



# **An Introduction to Computer Hardware**

## **First Steps in Computing**

## **FIRST STEPS WITH COMPUTER HARDWARE:**

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## Introduction

To enjoy using a computer, it is not necessary to understand how it works.

By and large, once you switch the machine on, you will have enough to do working out how Windows™ or the various programs work. This is the **software** side of the computer, and it makes sense for you to concentrate on these initially, because without them the **physical (hardware)** bits and pieces of the machine are incapable of achieving anything useful. It is the software, not the hardware, that allows you to write letters, send emails, process pictures, play games etc and you, the user, can largely ignore the clever electronics and precise engineering of the hardware that does as it is told by the software.

So why are we asking you to spend some time reading this brief introduction to computer hardware? The reason is that many of the frustrations that new users of computers experience are due to a lack of understanding of how the hardware works. It's little use having digital cameras and sophisticated scanners and printers if you are unsure how they connect to your computer (or the things you should check first when they go wrong).

Don't be concerned. What follows is not a repair manual! Nor is it a necessary part of your course for you to remember the names of all the parts and where they are located or what they do. After all, how many drivers can name the various engine parts (or even know how to open the bonnet!). My mother used to sit patiently in the car when she arrived at a garage until the attendant came out to see what was wrong, because she had never understood how petrol pumps worked (she said) ...

But if you are buying or using a computer for the first time, by reading the following pages you may recognise some of the mysterious jargon and make better purchasing decisions or even understand which socket takes the plug for your shiny new printer. If you get the opportunity, try to identify the various parts mentioned in these pages with those on the computer you are using and it will all begin to make more sense.

We hope you will find the pages detailing the keyboard and the 'ports' at the rear of the computer particularly useful in the first instance, and that the other pages will provide valuable background information in the longer term.

# Input Devices

It is common to divide external computer hardware into two groups. The first group deals with transferring data or commands from the user into the computer. These are known as **input devices**.

The most obvious input devices are the **mouse** and **keyboard**, where pressing keys or rolling the mouse and clicking the buttons causes the computer to respond in some way to these instructions. When computers were first developed, the only way to communicate with them was via the keyboard, but there are now a plethora of different devices capable of inputting information into the computer.

If you need to **transfer images** into the computer you can use a **scanner** that acts like a photocopier for the computer. Simply place your image on the scanner and after it has been scanned, you will see the image on the screen. You can then use software programs to alter the size, colour, contrast etc.

If you need to **draw** images and have them displayed on the computer screen you can use the mouse, but this is often compared to attempting to use a 'brick' to draw with. Many artists use a **graphics tablet** and a **stylus** to more closely recreate the traditional artistic tools.

Games players have a wide range of hardware available to them to help them **drive**, **fly**, **score**, **and shoot** more realistically than by using a mouse. The most common are **joysticks** but they can also choose **steering wheels**, **gamepads**, and **headsets**.



A keyboard with an ergonomic design



A scanner with an auto document feeder lid



A graphics tablet and stylus and a modified mouse



A joystick and steering wheel for gamers



# Output Devices



*Traditional monitors are large and bulky but offer excellent image quality*



*Apple Computers produce a beautiful flat panel display integrated with an equally beautiful dome computer*



*An inkjet printer (above) and a laser printer (below)*



Once the user has managed to input the commands and information required into the computer, there are several output devices for the computer to pass that information back to the user.

The most obvious is the **computer monitor**, sometimes known as a **VDU** or visual display unit. Modern monitors offer high resolution (quality) images and generally do not suffer from the irritating flicker or strobing effect that were common a few years ago. Nonetheless, it is important to select the largest, brightest screen that will fit in your workplace and that your wallet can afford, as you will spend a lot of time looking at it.

It is expected that the older CRT (cathode ray tube) monitors will be replaced by **flat panel screens** within the next few years, just as the older televisions are being replaced by larger, flatter screens. These **LCD** (or liquid crystal display) are considerably lighter and produce far less heat than the older monitors.

One of the most important output devices to add to any computer system is a **printer**. The best value currently are **inkjet** printers which can produce stunning quality colour prints. They work by silently squirting microscopic droplets of ink at the page from a colour and a black ink cartridge. The resolution and definition of image from some of these printers rivals the prints produced by traditional photo developers. Inkjet printers can be slow and the cost of replacement cartridges can be very high.

**Laser** printers generally produce black and white prints (although **colour laser** printers are reducing in cost all the time) and are preferred in offices as they are much faster than inkjet printers, have a higher paper capacity and are cheaper per page than inkjets.

# The Keyboard

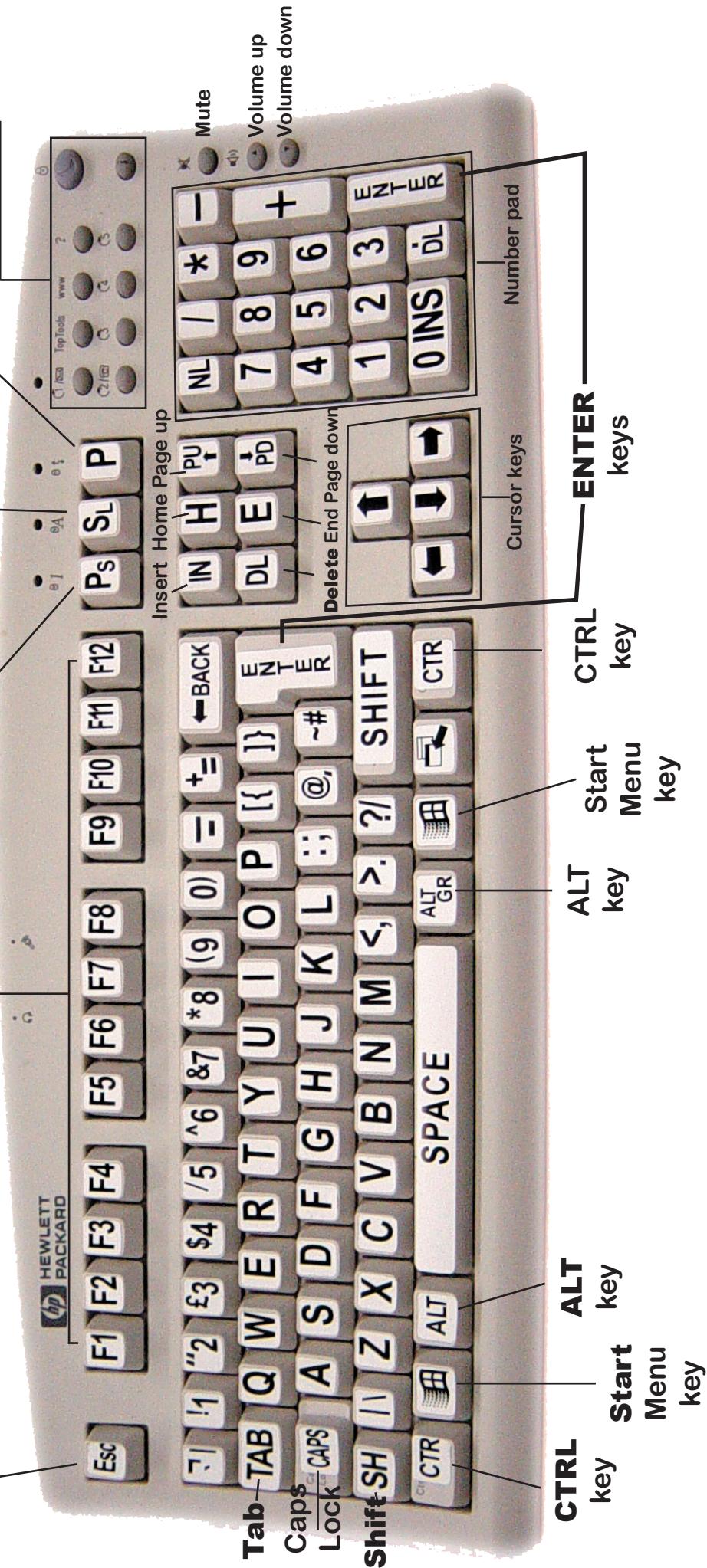
Some of the most important keys are shown in **Bold**

