

SUPERCARGE YOUR PC

Even a computer bought only a few months ago can quickly seem out of date. In order to keep up with the times you need to get a handle on how to perform your own upgrades. Niall Magennis shows you the best ways to boost your PC

There's an old saying that you shouldn't mess with things you don't fully understand. If that were the case then we'd all be giving members of the opposite sex a wide berth.

While most of us will never fully understand the inner workings of our PCs, it's pretty easy to build up a bank of knowledge that will serve you well enough to allow you to perform a few choice upgrades. What's more, we've put together a guide that will supercharge

your PC and give it more grunt than a hotrod from *The Fast and The Furious*.

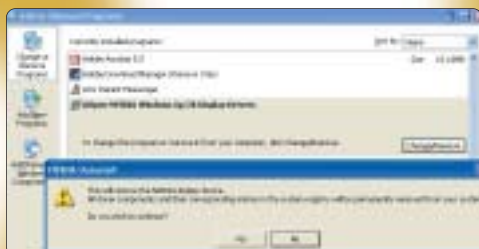
First of all let's get one thing straight: it's actually quite difficult to damage your computer while performing upgrades. There are two main things to remember before you open your PC. First, make sure you unplug your computer from the mains to eliminate the risk of electric shock. Second, be wary of static electricity – don't wear a *Star Wars* Wookiee costume while

upgrading and before you go near any of your PC's components touch a metal part of the case. This discharges any static electricity from your body.

While it's always best to be as gentle as possible when adding and removing parts from your system, you will sometimes have to exert pressure on a card to get it into a slot or wrestle a connector into a socket. Don't be overly concerned if at times you have to be a tad rough.



Upgrade your graphics or sound card



1 Uninstall the drivers for your existing card – in this case it's for an nVidia graphics card. Head to the Windows Control Panel and then click on Add/Remove Programs. Select the entry for your graphics card drivers and click on the Change/Remove button



2 Shut down your computer and unplug the mains lead. Ground yourself by touching a metal object such as a nearby radiator and put on an antistatic wriststrap. Open up your PC's case and remove the screw or retainer holding your existing card in place.

Pull the card out of the slot and replace it with your new graphics card. Refasten the screw or retainer and close your PC's case



3 Reboot your system and insert the CD-ROM with your new card's drivers. Follow the instructions in your card's manual on how to install the new drivers. That's it! You should now be able to enjoy lightning-fast performance from the latest games

RAM it in

Where do you start if you want to give your computer a bit more oomph without spending a packet on new parts? Adding more RAM is one of the easiest upgrades you can perform and will have a significant effect on your PC, especially if you do lots of graphics or video-editing work.

It's child's play to add more memory to a desktop machine. First you need to know what kind of RAM your PC is currently using. It can be tricky to find this out on your own so we'd recommend using a supplier such as Crucial (www.crucial.co.uk). Its website features a special wizard that you can use to find out exactly what memory your machine uses.

Before you buy your RAM, though, you need to check that you have a spare memory slot available in your PC. To do this turn off your machine, unplug the power cord and open up your system's case. Have a peak inside to see if there is a spare slot. If there's one free then you're in luck – you can just buy some new RAM to fit in the space.

If all the slots are currently in use then you may still be able to upgrade, but you will have to discard some of your existing memory to free up a slot. This is a bit of a waste but not uncommon.

Another point to note is that the very latest motherboards have dual-channel memory capability. What this means is that the processor can read from two RAM sticks at the same time, thus speeding up memory access. However, to take advantage of

this you do have to install your memory sticks in pairs.

Once you have bought the RAM it's simply a case of popping it into the correct memory slot (as shown opposite), reconnecting your power lead and booting up your computer. You don't have to install any drivers or change any settings on your PC. Your computer will automatically recognise that extra memory has been added.

Play your cards right

Having got your memory sorted out, the next thing is to add some plug-in cards. This is where the fun really starts as one of the most popular upgrades for any PC is a faster graphics card which will improve gaming performance.

But you must be sensible about graphics card upgrades. The latest cards are always expensive because they use cutting-edge chip technology. To take advantage of their power you need a pretty fast processor. Plonk a top-notch card in an ageing PC and you're not going to get the full benefit. That said, if your PC is relatively new and you want to get the most from the latest games then a graphics card upgrade is a safe bet.

Current leaders in the graphics technology field are ATI (www.ati.com) and nVidia (www.nvidia.co.uk). The latest offerings from these two companies are the Gigabyte Maya II R9800 Pro (which uses ATI's Radeon chip) and the MSI FX 5900 Ultra, based on nVidia's top-spec processor. Both cards offer screaming-fast performance and are easy to add to your system.

