

PC speed boost

Like the scarecrow in *The Wizard of Oz*, your PC is nothing without a fully functioning brain. If your machine's having a crisis of logic, follow Jeff Bertolucci's advice on supplying it with a shiny new one – and a better memory too

When your old PC starts grinding along because you've asked it to handle a new game or picture-editing software, it's tempting to chuck it out and start all over again.

Of course that's not the most cost-effective solution. It is much more sensible to do a bit of investigation into the problem and replace some of your PC's innards – any upgrade can only improve your machine's performance.

The most obvious upgrades – and two of the simplest – are the CPU and RAM. The CPU really is the grey matter in your system and a clunky old one can make hard work of anything other than basic office programs. The Pentium III, for instance, will really labour if you place heavy demands on it.

It's all down to speed. The faster the CPU, the nipper your applications will be. Insufficient memory will also make your PC plod along. Again,

what you need depends on your OS and the applications you plan to run.

How much you spend and how far you go are entirely up to you. You can upgrade just the CPU, just the RAM or go for the speed rush of the full double whammy.

This workshop will help you figure out what hardware you need and explain how to source, buy and fit your new components. Then all you have to do is sit back and watch it all go.

ILLUSTRATION: AILEEN O'DONNELL

Problem solvers

CPU

I can't find my old CPU

It might be hidden beneath other system components or under a plastic cover, either of which you must remove before you can upgrade the chip.

My PC doesn't recognise the new processor I just installed

Update the Bios. Download the Bios update from your PC vendor's or motherboard maker's site and follow the vendor's instructions.

I'm not sure if the new CPU's cooling fan is working

If the new processor includes a cooling fan, connect the fan's power cable before you boot up. If the fan isn't spinning when you do this, turn off the PC straight away and check the power connections. Running the PC without a working fan for the new processor could damage your CPU.

RAM

I don't know which memory type my PC uses

Go to a RAM vendor's website (such as www.kingston.com/uk or www.crucial.com/uk) and find the name of your PC (or motherboard, if you are on the Kingston site). It's the fastest way to ascertain the right memory modules for your system.

The memory modules are blocked by messy wires

Disconnect the wires to install the memory and reconnect them afterwards.

My PC doesn't recognise the new memory

Turn off the PC, open the case and examine the modules. Are they seated correctly with clasps firmly in position? Extract and reinsert them to make sure the clips click into place, signalling that they are firmly seated. Don't be afraid to use a little muscle, but not too much – memory modules are delicate and can bend or break easily.

Bolster brain power

The need for speed is most evident in processor-intensive tasks such as encryption, video editing and gaming. Your 500MHz Pentium III chip might sprint like a greyhound when running Outlook, but it will hobble along when paired with Adobe's Premiere Pro. The vendor recommends running a 3GHz Pentium 4 for optimum performance in this program.

A CPU upgrade isn't simply a matter of swapping an old processor for a new one. The installation takes just minutes but the real work should happen before you even open the computer case. A bit of research is crucial to buying the right chip.

Do you need a 423- or 478-pin package? A ZIF socket or Slot 1? What's the frontside bus speed and is a Bios upgrade required? Your PC manual or a spot of online searching should provide this data.

When choosing a CPU, consider sockets and motherboards. Sockets are an issue because Pentium 4 chips have varying numbers of pins. You can't upgrade from a 1.3GHz P4 processor, which uses a 423-pin socket, to a 3GHz P4 which uses the larger 478-pin size. But there is nothing to stop you upgrading from a 1.3GHz P4 to a 2GHz P4.

If your computer can't handle a truly speedy processor, consider upgrading the entire motherboard. The AMD (www.amd.com) and Intel (www.intel.com) websites both have information about how to do this.

Make sure the other system components, including the hard disk controller, the graphics card and the memory, are not only compatible with the system's motherboard but are also your best choices. It makes little sense to match the latest motherboard, CPU and memory with a near-obsolete graphics board.

Thanks to PC vendors' support websites and search engines such as Google, information about processors is easy to find these days.

If you bought a generic PC from an independent retailer, check the motherboard manual or the board manufacturer's website to determine the best upgrade. This is important in the case of a CPU maker that uses the same socket type for its entire processor line.

Although it's tempting to assume a chip that fits is the right upgrade, this isn't always the case. In most PCs, the processor sits in a socket on the motherboard. AMD's Athlon and Duron chips, for example, all use a 462-pin socket.

But if your motherboard has a 266MHz frontside bus, it won't be compatible with the latest Athlon 3200 chip as this requires a 400MHz bus. AMD's site (www.amd.com/us-en/processors/technicalresources) has a motherboard search tool that finds the best CPU for your PC.