**Escape** (or Cancel key)

**Function Keys (F1 - F12)**

**Print Screen : Scroll Lock : Pause Break**

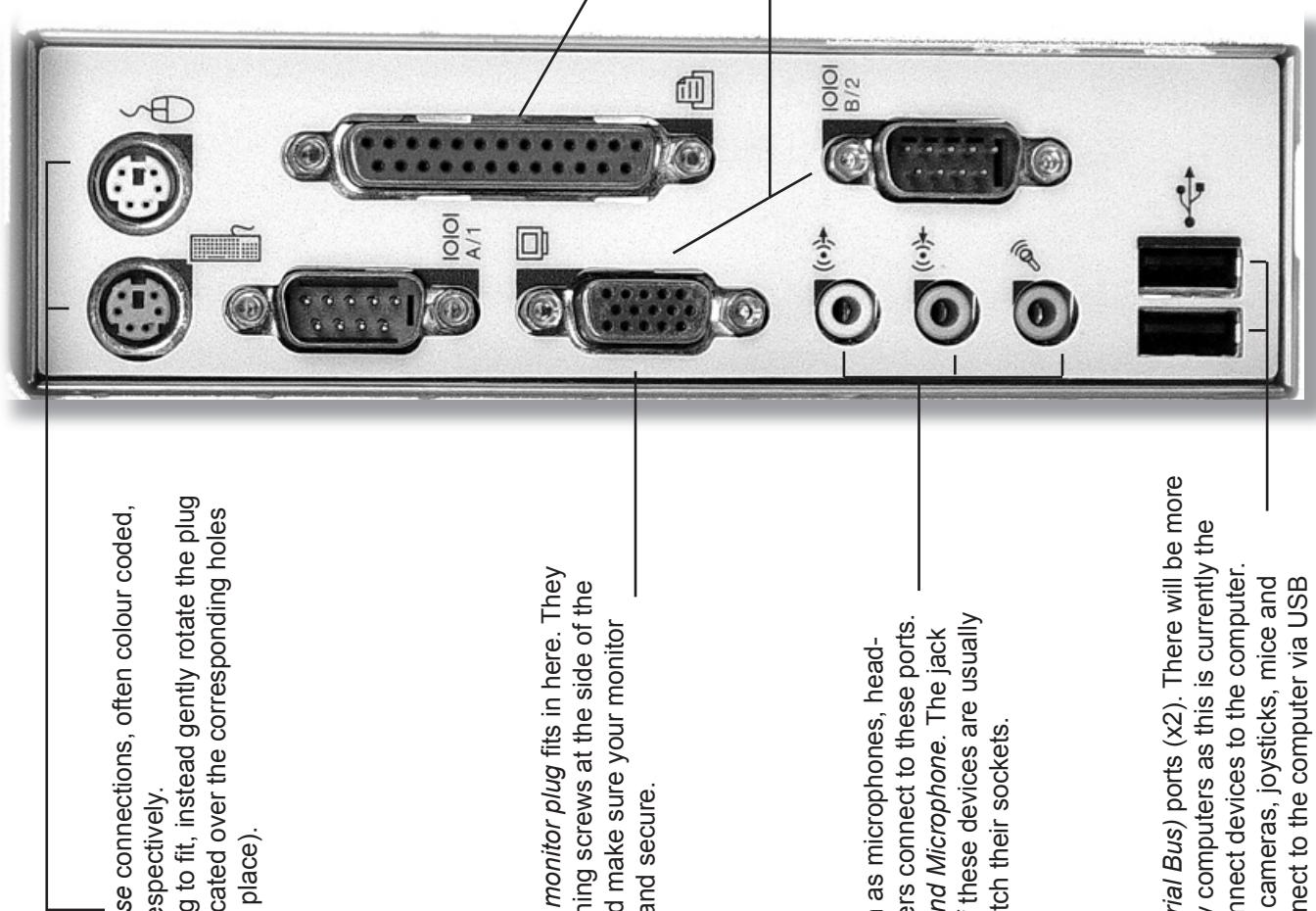
Special function  
shortcut keys, eg WWW



