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Before You Start

Before you start troubleshooting your computer, you should be aware of some basic fault-finding principles, and also how to identify and locate the various components in the PC.

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Don't forget

The screenshots used in this book are taken from Windows 7. The troubleshooting procedures and tips also relate to this operating system.

Introduction

All computer faults fall into one of two categories – hardware faults and software faults. Establishing which is a key part of successful troubleshooting as, by doing so, you immediately eliminate a whole host of issues that you may otherwise have investigated.

Occasionally, it will be quite obvious where the problem lies; for example, when your power supply unit announces its demise with a loud bang and puff of smoke. Usually though, the solution won't be so clear-cut; indeed you may even find yourself in a situation where the problem could be both hardware and software related. A classic example of this is when the PC's boot procedure starts but then stops before the operating system has loaded. This can be caused by a faulty motherboard, CPU, memory, hard drive or video system. It can also be caused by a damaged or misconfigured operating system. But which? Where do you start?

That's where this book comes in. While it doesn't cover all possible faults (there are a million and one things that can go wrong with a computer), it does explain the more commonly experienced problems and how to resolve them.

In the majority of cases, these problems are software related and, of these, most will be an issue with the operating system. It follows therefore, that the majority of the fault finding procedures and tips in the book concern the operating system.

While many of these software faults are common to all operating systems, some are not and, as we can't cover all the various operating systems, the book focuses on the one most commonly used – Windows 7. You'll learn how to troubleshoot Windows 7 itself, and how to use it to troubleshoot other parts of the system, including hardware.

However, if you are using a different operating system, don't let this put you off. Windows Vista is very similar to Windows 7 and so virtually everything in the book is relevant to this operating system as well.

With regard to hardware, troubleshooting techniques are much the same for all operating systems and so the book will be useful whatever your setup.

Common Causes of PC Faults

Before you start pulling your PC to bits, you should be aware that most faults are user-induced. So it's quite likely that the problem is due to something that you have recently done on the PC.

Therefore, the first thing to do is to think back to what you were doing immediately prior to the fault manifesting itself. If you can identify something specific then very often simply “undoing” it will resolve the problem.

The following are the most common causes of computer faults:

Downloading from the Internet

There are hundreds of thousands of known viruses and more are being developed all the time – the vast majority being spread via the Internet. Problems caused by viruses range from minor nuisances to full scale disasters. On a related note, there is also the issue of malware. Some of these programs, or a multitude of them, can literally bring a computer to its knees.

So if your PC starts playing up after an Internet session, particularly if you've downloaded something, there is a good chance it has attracted an unwelcome visitor. Obtain up-to-date virus and malware removal programs and scan your system with them.

Installing a Hardware Device

Installing and configuring hardware with recent operating systems such as Windows 7 is usually very straightforward.

If it's a modern device it will almost certainly use the USB interface; all you have to do is install the driver and then connect the device to the PC when prompted to – Windows does the rest.

However, if you have an old PC, are using an old operating system, or the device being installed is old, then you are quite likely to run into problems. These are usually incompatibility issues between the device and the operating system and can often be resolved by simply updating the device's driver.

Getting the connections wrong is another common source of problems. For example, connecting a speaker system to the wrong output jacks. As a general rule, simply undoing everything you've done, reading the instructions carefully, and then starting again will, more often than not, resolve the issue.

Don't forget



Most problems users experience with PCs are caused by the users themselves doing things they shouldn't (or not doing things that they should!).

Hot tip



If your PC starts playing up after an Internet session or opening an email, there is a good possibility that it has picked up a virus or malware.

Beware

Be very wary of installing Shareware and Freeware programs downloaded from the Internet. They often contain an unwelcome attachment.

Hot tip

When uninstalling a program, you may see a message stating that files about to be deleted might be required by other applications and offering you a choice as to whether to keep them or not. Always choose to keep these files just in case they are needed.