Graphics cards simply clip into your computer's AGP port, a special slot dedicated to graphics use. You can easily spot the AGP port inside your computer because it is coloured brown, unlike PCI slots which are usually white. For instructions on upgrading your graphics card see the step-by-step guide, left.



BEGINNER



INTERMEDIATE



ADVANCED

Memory cards must be inserted in order into slot one, two and so on. Pull the handles outwards on either side of the slot, line up the card then push firmly downwards. The memory will then be locked into place



Once you've upgraded your computer's graphics performance you may be tempted to upgrade your sound card for surround sound when playing games or watching movies. It is usually just as easy to swap a sound card as it is to replace a graphics card. Most of today's sound cards offer excellent audio quality thanks to onboard 24bit converters and high sampling rates. They also tend to offer multiple channels of audio output for immersive movies and games.

The latest cards such as the Terratec Aureon 7.1 Space (www.terratec.co.uk) and M-Audio's Revolution (www.m-audio.com) can output eight channels of audio – seven surround sound channels and one low-frequency channel for bass effects. For the ultimate in audio you'll need to combine the card with a PC speaker setup that features seven satellites and one subwoofer – for example, the Creative Inspire 7.1 7700 or the Videologic ZXR-750 (www.videologic.co.uk).

Hard drivin'

Fitting a new hard drive or optical drive such as a DVD writer is another worthwhile upgrade for your system. However, it can be more tricky than some of the previous upgrades we've looked at. Hard drives are pretty cheap these days – you should be able to pick



Upgrade a laptop's memory



Unfortunately you can't upgrade a laptop in the same way you can a desktop machine. It's impossible to change the processor or motherboard, for example, because laptops are generally bespoke designs that are unique to each manufacturer.

However, there is a reasonably easy and not too expensive way to boost the performance of your notebook. Pretty much all portables have a hidden compartment that houses a slot for adding more RAM. Notebooks that can be upgraded usually have a panel on the back which is easy to remove. Most modern applications are extremely memory hungry, so adding more of the stuff will produce notably better performance.

Even if there isn't a spare RAM slot you may be able to remove the existing memory module and replace it with a larger one. Many notebooks have a certain amount of memory hard-wired to their motherboard, with the rest made up by the removable RAM stick. Replacing this will obviously only work if your laptop can accept more memory than is already in it.

1 To find out whether your laptop has a RAM expansion slot you'll need to refer to your portable's manual. Then use a supplier such as Crucial (www.crucial.co.uk) to make sure you get the correct type of RAM for your machine. Crucial's online wizard pinpoints your laptop's model number and ensures you purchase memory that will work with your notebook



2 Next, unscrew the cover on the bay to see if there's a spare slot. Some laptops only have a single RAM slot that is populated with the memory already being used by the notebook

3 Turn off the notebook and put on an antistatic wriststrap. Unscrew the cover of the RAM slot and carefully press the new memory module firmly into place. Remember to hold the RAM stick by its edges, not touching the gold connectors on the chip itself. Replace the notebook cover. When you turn on your laptop the RAM will automatically be accepted. No drivers or applications need be loaded





There's a series of metal cages behind the case's front panel where you attach various drives. The narrower cages are for hard disks and floppy drives, while the wider ones are for optical drives such as DVD-ROM and CD writers

up a 100GB model from high street retailer PC World or an online supplier such as www.dabs.com for around £100.

The big issue you need to be aware of when installing a new drive is that one device on an IDE drive channel can affect the speed of another. You never want a hard drive and an optical drive connected to the same channel as the optical drive will slow down the hard drive.

The correct way to connect drives to your PC is to add hard drives to the Primary channel (usually marked IDE1) and connect optical drives to the Secondary channel (usually marked IDE2).

You may also have to set special jumpers on the drive before installing it in your PC. Each IDE channel in the computer supports one drive in Master mode and the second in Slave mode. If your PC already has a drive connected to one of the IDE channels it will operate in Master mode. The drive you are adding must therefore operate in Slave mode.

Modern systems can detect what mode a drive should be operating in and set it accordingly without any intervention from the user – as long as the drive's jumper is set to Cable

Select mode, that is. This mode isn't supported on all systems, so it's usually best to manually adjust the jumper to Slave.

If you are adding a drive to an IDE channel that doesn't already have a drive attached to it you will need to set the drive's jumper to the Master setting. Then all you do is screw the device into a spare drive bay, connect the IDE cable and power cable and reassemble your machine.