What the keys do is explained on the next page

<b>Alt</b>	A 'shortcut' key, often held down while another key is pressed to request that the computer carries out an instruction
<b>Backspace</b>	Deletes characters and spaces one space to the left of the cursor. The left pointing arrow on the key illustrates the direction the cursor will travel. If held down, it will continue to delete, so don't be heavy handed on this key. It's the digital key that most clearly demonstrates the difference between a computer keyboard and a typewriter.
<b>Caps Lock</b>	Does exactly what it says on the key. Once pressed, everything you type will be in capital letters. Often used by those new to keyboards to use capital letters instead of (properly) using either of the SHIFT keys. When you next look at the screen you'll see that you've got a whole page of dazzling capital letters. Unless you want your text to be in big black uppercase, this key is seriously best avoided. You have been told. If you do press CAPS LOCK accidentally you'll notice a warning light on most keyboards, usually above the keys and shown by an 'A' symbol. Tap the CAPS LOCK key again to turn it off.
<b>Ctrl</b>	The CTRL key is the most important key for allowing you to keep your hands on the keyboard and not having to point at click at various things with the mouse. When CTRL is held down and one of many other keys is tapped, actions are carried that would require several mouse movements and several clicks to otherwise achieve. For example: CTRL + P = Print; CTRL + S = Save; CTRL + C = Copy, and so on. Once learnt, these keyboard shortcuts really help increase your confidence in feeling in control of the computer.
<b>Delete</b>	When asked to use the DELETE key with Alt and Ctrl to log in to a computer network, you should hold down the CTRL and ALT key with your left hand and tap the DELETE key with your right hand. Don't ask why. When text or objects or icons are selected and the DELETE key is pressed they are removed from view (or deleted).
<b>Enter</b>	One of the biggest keys because it's used a lot. You press ENTER to confirm that you want something to happen. It means YES, OK, that's what I want, do it! You should develop the habit of pressing ENTER instead of using the mouse to click on Yes or OK in screen windows. Saves a lot on unnecessary rolling and clicking about with the mouse.
<b>Escape</b>	The ESCAPE key isn't used when typing text. Rather, think of it as No or Cancel. Many actions on the computer require you to indicate Yes or No (OK or Cancel). ESCAPE always means No or Cancel or sometimes STOP. If ENTER is positive, then ESCAPE is negative.
<b>Function</b>	The FUNCTION keys are often used by programs as 'shortcut' keys. A string of instructions and actions can be 'recorded' by FUNCTION keys, like the pre-tuned station selector buttons on car radios. Used inside programs, they can be incredibly useful, time saving keys. Pressing the FUNCTION key F1, for example will generally bring up a full help menu inside any program.
<b>Shift</b>	Use the SHIFT key by holding it down as you tap another key, either to make a letter uppercase (capital) or to choose a symbol on the top of a key, such as SHIFT + 3 = £. Remember to use SHIFT instead of Caps Lock for capitals. SHIFT is also often used as a 'modifier' key inside programs, eg, holding down SHIFT while resizing pictures will ensure they are scaled proportionately.
<b>Space</b>	Used to make spaces between words or letters.
<b>Tab</b>	The Tab key has two main uses. In word processing it is used to move the cursor a specified distance across the page (useful when laying out things like timetables). Tab is also used to 'cycle' through available options in dialogue boxes.

## The Connections on the rear of the computer



**Keyboard and Mouse** connections, often colour coded, purple and green respectively.  
(Don't force the plug to fit, instead gently rotate the plug until you feel it is located over the corresponding holes and then press into place).

**The VGA port.** The *monitor plug* fits in here. They usually have tightening screws at the side of the plug and you should make sure your monitor connection is tight and secure.

**Audio devices** such as microphones, headphones and speakers connect to these ports. *Line In, Line Out, and Microphone*. The jack plugs on the end of these devices are usually colour coded to match their sockets.

**USB (Universal Serial Bus) ports** (x2). There will be more USB ports on many computers as this is currently the favourite way to connect devices to the computer. Printers, scanners, cameras, joysticks, mice and keyboards can connect to the computer via USB

# Personal Computer Hardware

The newspaper adverts scream out prices, and include seemingly meaningless abbreviations such as MHz, ATA-100, DDR, XGA. Do you know what these buzzwords really mean? Does anyone?

The PC may be the single most important tool for many workers, but because it is often purchased in a high street camera store or even a supermarket, it is often treated as a commodity item, almost a 'white good' such as a fridge, freezer or microwave.

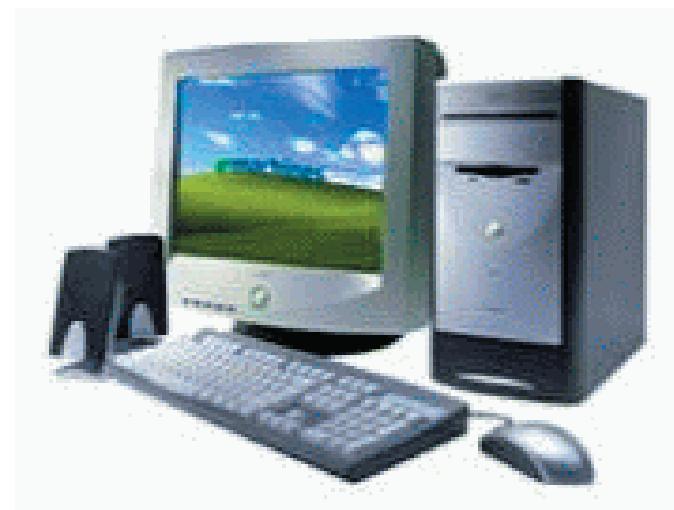
First the good news. There are no bad Personal Computer systems. The least powerful system available today is better than the most expensive system of a few years ago. High quality components are produced in such large numbers at such low prices, that there is no profit building substandard systems.

The bad news is that the process doesn't stop, and the most expensive or most powerful system you buy today will be (practically) obsolete next year.

If you want to know how a PC works and what all the jargon means, this section will attempt to answer your questions. No technical background is assumed, and even very complex issues will be explained in terms that everyone can understand.

## Who Made It?

Your computer wasn't made by the company from which you bought it. If you buy a car from Ford, you expect the frame, engine, transmission, generator, and other parts to come from Ford or at least be built to Ford



specifications. That isn't how the computer industry works. The companies that sell computers and whose names you know, such as Dell, Gateway, IBM, and Compaq, don't make any of the important parts. Instead, they assemble a computer from parts made by other companies.

Your computer was really made by companies such as Asus, Abit, ATI, and AMD. This is really an international business with companies scattered around the world. They are not scattered uniformly. For reasons that are not clear, different countries seem to specialize in particular parts. The US companies build the CPU (Intel, AMD). The motherboard comes from Taiwan (Asus, Abit, Shuttle, MSI, ...). Disks come from Singapore or Indonesia (Seagate, Western Digital, IBM, Maxtor). Memory most often comes from Korea. The external case and the power supply come from any of a dozen Chinese companies.