Don't forget

Changing a computer's settings without fully understanding the possible consequences is a major cause of so-called faults.

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Installing New Software

Although relatively rare, there are programs that are not compatible with the operating system being used. Uninstall the program and see if the issue is resolved. If not, a compatibility update may be available from the manufacturer's website.

You should also be aware that malware is often attached to legitimate programs available on the Internet. When the program is installed so is the malware (without your knowledge). The problem here is that uninstalling the program will not uninstall the malware. You will also have to run a malware removal program to get rid of it.

Uninstalling Software

Often we install a program to try it out and then, having decided we don't want it, uninstall it. With most programs there is no problem. However, there are some that simply refuse to go quietly. The usual problem is that these programs "borrow" files already on the system and then, when they are uninstalled, take these files with them. Any other programs on the PC that need the files will then not run correctly, if at all.

Running a Program

Sometimes, simply running a program will cause problems. This might happen because it has become corrupted or is conflicting with something else on the system.

Most commonly in this situation the PC will become unstable or slow down. Close the program with the Task Manager (see page 182), reboot and then run the program again. In many cases this will resolve the issue. If not, reinstall the program.

Changing Your PC's Settings

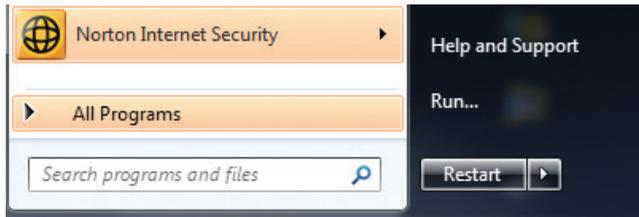
Operating systems (Windows in particular) offer numerous customizing options that enable the user to make many changes to the default settings. While most of these relate to a specific function or application, and so do not have a system-wide effect; there are some that do – registry and BIOS settings in particular.

If you do experience problems after changing a setting, undo the change to resolve the issue. If you can't remember what you did, use System Restore (see page 38) to undo the change.

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Shutting Down Your PC Incorrectly

There is a right way and a wrong way to shut down or restart your computer. The right way is to press the operating system's Restart or Shut down button.



The wrong way is to hit the reset or power off button on the system case front panel. This can corrupt any program that might be running, including Windows itself. In the case of Windows, it may result in you not being able to get the computer running on restart.

Usually, though, the effects are minor and can be repaired by restarting and then exiting in the proper manner, and running Chkdsk (see page 50).

Maintenance

If you have been cleaning the system case, inside or out, or a peripheral such as your printer, it's quite possible that you have inadvertently loosened or even disconnected something. Retrace your steps, making sure all boards and cables are firmly seated in their sockets.

Maintenance in Windows can also cause problems; for example, you may have been using a tuneup utility such as a registry cleaner. Some of these programs can cause more problems than they solve. In this type of situation, System Restore will get you out of trouble.

Upgrading

Replacing or adding parts to the system can cause all sorts of problems. Connections may be incorrect or not made at all, the device may be incompatible with the operating system or a program on it, or the device may be incorrectly configured. The solution is to uninstall the device's driver, remove the device from the system and then start again.

Hot tip



Many problems can be resolved by the simple expedient of rebooting or switching off and then on again. These actions will clear the memory and often reset misconfigured settings.



Read the Instructions

Another frequent cause of problems, particularly when installing a new hardware device, is neglecting to read the installation instructions. Some devices are very simple to install but others require a bit more attention.

Some require changes to be made to the default settings in the BIOS. For example, if you install a sound card it will be necessary to disable the sound system integrated in the motherboard. If you don't the system will use the integrated sound system by default.

Video cards also require changes in the BIOS. In this case, the interface the card uses must be specified. For example, if it is a PCI-Express video card, PCI-Express x16 must be selected in the BIOS.

