster than it was originally intended to go. While this is most commonly performed on CPUs, overclocking is now popular with some chipsets and even graphics cards. Remember, however, that if you artificially run a component beyond specification, you may damage it and probably invalidate your warranty.

A CPU's speed is dictated by two numbers multiplied together: the clock

multiplier and the front-side bus (FSB), so a PIII 750 is 7.5 times 100MHz. In recent years, Intel has locked the clock multiplier on its CPUs, which means overclockers have been forced to increase the FSB instead.

Apart from ensuring the resulting speed is still within the CPU's manufacturing tolerances, increasing the FSB has many other impacts.

First is that the PCI and AGP buses are only guaranteed to work at 33 and 66MHz respectively and these

speeds are calculated as a fraction of the FSB. Consequently, you'll have to ensure your motherboard offers appropriate dividers, or you may be running these often sensitive buses beyond their specification.

In BX chipset systems, the memory is also driven at the same speed as the FSB, so a 133MHz FSB will require PC133 memory.

For more details on the practicalities of overclocking, check out *Hands On Hardware* in PCW every month.

26 Go for 16bit: the ideal compromise!

While 24 and 32bit colour modes may reproduce photographic images the best, 16bit looks pretty good, and is a lot quicker for your system to handle.

27 Quick games boost

To immediately improve your frame rate in games, consider playing them at a lower resolution. A setting of 640 x 480 may not be anywhere as detailed as 1,024 x 768, but it's a darned sight faster, and cheaper than buying a new graphics card.

28 Save the environment

Power-saving modes will reduce electricity use and prolong the life of your display. Don't forget to switch off your display at the end of the day, though, as most PC power supplies will no longer do it for you.

Sound advice**29 Magnetic shielding**

Loudspeakers use big magnets to drive those cones and produce the sound. There's nothing wrong with that, of course, unless they're placed too close to your monitor. The magnets will interfere and produce undesirable coloured interference and distortion on screen. The solution is to move them further away or, better still, to buy a magnetically shielded pair.

30 Boo, hiss!

To minimise background hiss when recording audio on your sound card's line or CD inputs, make sure you mute the microphone input. If you have a pre-amp option, known as 'boost' on Creative cards, then mute this too.

31 Digital dream

Most modern sound cards feature SPDIF ports, which squirt out digital audio through either an optical or coaxial phono connection. If your hi-fi pre-amp or processor features a spare SPDIF input, consider connecting it to your PC for the best quality. Note that many software DVD players can now redirect the raw Dolby Digital or DTS bitstream out of your sound card's SPDIF port, allowing you to connect it to an external Dolby Digital/DTS decoder.

Imaging and printing**32 Blocky digital camera photos?**

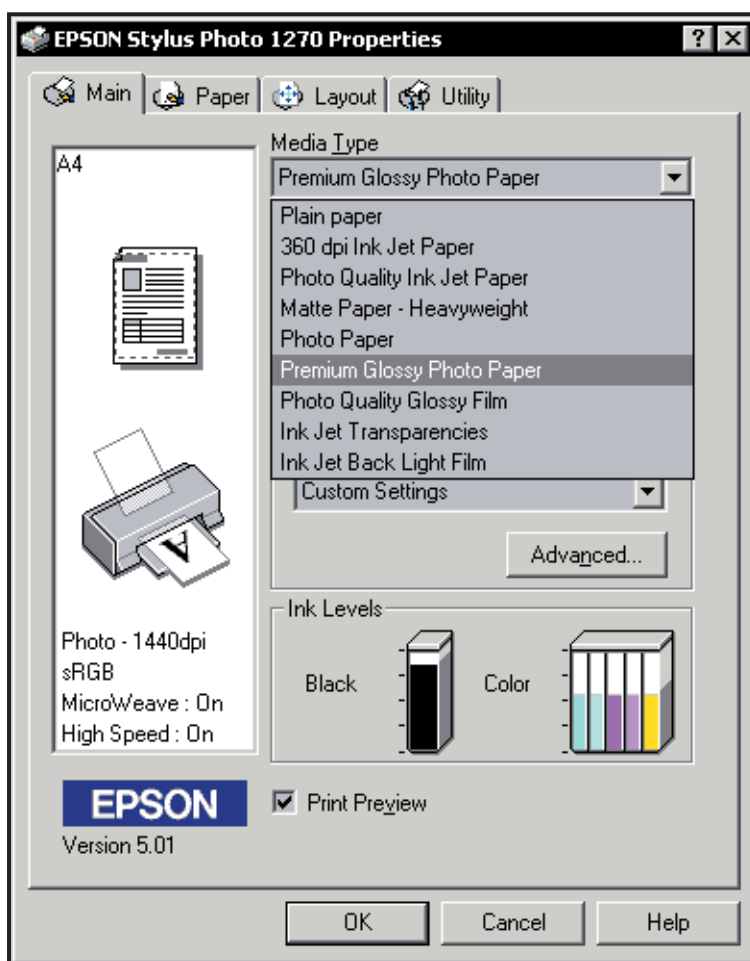
The general rule for printing photos on colour inkjets is to supply them with 200-300 dots per printed inch. If you've got a 2.1megapixel digital camera, that means you'll begin to see the blocky pixels on prints larger than 6 x 8in. To eliminate these jaggies, consider interpolating your image by two times in a package like Photoshop. This won't reveal any new detail in the picture, but will let you print to A3 without seeing any nasty blocks.