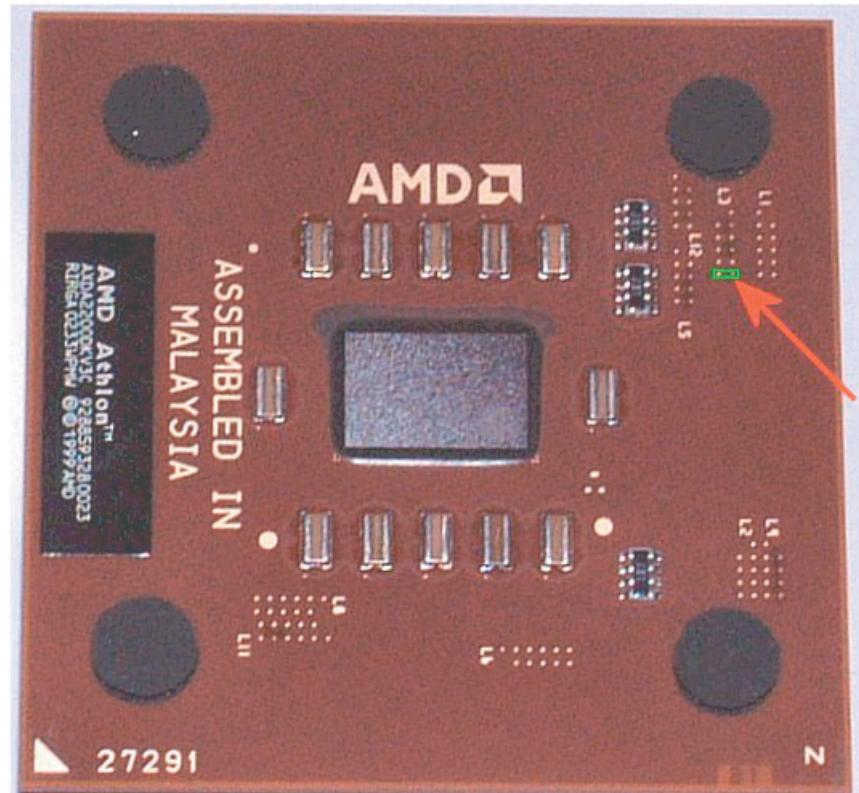
You can buy the components from any number of sites on the internet and assemble a computer yourself, but you won't save any money this way. The big computer makers buy parts in lots of a thousand, packaged in bulk



The two main manufacturers of cpu chips are, currently, Intel and AMD

The cpu chip is the largest chip inside the computer and all data passes to it and through it to all the other components such as memory and hard drives.

The picture on the right shows a top view of a cpu from AMD. Underneath are pins which lock the chip into its socket on the motherboard.



to save packing and shipping. Twelve screws attach the motherboard to the mounts on the case. Four screws attach the disk to the disk bay. Then the cables all plug into sockets. An unskilled worker can be quickly trained to assemble a computer every few minutes.

The advanced technology is in the manufacture of the chips, not the final assembly of the finished product. A **CPU chip** is constructed in a plant that costs billions. The building is on shock absorbers because the vibration generated by passing trucks would disturb the process! People wear spacesuits not to protect them from the environment, but to protect the chips from

flakes of loose skin or the particles we exhale.

Then the chip is packaged in plastic and shipped out. There is a socket on the **motherboard** and a mark to line up the corners of the chip to the corresponding corners of the socket. Lift a lever on the side of the socket and the chip simply drops into place. Lower the lever and the chip is locked in place. It is harder to tie a shoelace than to install a CPU chip on a motherboard. Plugging in the other components is only marginally more difficult.

Computers can be assembled from interchangeable components made by

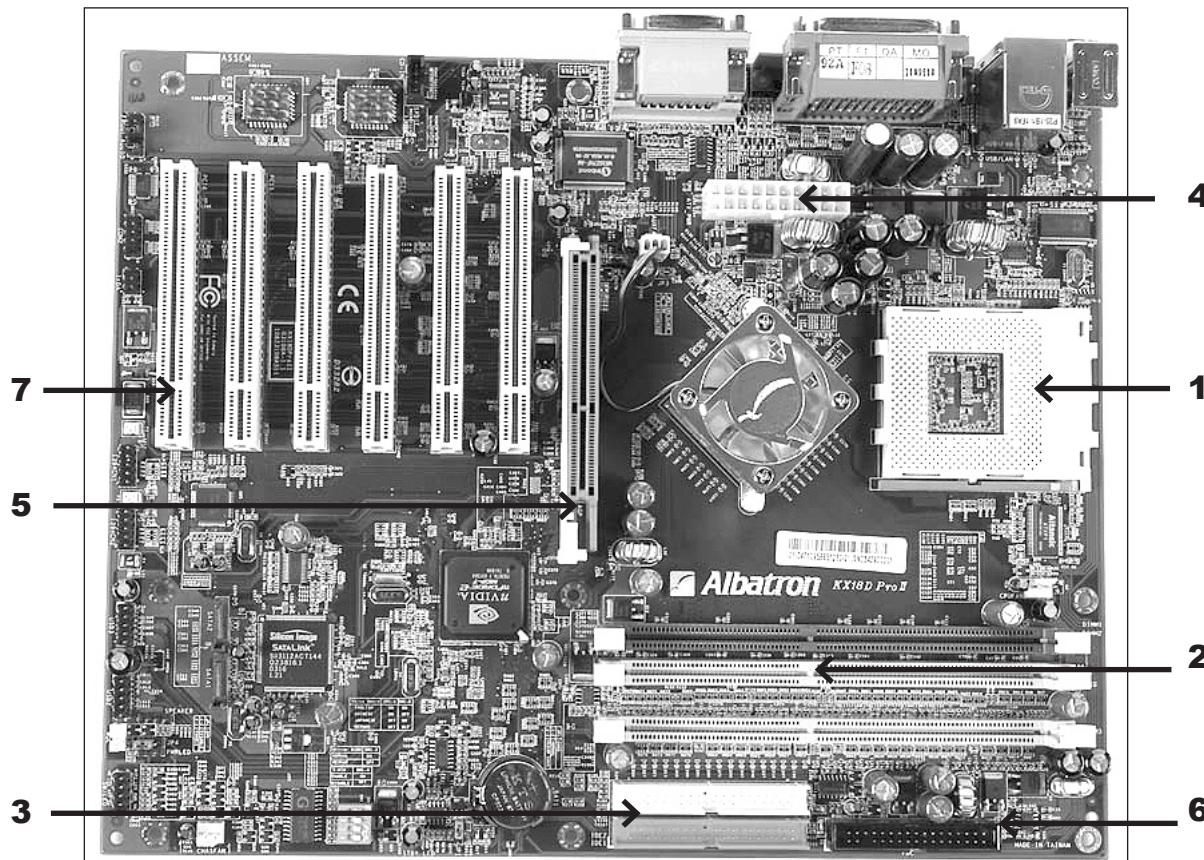
dozens of different vendors because the plugs, sockets and cables that connect the components are standardized. More frequently, however, the first company to build something creates a de facto standard. Standards last for a long time, but not forever.