Upon booting the PC the drive should automatically appear in Windows. If you have installed a hard drive you will need to format it. To do this right-click the drive's icon and select the format option. With large drives it's best to divide them into different partitions, giving you numerous virtual drives to work with in Windows. The best software for this is PowerQuest's PartitionMagic (www.powerquest.com). Find this program in your local PC World store for around £30.

Mother of upgrades



The ability to replace your computer's CPU will depend on the type of motherboard that is nestled inside your system. AMD and Intel processors use different sockets and different types of motherboard. It's therefore impossible to cross-grade between different manufacturer's chips without replacing the motherboard.

Different motherboard chipsets also support different processor speeds, so even if you have an Intel chip and want to upgrade to a faster one you may not be able to do so. This is because older motherboard chipsets tend not to support the bus speeds that the latest and fastest processors need.

If you've got a really old machine then you'll need to visit a specialist upgrade supplier such as PowerLeap (www.powerleap.com) or Evergreen (www.everttech.com). The firms sell mini circuit boards that house a faster processor plus the electronics to convert the chip's slot or socket interface to something compatible with your motherboard.

Such speciality upgrades are generally more expensive than simply buying a raw chip, but they are much easier to install for novice users. Both the PowerLeap and Evergreen websites feature special applets that will gather information about your PC, which you can

then email to the company so it can suggest a suitable upgrade.

A more drastic option for upping your computer's performance is to replace the motherboard – not an easy task as it involves taking your entire computer apart. You'll have to remove any plug-in cards and disconnect all the IDE cables to your drives. You must also be confident of your abilities.

If you're up to the job then replace an older board with something like MSI's 865PE Neo2-FIS2R (see details at www.msicomputer.com) or Gigabyte's GA-8PENXP (<http://uk.giga-byte.com>). Not only will you be able to take advantage of the latest processors, you will also get extra features such as onboard ethernet, FireWire and Raid support.

Bear in mind, though, that you may need to upgrade your system's processor and memory to match the motherboard, so it could be an expensive upgrade.

Ready, steady, upgrade

Whether your PC is feeling sluggish or you just want the latest technology, a serious bout of upgrading can reap great rewards. But you must be sensible when upgrading older machines.

Computer prices are at rock-bottom levels at the moment so if your PC is very old it may not be worth spending hundreds of pounds on upgrading its components when you could get a brand-new, well-specced machine for a similar amount of money. But for those with relatively new systems who want an extra lick of speed then a little bit of upgrading can certainly go a long way.

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As long as you've done your homework and selected the correct processor for your motherboard, fitting a new chip is a cinch



Get into networking



Not all upgrades are about raw performance – some are for convenience. If you've got more than one computer then you'll eventually find you need some easy way of transferring files between them. In years gone by you could transfer most files between two machines using a floppy disk. But this is not really an option now that computer files have outgrown their tiny 1.44MB storage capacities.

What you need is a proper home network which will allow you to share a broadband internet connection around your home, transfer files and folders across different PCs and even let you take on other members of your household in frantic Quake III frag fests.

There are two main ways to network your home. The first is to use a wired network based on ethernet. Most PCs today come with onboard networking. But even if your PCs don't have this built-in option you can quickly and easily upgrade them by purchasing cheap network cards.

If you want to share a broadband connection then it's best to buy a router that's compatible with your broadband supplier's service. There are many routers on the market and the package usually includes an ADSL modem, firewall and network switch. These routers can share your broadband connection among your PCs, protect those machines against hacker attacks and safely share files.



1 Your PC will probably have built-in networking hardware. If not, unscrew the cover on the bay to see if there's a spare white PCI slot. Note that you'll need separate NICs (network interface cards) for your broadband connection – if you have one – and to establish your PC network



2 Before adding or swapping PC components it's a good idea to earth yourself by touching a metal surface to disperse any harmful static electricity. Then, gently but firmly position the card in its slot and reassemble your PC. Your card should be automatically recognised when you restart



3 Physically connect the PCs by plugging in the cables to the ports on the back of the network cards. If you're connecting three or more machines you'll need to use a central hub or switch, rather than attaching the PCs directly to each other



4 To set up the network under Windows XP, navigate to Control Panel, Network Connections and choose Create a new connection. XP will then invoke its Network Setup Wizard and you can follow its prompts.

To connect non-XP PCs to a system running Windows XP, insert the installation disc and choose the Perform Additional Tasks option followed by the Setup home or small office networking option. This will bring up the same wizard as the one you've just used

Cutting the wires

Many people find that an even better solution for sharing data across multiple PCs is to opt for a wireless LAN. Wireless networks work in pretty much the same way as their wired cousins except, of course, they don't need any cables. Unfortunately they also tend to be more expensive and slower – most wired networks run at 100Mbps (megabits per second), while the fastest wireless networks are limited to 54Mbps.