33 Matched paper

Colour inkjet printers have an enormously wide range of different papers available – some are matt, some are glossy, some are thick and some are thin. The crucial thing is to know which paper you're using, and to instruct your printer driver. It will then know how much or how little ink to put on the page, striking the right balance between a soggy print and one which is lacking in the vibrancy department.



Cut down that background hiss

**34 Soft scans?**

When scanning photographs, the results can sometimes look a little soft. Consider sharpening them using software, either from the TWAIN driver if available, or from an image manipulation package. The sharpener of choice is the curiously titled Unsharp Mask, which normally lets you adjust settings and preview their effect before applying.

Tell your printer driver what sort of paper you are using

35 SCSI scanner not talking?

SCSI can be a superb interface for connecting drives and peripherals, but sometimes devices other than hard disks can give you trouble. The culprit is normally a missing Advanced SCSI Protocol Interface (ASPI) layer. Without ASPI loaded in Windows, you'll be lucky to get anything other than SCSI hard disks and CD-ROM drives working. Adaptec SCSI card users should get hold of a copy of EZ-SCSI 5 for Windows 95, 98 and NT, while Windows 2000 users should instead update their Microsoft SCSI card driver with one of Adaptec's own. This seems to do the trick for talking to SCSI scanners and other moody devices.

36 Cabling and cleaning Cable compromise

Most of us use extension cables and splitters to get our phone points to our modems, but these may be deteriorating the line quality and compromising your Internet performance. Remember that a 56K modem will rarely achieve its theoretical limit, but if you're consistently getting below 30K, then it may be time to check your cabling.

37 Simple networking

While LapLink's special USB cable is a neat way of quickly transferring files between two PCs at up to 12Mbps/sec, you can't beat the flexibility of a proper network. You'll need to fit a 10/100 PCI Ethernet card into each PC, and use CAT-5 quality cabling to support the faster 100Mbit speeds. If both PCs are connected directly to each other in a peer-to-



peer configuration, then you'll need to use a Crossover Ethernet cable.

38 Clean living

It's remarkable how much dust and dirt your PC accumulates over time. Try turning your keyboard upside down and shaking out all the sandwich crumbs. If your mouse has become unresponsive, remove the ball and brush any dirt and fluff from the rollers – cotton wool buds and compressed air can prove invaluable. Also check for fluff in your fan intake round the back of your PC case.

Keeping your cool**39 Biggest fan**

Fast graphics cards, high-speed hard disks and quick CPUs all generate a lot of undesirable heat, and it's a good idea to get rid of it if you want to prolong their life. Most PC cases feature mountings for one or two additional fans to pull clean air in and suck it back out the other end – costing less than £10 each, additional case fans will help your PC keep its cool.

40 Thermal paste

Heatsinks may keep processors cool, but will only work at their best if there's decent contact between them. Help them by removing the heatsink, getting rid of any redundant pads, and applying a very thin layer of heat transfer compound instead (£1.99 from Maplins, www.maplin.co.uk).