The round connectors on the motherboard for the keyboard and mouse are called “PS2” ports because they were introduced by IBM in 1987 with its PS/2 line of computers (no, this has nothing to do with “PS2” in the sense of the Sony PlayStation 2 game console). For the next 15 years they have served as a simple low speed interface for these two serial input devices. However, the collection of standard “legacy” connectors in the back of every computer has now become obsolete. Instead of **PS2**, serial, and **parallel** ports, the keyboard, mouse, printers, and scanners can

all be connected to a computer through the new standard, smaller, and more flexible **USB ports**. Unfortunately, consumers still expect the old connectors to be present.

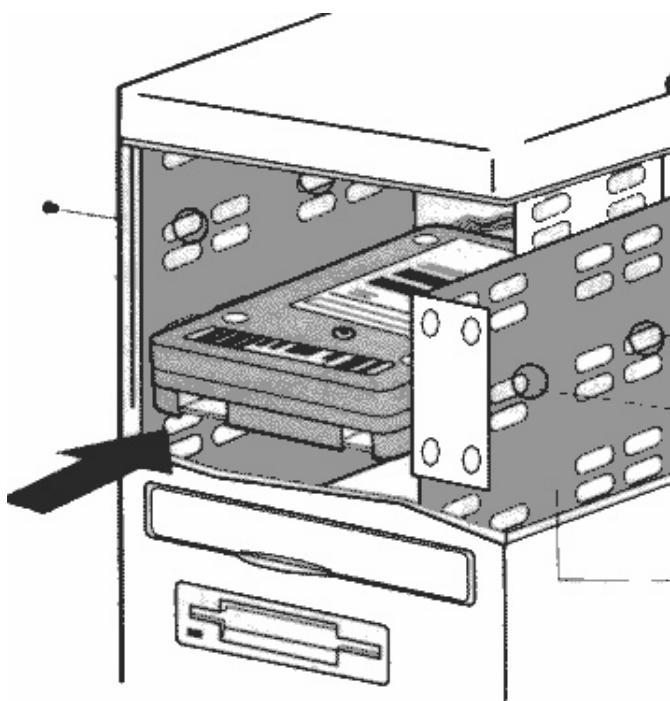
In 1987 IBM also introduced a new 15 pin interface between the video card and CRT monitor. (CRT stands for Cathode Ray Tube and is the same basic mechanism for providing images on the monitor screen as is inside the domestic television). It is called the **“VGA” port**. This standard interface has survived because it was flexible enough to adapt to much higher resolutions and refresh rates used in modern monitors. Today, however, if you use a **flat LCD display panel**, you will get a sharper picture and more accurate colors using the new larger digital **DVI** connector.

*The motherboard is at the heart of the computer. All the various components of a computer are connected to the motherboard. 1. The processor (cpu) 2. Memory chips 3. Hard disk 4. Power supply (psu) 5. Graphics card (AGP) 6. Floppy drive 7. PCI slots for sound cards, modems etc.*





A hard disk stores all your data and programs. The case is sealed (unlike floppy disks) to prevent dust and dirt from damaging the cylinders inside that spin at high speed. The diagram below shows where the hard disk is located inside the computer case.



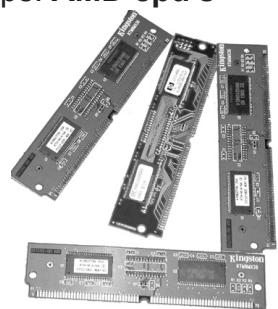
Sometimes you plug an old device into a new computer. Sometimes you plug a new device into an older computer. Where possible, vendors build into all new equipment compatibility with older standards.

Similarly, you connect a **hard disk** which permanently stores your data and programs, to the motherboard. The disk and motherboard agree to run at the highest speed supported

by both devices and by the cable. The latest motherboards continue to support older interfaces, but they also support a new smaller, simpler, faster connection called **Serial ATA**.

The **PCI** bus (slots) was introduced by Intel about ten years ago and is still in use today. This means that adapter cards can be freely transferred from old to new computers. Other interfaces, however, seem to change every few months.

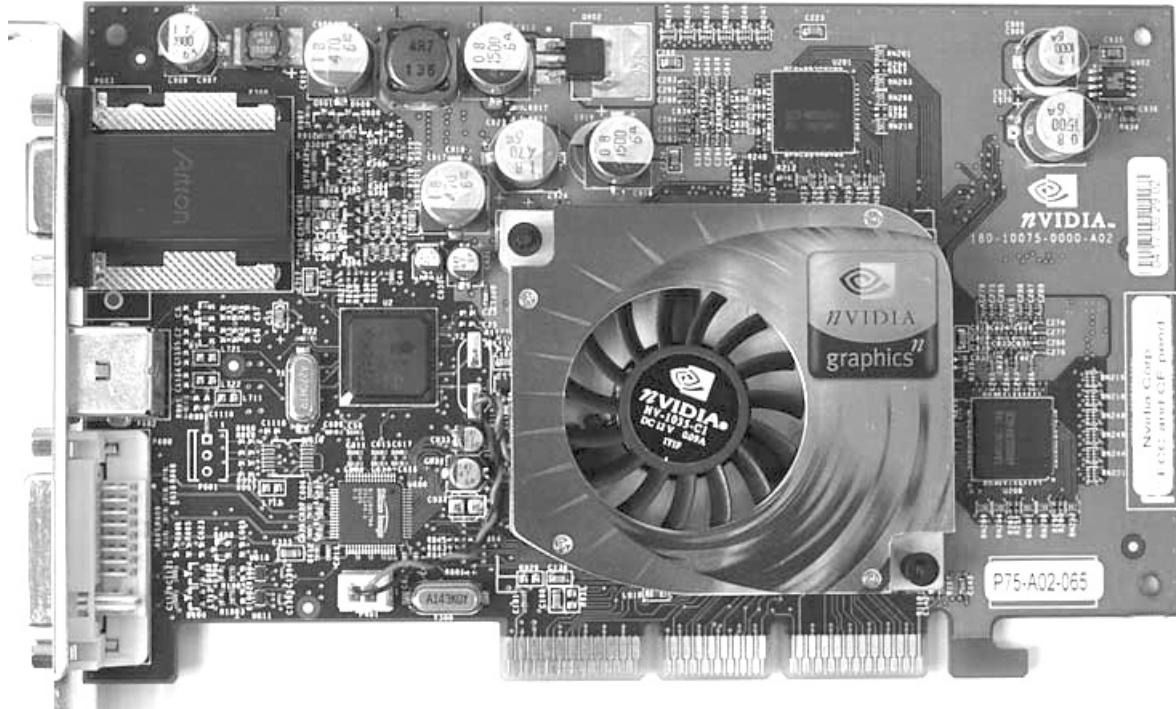
The **Intel CPU** (processor) slot for a Pentium 4 started at one size. It then changed to a different size and number of pins. A new motherboard will support CPUs that run at any of the older speeds, but older motherboards will not support the new chips. **AMD** cpu's require a different motherboard design to Intel's.