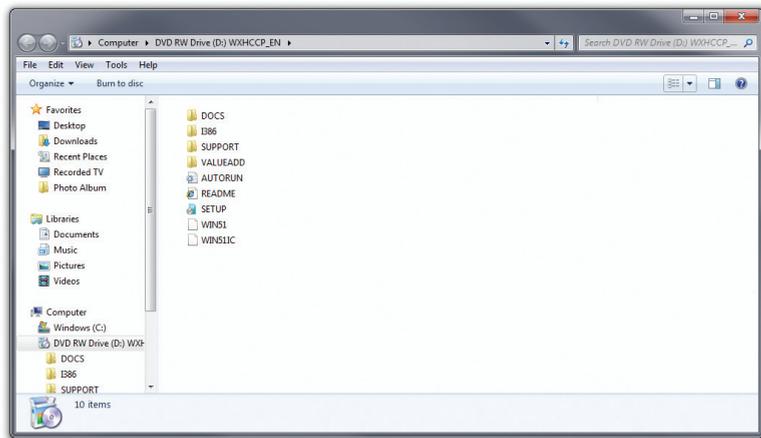
Don't forget



Some applications, video card drivers in particular, can be the cause of incompatibility issues with your system. These are often documented in a "Readme" or "Help file" on the installation disk. Make a point of reading these files as doing so can save a lot of time.

It's not uncommon for some devices or programs to be sold with known bugs that can cause incompatibility issues with other hardware or software on the system.

Furthermore, very often these will not be documented in the installation manual but rather in a file on the installation disk entitled "README" or similar. Taking a few minutes to read these instructions can save a lot of head-scratching and frustration.



All you have to do is right-click the CD/DVD icon in My Computer and then click Open. This will reveal the contents of the disk. If you see a "README" file, as shown in the screenshot above, take the time to read it.

Isolating the Fault

Sometimes you will have absolutely no clues as to what is causing the problem. It will be a head-scratcher knowing even where to begin. In situations like this you need to think logically and eliminate as many possibilities as you can.

First, establish whether the problem is a hardware or a software fault. If there are no clues as to this either, reboot the PC into Windows troubleshooting mode (known as Safe Mode – see page 37) and if the fault has now disappeared, you almost certainly have a hardware issue. If it hasn't, it will be software-related.

Once this has been established, you will have much fewer things to consider.

If Safe Mode indicates a hardware fault, the simplest method of pinpointing the offending device is to, one by one, disconnect as many of them from the system as you can, rebooting each time until the faulty one has been isolated.

You then need to establish whether the fault lies with the device itself or with its connections. The latter is the most likely so check this out first. If the issue is still unresolved, the device is faulty and will need to be replaced.

Software faults are often much more difficult to isolate as very often there can be more than one cause. Windows provides a number of useful troubleshooting and information utilities with which most faults can be rectified. However, using them does require more knowledge than the average PC user is likely to have. A typical example is the System Configuration utility, which can be used to isolate software issues on a trial-and-error basis.

Serious faults with Windows 7 are, strangely enough, often not too difficult to resolve. They can usually be fixed with the aid of several troubleshooting and repair utilities located on the installation disk.

For example, if Windows refuses to start, one of these utilities, Startup Repair, will check the files used to start Windows and if it finds any that are missing or corrupt, will replace them from the original files on the disk.

Don't forget



The first step is to establish that the fault is either hardware- or software-related. This narrows down the number of possible causes considerably.

Hardware Substitution

In Chapter Two, we'll see how to troubleshoot faulty system hardware, e.g. memory and video, with a diagnostic program that produces a series of coded beeps. For example: faulty memory is indicated by continuous beeping, while a faulty video system is indicated by eight beeps.

However, it must be said that this method can sometimes be rather ambiguous. A typical example is when a motherboard is flagged as being faulty when, in fact, it is the CPU or memory (both located on the motherboard) that is the cause of the issue.