Similarly, at <http://processorfinder.intel.com/scripts/default.asp>, Intel provides a large amount of technical data about its chips.

Take our PC, a generic model currently running a 933MHz Athlon. Though its age and lack of branding meant info about it couldn't be sought on a PC retailer's site, we found all the information we needed on Crucial's site (www.crucial.com).

Typing in details of the Asus A7A266 motherboard not only elicited a list of compatible RAM sticks, it also brought an important query to our attention: the motherboard came in two revisions, B and C. One came with a 266MHz frontside bus (the conduit between the main memory and the CPU) while the other topped out at 200MHz.

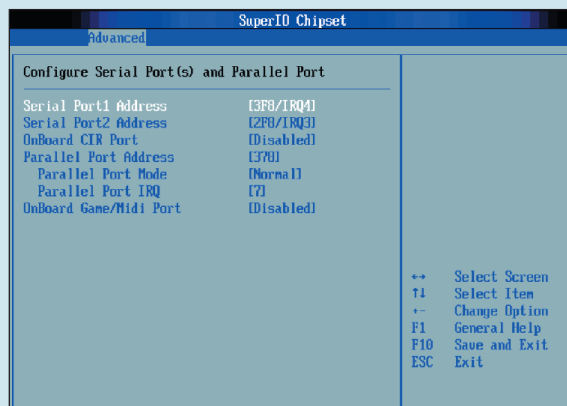
Drilling down through motherboard manufacturer Asus' site revealed we had the faster of the two. While there, we were also able to download a Bios update patch.

Selecting a suitable CPU

1 Before installing a new processor, upgrade your computer's Bios (basic input/output system). If you don't, your PC may not recognise the new chip.

System and motherboard manufacturers routinely tweak Bios instructions to fix glitches and accommodate newer components. It's worth checking your computer vendor's website before resorting to the motherboard maker's site. Since our PC was self-built we found the latest Bios for it on the motherboard maker's site, which also provided instructions on how to update or 'flash' the Bios.

The process involved copying a few files to a floppy disk and then using this to reboot the system



2 The CPU is a fairly simple component to upgrade.

If you have a Socket A motherboard, your PC probably uses a ZIF (zero insertion force) socket on its motherboard with an adjacent lever.

Having located it (ours was under the processor fan as you can see), lift the lever, remove the old chip, orient and insert the new CPU. Having positioned it correctly, return the lever to its locked position



Next, we pointed our browser to www.pc-memory-upgrade.co.uk. Having established our motherboard would tolerate us replacing our Socket A (compatible with Socket 462) Athlon processor with an Athlon XP 2000+, we ordered one for €76 (around £52).

CPUs are simple to replace but they aren't always easy to locate on the motherboard. Our Athlon chip was hidden under the fan designed to keep it cool. Having prepared our PC by flash upgrading the Bios (see *Selecting a suitable CPU*, left), we grounded ourselves with an antistatic wriststrap and set about removing the old CPU.

It required both dexterity and patience to unhook the fan without damaging the motherboard. The processor itself was recessed in a 462-pin socket but we were able to replace the whole CPU. After replacing the fan and clipping its pins back into place, we attached its lead to the processor fan pins nearby on the motherboard, reassembled the PC case and powered up again.

Even if you're also going to add RAM or perform other upgrades, it's worth checking that each one works as you go along. This way it's easier to identify the cause of any problems.