**Memory** is just as important to computers as it is to us. Memory chips store all the information used by the computer to carry out a task. As soon as that task is done, the memory is instantly overwritten with new data. It is important to understand that data held in memory is only there for as long as the computer is switched on. This means if you were writing a letter and the power to the computer was switched off, the computer would have no 'memory' of the letter. (To store things permanently, it is necessary to save them to the hard disk or floppy disk). Memory chips are cheap to buy and easy to install. There is no greater favour you can do your computer than to give it plenty of memory to work with.

**Video cards** plug into an **AGP** slot. They are

Your monitor cable plugs in here.



*Graphics (or video) cards fit into the AGP slot on the motherboard. They are now so powerful, they require their own fans to keep them cool.*

responsible for processing the colour and images that appear on the screen of your monitor. Processing images (rather than words) is now such an important part of what computers are used for, that video cards are becoming nearly as powerful and important as the CPU. Games in particular, require very powerful and fast video cards to move 3D shapes and textures around the screen.

Back in the 1950's, before fuel economy and pollution controls, people judged a car by the power of its engine. Today, however, cars are sold to the mass market based on a quiet smooth ride, side air bags, and a nice sound system.

Equally, there is a "hot rod" market for custom computers today. As with the custom car, the target audience for high performance computers are young males playing games. They have even borrowed a word from car customization, buying "modding" hardware for

their systems. Cases have transparent panels and low heat internal lights to show off the electronics. The CPU is "overclocked" (run at a speed higher than that recommended by the manufacturer) and the extra heat is removed with exotic cooling systems. As with cars, this is a specialty market.

**Speed.** Although ever increasing, speed is becoming irrelevant to most users. Almost all current computers are easily fast enough to run Windows, browse the Web, read E-Mail, listen to MP3 (music) files, and run all the Office programs. Faster speeds are only useful if you play computer games, edit video files, or run a server.

This is not a message that the computer makers want to hear. It might suggest to people that they keep their old computer for another year rather than replacing it with a new model. However, technology continues to evolve across the board, and the CPU speed may not be the most important thing.

**Noise.** Consumers are now beginning to consider things other than speed as a measure of how useful a computer is. As more and more homes install computers in their living rooms, the question of noise is becoming more important. Fast computers generally need quite a few fans to keep them cool and these create that irritating background buzz/hum. This won't do when the computer is sharing space in the living room with the TV and not just lurking in a back bedroom.



So consumers are beginning to demand computers that run silently. This has produced computers so quiet it is difficult to tell, without the lights, if they are on or off.

**Size.** It is generally held that consumers believe that a laptop is better if it is smaller, while a desktop computer is better if it is bigger. Most desktop units are sold in "Tower" configurations that are mostly empty air. This is not unique to computers. Most CD and DVD players sold in the consumer market come in big boxes that are 90% empty air. Meanwhile, improvements in chip technology can create a computer motherboard as small as 6 inches square that has all the standard features

**Keyboard.** For the full-time computer user, the most important part of the machine is often the keyboard. This is not an advanced, modern device. The design of today's keyboard is not much different from the electric typewriter of thirty years ago. Good design is still important.

A moderately fast typist may press 200 keys each minute, all day long. It is not very difficult to make a keyboard that can record the keystroke. It is much more complicated to make a keyboard that feels good and is comfortable to use. How far does the key move when it is pressed? What resistance does it provide. How does it feel when it hits bottom? The least expensive keyboards feel soft and squishy. A good keyboard has a substantial feel. In the modern era, where employees complain of hand injuries due to poorly designed keyboards, an extra £50 may be much less expensive than an insurance claim.

**Screens.** You spend a lot of time looking at the monitor. This is one place where bigger is definitely better. In recent years the LCD flat panel display has become more popular than the old bulky CRT display. They take up a lot less space and produce less heat. Very large panels are expensive.

Currently, consumers are divided into a group that wants the fastest, most powerful machine they can get, and a second group that wants the cheapest machine. There is currently no mass market for the qualities listed above. However, the development of such a market would not be unprecedented. In the '80s many of the giant car makers were unprepared when consumers developed a taste for Japanese and German cars because they were perceived to be better made and more fuel efficient. Should consumers develop a taste for "fit and finish", manufacturers can certainly develop configurations to meet the demand. Today, however, such systems are available mostly from the smaller companies.

# A Glossary of Computing Terms

This is a simple glossary of computing terms, collected over the years and reproduced by kind permission of Edinburgh University.

## A

### **Application**

A program which performs a particular function such as word-processing, or manipulating a database or spreadsheet -- as opposed to Operating System programs which control the way a computer works. Also known as 'software' or 'package'.

## B

### **Backup**

a copy of information taken as a precaution in case anything goes wrong with the original. Really important work should be backed up twice and the copies kept in separate places.

### **Browser**

See [Web Browser](#).

### **Bundle**

Computer components are usually sold separately, but some suppliers package together the most popular combinations of hardware and software to make things easier for the buyer. This is a bundle. Similarly, a word processor often comes bundled with the basic computer.

## C

### **C & IT**

"Communications and Information Technology": the buzzphrase for computers and the Internet.

### **CAL**

stands for "Computer Aided Learning".