Hot tip



Make a point of keeping any working components that you decide to upgrade. Having a supply of usable hardware components is the most useful troubleshooting aid you can have.

This is what computer repair shops do. Rather than try and find a specific fault on a circuit board or device, they will simply replace it with a working model.

If you didn't know better (and most users don't), you would buy a new motherboard and then take the CPU and memory out of the old board and install them in the new one. This would be a waste of time and money.

In the above scenario, what you should do is first check the memory by substituting it with one of the same type that you know is good. Then do the same with the CPU. This establishes clearly where the fault lies – CPU, memory or motherboard.

The same principle applies to other system hardware, such as the video card and the monitor. These parts are expensive and you don't want to be shelling out your hard-earned cash unnecessarily – you need to be certain that the part in question is faulty before going out and buying a new one.

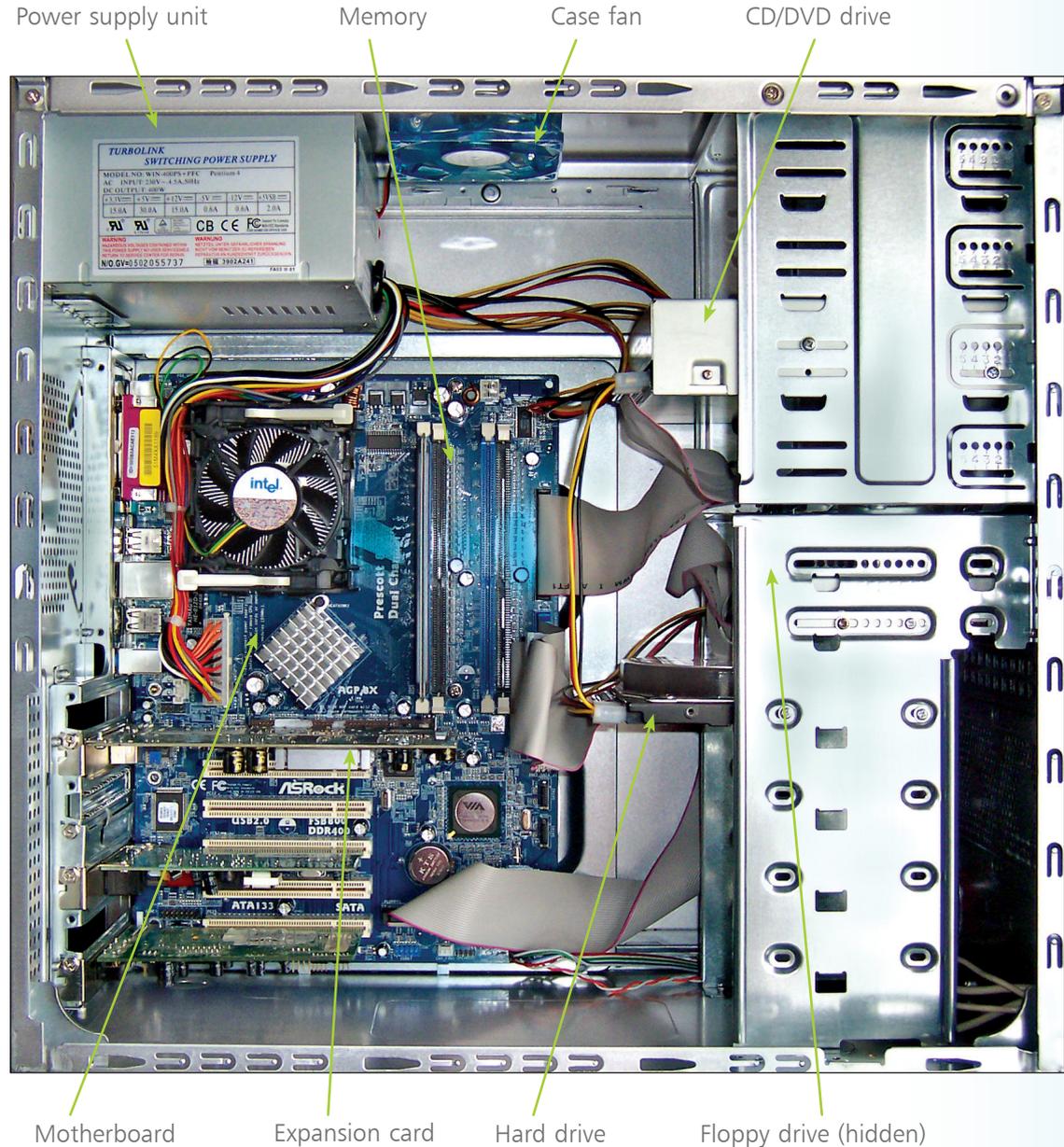
If you don't have a replacement at hand (how many people keep spare CPUs, motherboards, etc, lying around?) try making a few phone calls to friends and family. As many people do upgrade their computers and keep the original parts for just this sort of purpose, you may well unearth what you are looking for. Another possible source is a local computer repair shop – these will have no end of used parts just lying around. Talk to the guy nicely and he might just give it to you!