More memory, more programs

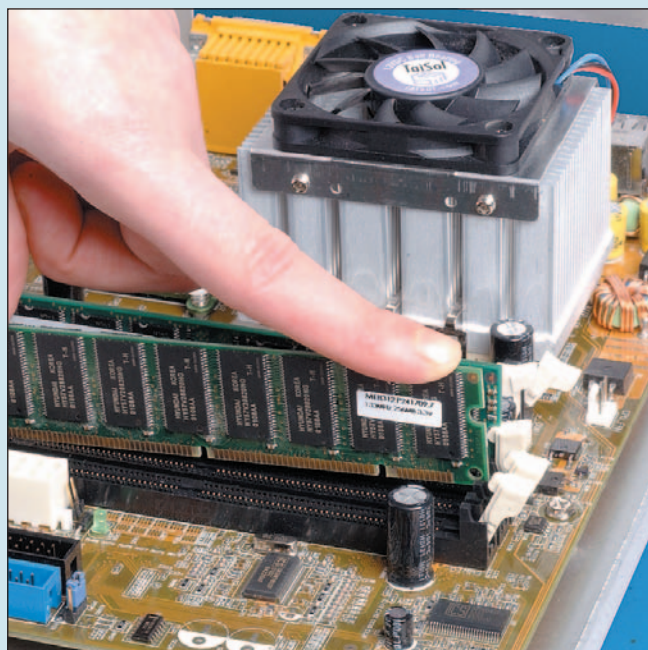
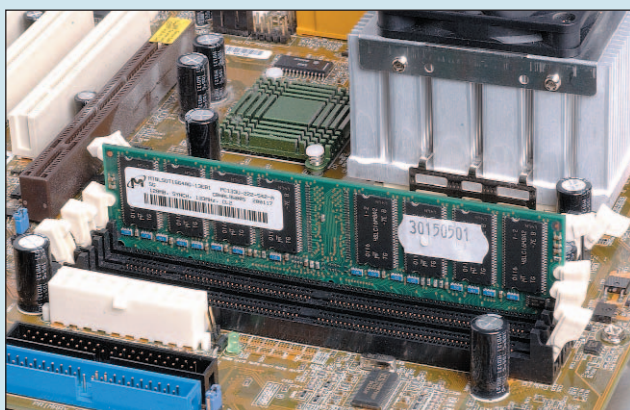
Insufficient memory can slow a PC to a crawl. Switching between open applications becomes a finger-tapping exercise in frustration and graphics take forever to load. Meanwhile in the background the mechanical grumble of an overworked hard disk is always audible, churning to temporarily store data because there isn't enough RAM to handle it.

But how much RAM is not enough? That depends on the operating system and applications you run. Microsoft says 128MB is a good baseline for Windows XP but anyone who has used the OS knows 256MB is the real-world minimum for satisfactory performance. And if you run digital video or 3D games, your memory requirements will skyrocket. For example, Adobe recommends 1GB or more of RAM to run Premiere Pro.

As we've already said, before buying new components you'll need

Adding memory to your PC

Adding more memory to your PC is a quick and painless process. As with the processor upgrade, it's a wise precaution to ground yourself with an antistatic wriststrap before removing the system's cover so that components don't get damaged.



1 First, find the existing RAM module(s). You may need to brush aside some cables to locate the memory sockets on the motherboard. If space constraints mean you have to swap a module for the new one, lift the retaining bar holding the RAM stick in place and remove the memory module. You may need to rock it gently from side to side to loosen it

2 Now insert the new or replacement module in a free slot. The module may need a strong push to fit snugly; a PC won't recognise RAM that isn't fitted correctly. When the memory is properly situated, the clips that hold it in place will snap into position. Reattach the power cable, close the case and reboot the PC.

In the space of five minutes we hiked up our total RAM from 512MB to a whopping 1,380MB. The primary benefit was faster overall performance, particularly when jumping between several open applications

to know the maximum processor speed your machine can support, how much and what sort of RAM it can take as well as the slot and bus information.

Since we'd already established the supported frontside bus speed of our Asus motherboard was 266MHz, choosing compatible memory was easy particularly with the assistance of Crucial's memory selector.

You can also establish information about memory types (SDRAM, DDR RAM, RDRAM aka Rambus) using Kingston's Memory Search at www.kingston.com/uk.

RAM needs to match so, although our motherboard supported it, we weren't able to use faster, cheaper DDR RAM unless we first removed

the existing SDRAM ones. Instead, we stuck with SDRAM and bought two £89 512MB sticks.

Lack of slots meant replacing an existing 256MB RAM module with the 512MB one. The total memory was boosted by 768MB, giving us two-and-a-half times as much operational memory, while our processor upgrade provided a massive speed boost for very little outlay.

These tools also identify the maximum amount of RAM your motherboard can handle, which is critical if you want to add as much memory as you can. All Pentium III systems, many Celeron and some first-generation Athlon and Pentium 4 ones use synchronous dynamic RAM (SDRAM).

Most Athlon and P4, and many Celeron PCs, use double data rate synchronous dynamic RAM (DDR SDRAM), which increases the frequency bandwidth of SDRAM to improve memory speed.

Some P4 systems use RDRAM (aka Rambus memory), a pricey, less popular technology. RDRAM offers performance boosts over conventional SDRAM, too. If you try to install the wrong size RAM, such as a DDR module in a motherboard built for SDRAM, either it won't fit or the PC won't recognise it.

In total we spent £230 and turned a slovenly PC that hated multitasking into one that jumped to attention and could turn its hand to anything we threw at it. ☒



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