### **CD-ROM**

a type of compact disk -- rather like the audio compact disk -- in which computer data is stored as pits in the surface. Any type of computer data -- software, educational material, games etc -- can be stored on such disks for read-only access (though writeable "CD-ROMs" are becoming available). CD-ROMs generally hold up to about 660 Mb of information more securely than hard disks, but are somewhat slower in transferring data.

### **CD-ROM drive**

a device which can read data from a CD-ROM and feed it into a computer. a device which can read data from a CD-ROM and feed it into a computer. Modern CD-ROM drives are much faster than the original specification, 24\* and 36\* drives are popular.

### **Clip Art**

A collection of graphical images which may be used in the preparation of documents or Web pages. Clip Art collections are many and varied, in subject, quality and price.

### **Communications**

The transmission of information between one information-processing device (computer system) and another.

## **Communications Network**

A system similar to a telephone network which enables the transmission of information between information-processing devices. At its simplest, a communications network is a piece of wire connecting two computers, plus circuitry to drive the wire; a more useful network interconnects several computers and peripheral devices such as printers, and may itself contain dedicated computers which act rather like the exchanges in telephone networks.

Two major types of Network are Wide Area Networks which are not limited in geographical extent (and for example can include satellites for worldwide coverage), and Local Area Networks which are very fast but limited to short distances (usually less than a kilometre).

## **Compatibles**

(Largely obsolescent) A type of PC, or Personal Computer, which is such a good copy of the IBM brand PC that it can run all the same software. The personal computer market is dominated by "IBM compatibles" and the Apple Macintosh.

## **Computer-Aided Learning (CAL)**

The use of a computer system as a teaching tool, with the user working through the material at his or her own pace. The subject matter can be anything at all -- not just computing -- and the presentation can include graphics, sound, animations, video, and any information which can be represented electronically. Progress through the material does not have to be linear: the student can follow a path of greatest need or interest.

## **Computer Tool**

The hardware or software you need to accomplish a particular task. Usually a program, or a feature in a program, the right tool can make all the difference between good and poor results.

## **Configuration**

The particular assembly of components and devices comprising a computer system; the characteristics (power, capacity etc) of such a system.

## **Consumables**

The regular minor purchases which are required for a computer system, such as floppy disks, and paper and ink or toner for a printer.

## **Co-Processor**

A second chip alongside the Central Processing Unit, which can perform specialised calculations to take some of the load off the CPU and therefore speed up the computer. The Maths or 'Floating Point' Co-Processor is particularly important, though its function tends to be integrated into modern microprocessors.

## **D**

### **Data**

a collection of measurements or other information which can be stored in a computer and handled by a suitable program, such as a database, spreadsheet or statistical package. 'Raw data' is in its original form, whereas processed data is the result of the operation of a program on raw data.

### **Database**

A file or set of files of data, representing a collection of information, which can be used in several ways, for several purposes, and/or by several users. A simple database is the electronic equivalent of a card-index system, just storing text in an unstructured format with simple tools for its rapid retrieval. More sophisticated databases can store any type of electronic information (including sound, pictures and movies), and can store complex data inter-relationships. A database is one of the components of an Integrated Package.

### **Database Management System**

Strictly, a 'database' is just a collection of 'data', and a Database Management System (DBMS) is a program which operates on the data in the database. The term 'database' is sometimes used where

'Database Management System' is intended. Common database packages include Access and FileMaker.

### **Desktop Publishing (DTP)**

The use of a desktop computer such as a Mac to lay out a page of text, pictures and graphical elements ready for printing. Although word-processors are becoming very sophisticated, they are not usually flexible enough to handle every aspect of any type of publication. The commonest DTP programs are PageMaker and QuarkExpress.

### **Disk Drive**

The mechanism in which a magnetic or optical disk is loaded in order to record or recover information on the disk's surface. It includes a motor to spin the disk at a very precise speed, and magnetically sensitive read and write heads mounted on movable pick up arms.

### **DOS**

Disk Operating System -- an operating system which controls the basic tasks of a personal computer of the IBM and compatible variety, such as reading and writing disks, loading and clearing programs, and handling input/output with the keyboard/screen. Windows 3.x requires DOS to run - later versions of Windows do not. MS-DOS and DR-DOS are two common, largely compatible brands of DOS.

### **Dot Matrix Printer**

a (cheap, noisy and comparatively slow) printing device in which text and graphics are produced by an array of fine pins forcing a printer ribbon against paper. Produces pretty poor output only suitable for draft work. The alternative is a 'non-impact printer' such as an [inkjet printer](#) (relatively cheap) or [laser printer](#) (relatively expensive).

### **DTP**

See 'DeskTopPublishing'.

## **E**

### **EaStMAN**

a 'Metropolitan Area Network (MAN)' which covers all the sites of all the Higher Education institutions in Edinburgh with a link to Stirling University, giving them all high-speed, high-bandwidth connections to each other and via SuperJANET to the Internet.

### **EdLAN**

The Edinburgh network of interlinked ethernet LANs, with a very high speed fibre optic FDDI cable providing the main data highway.

### **Electronic Mail (Email)**

Messages sent from computer to computer, across the network. Email combines the best qualities of the letter and the telephone, and is moreover developing so that it can be used for things they cannot do - such as sending pictures and sounds. Thanks to the Internet people almost anywhere in the world can send each other messages by email.

### **Environment**

A computing environment is a complete system of hardware and software, including the computer, its peripherals, its operating system and application software. The more modern the hardware and software, the better the environment - and the easier it is to do your work.

### **EUCS**

Computing Services at the University of Edinburgh, the organisation which runs the central (non-departmental) computing services for teaching, research, library and administration.

## **F**

### **File**

A body of information, recorded on a storage device such as a magnetic disk in a computer, or for use by

one. For example word-processor documents, programs, sets of data, and pictures are all stored in files.

### **File Server**

A computer dedicated to storing files which are then reclaimed over the Communications Network when they are needed by individual users on their own computers. A single logical file server may actually consist of a number of individual machines.

### **Filestore**

Another name for a File Server.

### **File Transfer**

The transmission of bodies of information in bulk from a storage medium on one computer system directly to a storage medium on another computer system, through a communications network.

### **Floppy Disk/Diskette**

A flexible magnetic disk of 3.5" (or 5.25" on older PCs) diameter, enclosed in a square protective sheath of plastic or paper. The magnetic heads in a Floppy Disk Drive can record data on the disk and read it back, much as music is recorded on a domestic audio cassette. The drive mechanism is much cruder than a hard disk's, so storage capacity is limited to around one megabyte (compared to anything in the range 500-64,000 Mb on a hard disk).