With this scenario in mind, should you ever decide to upgrade a working device to improve the capabilities of your PC, instead of throwing it away, keep it; you never know when it might come in handy.

Anatomy of a Computer

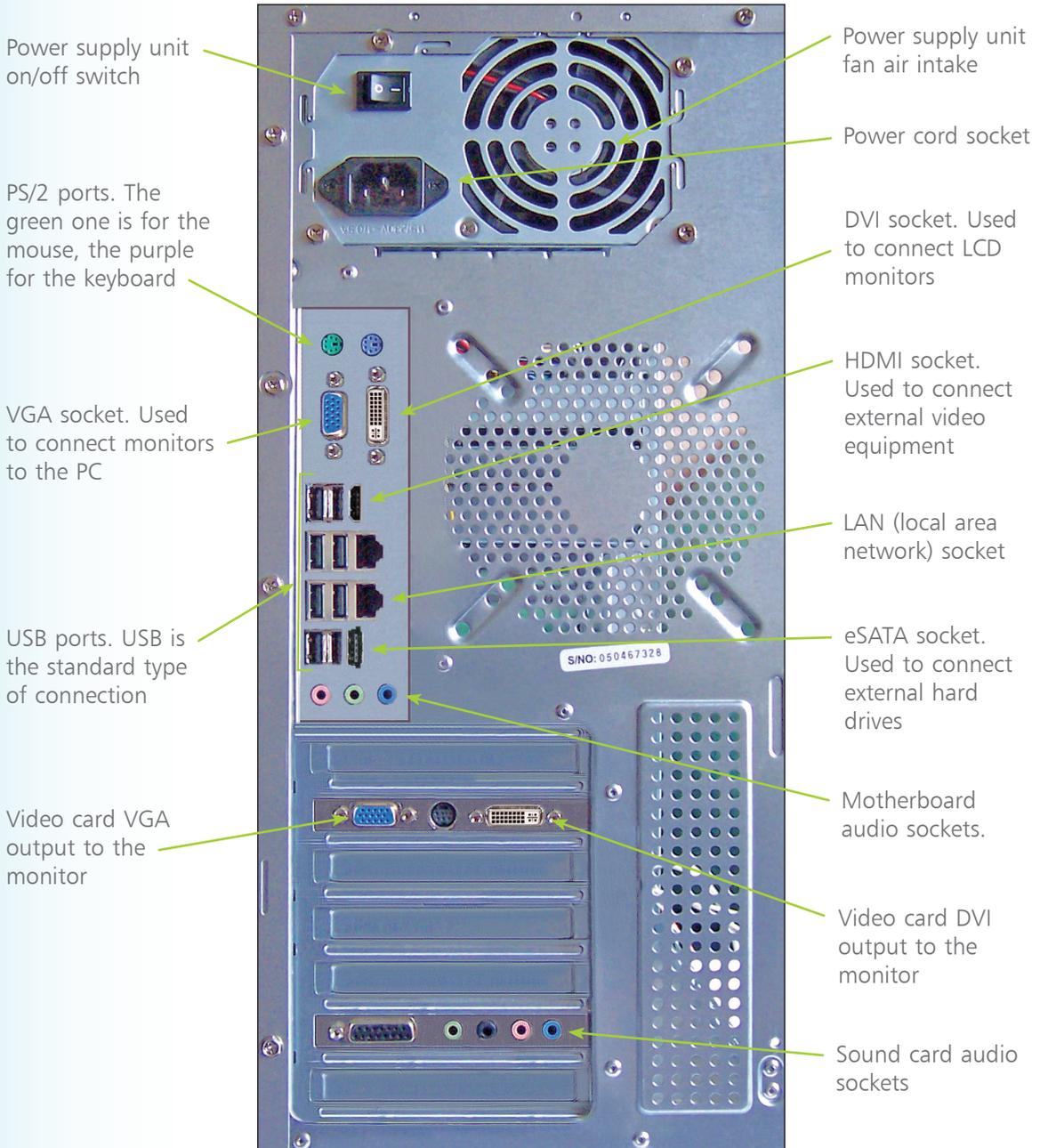
If you want to be able to deal with hardware problems, it will help enormously to have some knowledge of your PC's components and where to find them.