41 CPU heatsinks

Overclockers often have to pump higher voltages through their CPUs in order to get them to work reliably at faster speeds. This in turn generates more heat, so bigger heatsinks and fans are a must. Remember that PPGA processors need different heatsinks to FC-PGA processors, as they're slightly different heights. Hills Components (www.hillcomponents.co.uk) has a good range of Titan fans.

Chipsets under the spotlight

In recent months, the chipset (which co-ordinates activities on your motherboard) has come to the forefront of attention. Intel's issues with its RDRAM-to-SDRAM protocol converters on 820 and 840-based motherboards have forced many users to look more closely at chipsets when they are looking

to buy a new system.

Intel's old BX chipset still cuts the mustard, particularly when overclocked from 100 to 133MHz, but this pushes the AGP bus beyond spec, and supplies of the chipset are now almost non-existent.

Natively supporting PC133 memory, Intel's brand new 815 and 815E chipsets are

set to do good business in mainstream products.

Many enthusiasts are, however, waiting for VIA's forthcoming chipsets that will support new DDR SDRAM, effectively running at 266MHz. We hope to see DDR motherboards for both Intel and AMD CPUs before Christmas.

42 Monitor temperatures

Wary users or overclockers should always keep an eye on the various temperatures in their systems, especially when they've been on for the best part of a day. Most BIOSs will indicate the CPU temperature, and some motherboards come with utilities to check this from Windows. Intel lists thermal guidelines in the developer sections of its website, but if your CPU is approaching 70 degrees Celsius, it's definitely time to cool down.

43 Do your research

If you want to check out overclocking or upgrade options, then the bible is your motherboard manual. If you've mislaid yours, identify your board and download a copy from the manufacturer's website – it's essential.

Media care**44 Fragile CDs**

Tomorrow's World may have introduced compact discs as indestructible, but they're more fragile than we first thought. CD-R discs are particularly sensitive to scrapes and scratches, so keep them in their cases when not in use.

45 Uncertain backup?

When is a backup not a backup? When it's not been verified. It's no good studiously backing up your data if you don't check to see it was stored without a problem. All backup software offers a verification option, which simply checks to make sure everything went to plan – make sure you use it!

46 Backup for backup

You may be happily backing up and even verifying, but then one day your backup media fails, or is lost, burnt or nicked. If you really care about your data, back up twice each time, onto different media, and cycle it from time to time. Where possible, try to keep your backup media separate from your PC in case your system is stolen or damaged. A fireproof safe or off-site location could end up being the securest place for your precious backup media.

47 Scary magnets

Tapes and floppy disks store and identify their data using magnet properties of the media. Clever stuff, but easily distracted by a bigger magnet, like the ones they use inside your monitor and in loudspeakers. To avoid the chance of accidentally erasing your tape or floppy, do not leave it on top of your monitor or speaker.

It's dead Jim!**48 New drive won't appear?**

A new hard drive may be connected up correctly, but if your BIOS hasn't been informed, then it may as well be in Timbuktu. If

it's an IDE drive, ensure the first page in your BIOS has the appropriate channel set to AUTO, and that the channel itself is enabled. If you want to boot from a SCSI drive, make sure your BIOS knows to boot from SCSI and not IDE.

49 Machine won't start up?

There's a reason most technical support people ask you to check your cables and connections – they're often at fault in a system which mysteriously won't start up. If your PC fans are whirring, but there's no beeping, nothing on your display or anything else at start-up, then switch off and make sure your CPU, memory and cards are correctly seated in their respective slots. It's often worth removing them and re-inserting to be sure. AGP graphics cards are notoriously troublesome, and often pop out from their slots almost invisibly, but sufficiently to halt a system. After much cursing and head scratching, we've discovered most mysterious non-boots are due to a badly seated component.

**50 Machine won't switch off?**

The power button on PC systems with ATX power supplies isn't simply an on/off affair; instead it works in states. If your machine won't physically switch off when you press the button, try holding it in for a few seconds. Also remember to enable ACPI in your BIOS so that Windows can switch off your PC when you shut down.

Clash of the Titans: try Hills Components for a wide range of fans