There are currently three official standards for wireless networking. There's IEEE 802.11b, which offers data rates of up to 11Mbps, as well as IEEE 802.11g, which offers data rates up to 54Mbps. This faster standard is also backwards-compatible with 802.11b kit so you can mix and match between the two speeds. The new standard is 802.11a, which also provides speeds of 54Mbps but is not compatible with the other two standards as it uses a different wireless frequency.

At the moment 802.11b and g are the most widely supported standards. If you've got a laptop with Wi-Fi built in then it will probably support these standards.

If you haven't much of an idea about networking then it's best to buy all your kit from a network specialist such as Netgear (www.netgear.com). Equipment from a single manufacturer tends to work together straight out of the box, saving you the need to configure a wireless network – something which isn't a particularly easy task.



↑ Wireless broadband routers connect to your always-on internet connection and then allow all local computers around with wireless cards to access the link. The router will firewall the link, allowing you to share drives and folders safely around the network



↑ You will need to install a wireless PC card for each notebook on your wireless network

Squeeze if you wanna go faster

Not all upgrades involve buying new kit. It's possible to squeeze more performance out of existing components by overclocking them (running components, usually a processor, at a higher speed than they are officially meant to run). The faster they go the better the performance you can extract from them.

Overclocking will void your PC warranty and, if you're not careful, can seriously damage components. You need a fair amount of technical nous; this is not an upgrade for novices. But done carefully, experienced users can squeeze extra performance from a chip without doing any harm at all.

You can overclock a processor by changing the clock multiplier or change the FSB (frontside bus) frequency. Most chips

have locked clock multipliers so the only real way to overclock modern chips is to change the FSB.

The faster a component runs the more heat it generates in the process. If a processor gets too hot it will eventually burn up and stop working so you need better cooling methods as you push the chip to faster speeds. You will need to invest in a better fan or heatsink or both. Sites such as www.overclockers.co.uk and www.alphanovatech.com provide a broad range of cooling options, from large CPU fans to heatsinks. You also need to get the warm air circulating out of your PC's case and it may be necessary to purchase a case fan as well.

Thermal paste (a white, glue-type substance) must be smeared on the top of the processor when setting a new heatsink or fan in place. This is an excellent conductor and will make sure as much heat as possible is dissipated.

Increasing the speed of the FSB also ups the rate of the PCI bus. In rare cases this can play havoc with cards.



(The PCI standard only specifies cards should work at 33MHz.) You may also need to slightly up the voltage to your chip to make it more stable at higher clock speeds.

The key to sensible overclocking is to increase speeds gradually to see what works and what doesn't. Most of the necessary settings can be tweaked from the Bios in modern PCs, but on older machines you may have to get your hands dirty by changing jumpers on the motherboard. With ultra-new motherboards you can actually tweak the settings using Windows utilities.

To find where the settings for your motherboard are located you'll need to refer to the component's manual – either go to the manufacturer's website or, if that doesn't garner any results, try www.motherboards.org.

Pretty much every motherboard has some way of monitoring the processor temperature and this is key to any overclocker. Although there is no definitive guide to how hot your processor should be running, a general rule is keeping it below 50°C when idle.

How far you can push your processor will depend on its make and model and also on how the chip was fabricated. Slower chips fabricated at a finer micron level generally offer better overclocking possibilities.

Normally, Intel chips can be overclocked further than AMD ones, but certain speeds of processor just aren't great for overclocking. Again, check on your processor manufacturer's website before undertaking any overclocking.



1 Enter the PC's Bios screen at bootup, usually by pressing Del (or F2 or F5 depending on your motherboard). On this Abit board we need to enter the Soft Menu Setup screen so we can overclock the CPU



2 The software menu screen may be called a different name in your Bios but many of the settings that you can change will be the same. Here you can see the settings for a standard 2.2GHz Pentium 4 chip



3 To overclock your CPU you need to change the Ext. Clock (CPU/AGP/PCI) option. The FSB can be set from 100MHz up to 412MHz. The key to safe and successful overclocking is to make very small changes. Around 5MHz at a time is probably safe for newer chips. Patience is a prerequisite!



4 You may need to increase the voltage to the chip to make it more stable when operating at higher speeds. If so, only small incremental changes as too much voltage can make the chip overheat. Increases of .05 or .10v should be fine with newer chips cooled by a decent fan