Inside the Computer



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At the Back of the Computer



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Motherboard

Ports CPU power CPU socket Chipset Memory slots Motherboard power socket

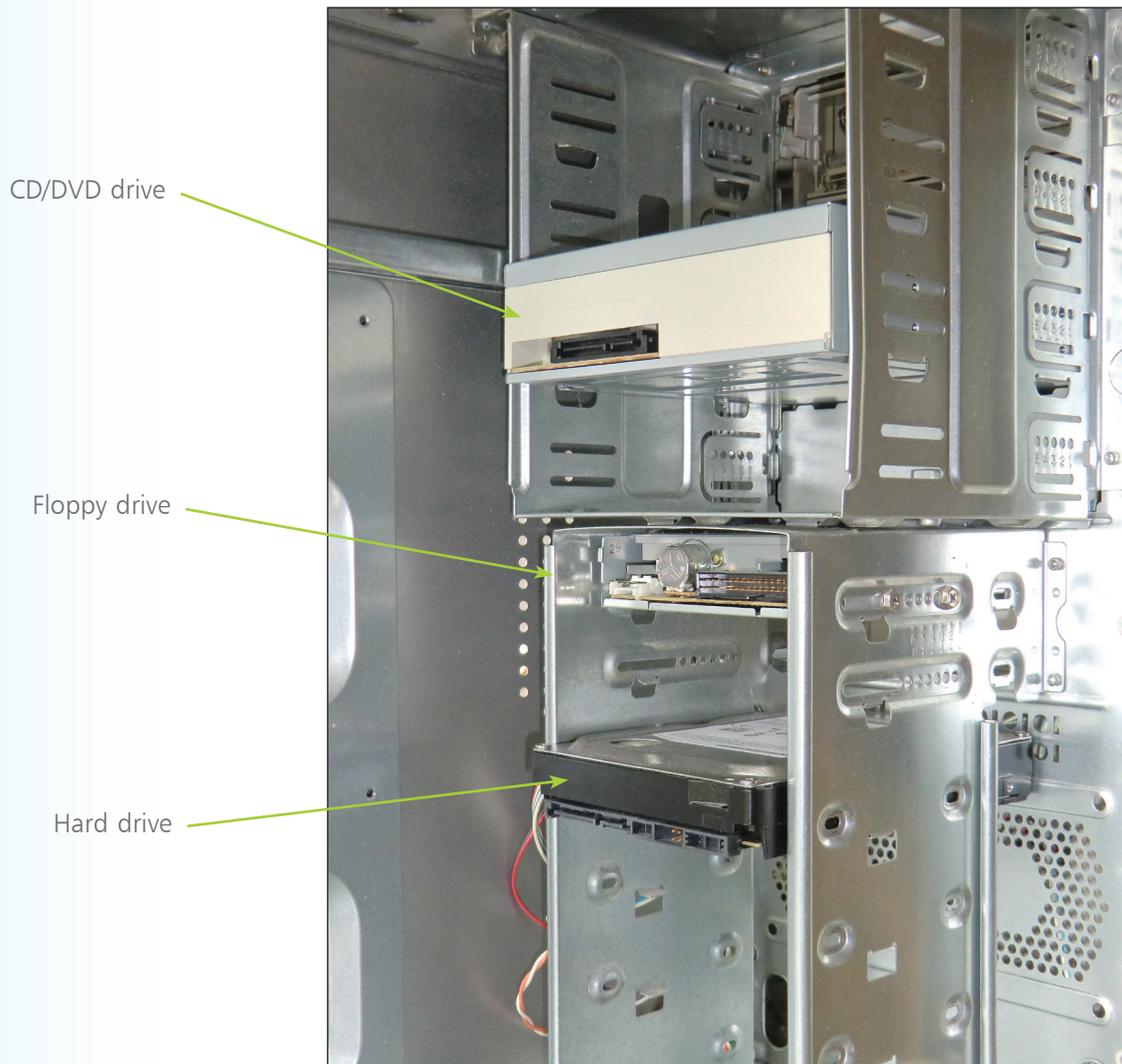


BIOS chip PCI Express x16 video card socket PCI Express x1 socket PCI socket ATA drive socket SATA drive sockets

...cont'd

The Drive Cage

Located at the front of the system case, the drive cage is where all the drives in your system are installed.



Note that modern computers are no longer supplied with Floppy drives. However, if your PC is several years old it will probably have one. If so, it will be in the location shown above.

Your Computer's Parts

Motherboard

The motherboard is the large circuit board that you will find screwed to the right-hand side panel of the system case.

This board is the heart of the computer and every component, including all the peripheral devices, is connected to it. It provides sockets for the CPU, the memory, expansion cards such as video and sound cards, and the drive units. It also provides ports of various types (located at the top-left of the board) for the connection of peripheral devices such as external drives and printers.

Of all the hardware devices in a PC, the motherboard is the most difficult to replace. This is because all the other devices have to be disconnected from it, the CPU, memory and any expansion cards have to be installed in it and, very often, devices such as the power supply unit have to be removed completely in order to get access to it.

That said, as long as you make a note of what goes where, or take some pictures, it is actually a relatively straightforward task to replace one of these boards.

Central Processing Unit (CPU)

The CPU is the brains of the computer as it carries out all the calculations, processes instructions, and manages the flow of information through the system.

It is usually located at the top-left of the motherboard and is hidden by a heatsink/fan assembly that prevents it from overheating.

As with all other parts in the PC, the CPU is easy enough to replace. However, you do need to know what you are doing, so should you decide to attempt it be sure to read up on the procedure first. ("Building a PC in easy steps" by this author gives full instructions.)

Hot tip



When a motherboard is replaced, some settings in the BIOS will need to be changed depending on what type of hardware is in your system.



Beware

The only difficult part of adding, or upgrading, memory is getting the right type of memory for your system. Full details regarding this will be in the PC's manual.

Hot tip

Being mechanical devices, all hard drives eventually fail. Before they do though, they will usually exhibit warning symptoms such as excessive noise, data corruption, locking-up of the PC, and slow opening and closing of files.

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Random Access Memory (RAM)

A computer's memory consists of a circuit board (known as a module) on which are a number of memory chips and associated circuitry. Its function is to provide an electronic holding place for instructions and data that the computer's CPU can access quickly.



When a computer is running, essential parts of the operating system are loaded into the memory, as are any programs in use. Some hardware devices, such as sound and video systems, also use the memory.

Memory modules are very easy to replace as they simply plug into a socket on the motherboard.

Hard Drive

The hard drive is where a user's data is stored. These are electro-mechanical devices that contain a number of ceramic or glass storage discs coated with a magnetic layer. In a procedure known as formatting, the operating system writes a file system on to the magnetic layer, which enables the drive to locate data when requested to do so.



Replacing a hard drive is a very simple operation that requires four screws to secure it in place. Then it is connected to the motherboard by an interface cable. It also needs a power connection, which comes from the power supply unit.

It then has to be partitioned and formatted by Windows after which it will be ready for use.

...cont'd

Video System

The video system is responsible for producing the picture that you see on the monitor – without it the monitor would be blank. Two types of video system are used in PCs: a video card that plugs into the motherboard (shown right) and an integrated video system that is built in to the motherboard.



Most PCs use integrated video as this is the cheapest option for the manufacturers and, for most purposes, it is perfectly adequate. However, integrated video is not as good as a video card, which is essential for some applications, e.g. games and business applications such as Computer Aided Design (CAD).

A video card is also much easier to replace as all you have to do is plug it into the motherboard and then connect the monitor to it. To replace an integrated system, you will have to replace the motherboard as it is part and parcel of the board.

Sound System

Sound systems are much the same as video systems in that they come in two types – integrated sound and sound cards. The pros and cons of both types are the much the same as for the two types of video system.

CD/DVD Drive

This device serves two purposes:

- 1) It provides a means of importing data to the PC, e.g. installing a program from a CD or DVD
- 2) In the case of writable models, it provides the user with removable data storage options, i.e. you can write data to a disc and store it in a separate place. This provides a good way of backing up important data

The difference between CDs and DVDs is essentially the storage capacity of the disc – 700 MB with a CD and 4.5 GB with a standard DVD, and the speed at which data is written and read.

Beware



Should you ever replace a video card, make sure it is compatible with the motherboard. Modern video cards use the PCI-Express interface while older ones use the AGP interface.

Hot tip



CD/DVD drives have an internal lens that reads the data on the disc. Over time, this lens can become obscured by grime and, as a result, may have trouble reading discs. Typical symptoms of this include the drive taking a long time to read a disc or even the PC locking up.

Before you replace the drive, try cleaning the lens with a lens cleaning disc. They don't always work but it's worth a try.

...cont'd

This device is usually located at the top of the drive cage and is very easy to replace. As with the hard drive, there are four securing screws and two connections – power and data. However, there is no need for partitioning and formatting – connect it and it's ready for use.



Power Supply Unit (PSU)

Computers use direct current (DC) so they need a device to convert the alternating current (AC) that comes in from the mains supply – this function is provided by the power supply unit. These devices also provide different levels of DC output, e.g. 12V, 5V, -5V, and -12V to suit the requirements of the various components in the PC.



Usually located at the top-rear of the system case, PSUs are the most likely of all a PC's components to give trouble. The main problem is that they all eventually fail (being a highly stressed component, this is inevitable).

With a good quality model, this is not too much of an issue – it just stops working, the PC goes dead and the user fits a new one. However, low quality units will literally burn out with a loud bang and, in the process, send a surge of current through the system that can damage other components, the memory in particular.

Another problem with low quality PSUs is that the current they supply tends to fluctuate. This means that the PC is sometimes not getting enough and at other times it is getting too much. If these variations in current exceed the tolerances to which the PC's components are built, it behaves erratically. This results in an unstable PC, and often premature failure.

Beware



If you should have cause to replace a PSU, make sure you get one that provides overload protection. This will prevent it from blowing when it eventually fails. Also, make sure it provides the type of connections required by your hardware.