### **Formatting (of documents)**

Operations such as line-filling, justification, pagination and italicising or emboldening, performed by a word processor or DTP package to prepare documents for printing.

### **Formatting (of disks)**

A pattern of tracks and blocks recorded on a brand new floppy disk to enable a personal computer to record information on it properly.

### **FPU**

Acronym for Floating Point Unit -- a special type of co-processor for handling floating point mathematical calculations.

## **G**

### **G3**

newest member of the PowerPC family of processor chips made by Motorola and IBM and used in Apple Macintosh computers. Fast and powerful.

### **Gigabyte**

A unit in which very large storage capacities can be measured, being one thousand million bytes ('characters'), or one thousand Megabytes.

### **GUI**

Graphical User Interface, pronounced "gooey". See also WIMP.

## **H**

### **Hard Disk**

A storage medium, consisting of a magnetically-sensitive metal alloy disk. Magnetic heads moving over the surface of the disk record and read back information. Hard disks are usually mounted in a sealed and enclosed package to exclude dust and other pollutants which could damage the surface or the read/write heads; this allows them to hold much more information than a Floppy Disk. Storage capacities for hard disks used in personal computers range from 800 Mb up beyond 16,000 Mb (16 Gb) and are still rising.

### **Hardware configuration**

the specification of a computer's components, taking in such things as the type and speed of the processor, the amount of memory, the size of the hard disk, the presence of a co-processor, the type of screen and keyboard, and the integration of other specialist devices like communication cards and sound capability.

## **holyrood**

one of the multi-user central service Unix host computers at Edinburgh University. Its full name is holyrood.ed.ac.uk.

## **Host Computer/Host**

A powerful computer which can support the work of many users simultaneously, who log on from interactive terminals or workstations through a Communications Network. It usually provides more secure and reliable storage than a personal computer for valuable files.

## **HTML**

'HyperText Markup Language': a system of codewords and symbols which can be inserted in plain text to create a Web page which can be displayed by a Web browser.

## **Hypertext**

Plain text which has been marked up with HTML and containing 'links' -- pointers to further information -- which can be activated in a Web browser simply by clicking on them.

## **IJK**

### **Icon**

A small graphical item displayed on a computer screen to represent a program, data, document or other function within the computer.

### **Inkjet printer**

a cheap non-impact printer which creates text and graphics by squirting drops of ink at the paper, typically on a 300 dpi matrix. Results are almost as good as a cheap laser printer's, though the ink may fade in sunlight and may run if it gets wet.

### **Install**

The process of loading an item of software into a computer, for example adding a new application program.

### **Installation**

A complete computer system - its hardware and software, the room in which it is located and the ancillary services it needs (such as air conditioning).

### **Integrated Package**

A software package for use on personal computers, often with the word "Works" in its name, which contains a word-processor, graphics tools, database, spreadsheet and communications capability. While not always as sophisticated as dedicated individual packages this is often enough for the general user, and much cheaper.

### **Interactive**

A mode of computer operation in which the user is constantly guiding the computer, usually through the keyboard and screen of a console. The term can also be applied to a training package or video presentation. In all cases the path taken through the material is dependent on the responses made by the user.

### **Internet**

A worldwide network of communications networks, which began in America and is now truly global (even reaching Antarctica). It uses the set of protocols called TCP/IP to send and receive information.

### **IP**

'Internet Protocol'.

### **Kilobyte/Kb**

unit of storage or memory capacity. 1Kb=1024 bytes (characters).

## L

### **Laptop**

A computer which is small enough and portable enough to be rested on the knees and used there.

### **Laser printer**

A non-impact printing device which operates in similar fashion to a photocopier, in which a laser draws the image of a page on a photosensitive drum which then attracts toner on to the paper, where it is subsequently bonded by heating. More expensive to buy than an inkjet printer, but usually cheaper to run. Now the most popular type of printer for reasonable quality at reasonable cost.

### **Licence**

Permission to use a piece of software. Most software publishers retain ownership of their products but grant permission to the purchaser to use the software, according to the terms of the software licence.

Two of the most important stipulations are that the software is only used by the licence-holder (no illegal copies to be taken), and that commercial benefit is not derived from software sold under academic terms.

### **Log on**

Attach to a multi-user computer ready to do some work on it, by supplying a user name and a secret password. Some computers are set up as information servers and allow anyone to log on to them, often with the user name 'anonymous' and a password which is the email address of the person who is logging on.

## M

### **Mac**

Shortened form of Macintosh, the Apple range of computers highly regarded for their easy-to-use graphical interface.

### **Mainframe**

A large and powerful computer system, capable of providing services to a hundred or more users simultaneously. See also Host Computer.

### **MAN**

Acronym for 'Metropolitan Area Network'.

### **Maths Co-Processor**

A chip which specialises in performing mathematical calculations, and to which the Central Processing Unit can hive off some of its work in certain applications such as graphics and CAD, to improve the overall performance of the computer system.

### **Megabyte/Mb**

A unit of Memory or Storage capacity, equal to 1,048,576 bytes or 1,024 kilobytes.

### **Memory**

A semiconductor (silicon chip) medium, comprising a large number of locations, each with its own unique numerical address, in which a computer can store individual items of information (including instructions). Memory can be either transient (see RAM) or permanent (see ROM).

### **Menu**

A list of options, displayed on a computer screen, indicating to the user a choice of activities available, and enabling the user to make a selection to initiate one of these activities.

### **Metropolitan Area Network**

A high-speed, high-capacity network linking together various sites in a geographically contained area such as a city.

### **MHz**

MegaHertz -- a frequency of one million cycles per second. This is the unit in which the speed of a computer's processing unit is measured -- that is, the speed of the clock which initiates each action.

## **Microcomputer**

An outdated term for 'personal computer'.

## **Microprocessor**

the integrated circuit element - or 'silicon chip' - at the heart of a personal computer. It does most of the information processing but needs to be surrounded by other circuit elements to provide memory, communication links, keyboard, disk and screen controllers, etc.

## **Modem**

Modulator/demodulator, a device for encoding computer-generated data in a form suitable for transmission through the domestic telephone network and for decoding data received by a computer system through the telephone network.

## **Monitor**

A device like a TV set which displays graphical output from a computer, forming both characters and graphical items from a matrix of tiny dots called pixels. Each pixel is either on or off, or in a colour monitor can have its own unique colour. The number of colours which a colour monitor can display depends on how much memory is available for each pixel: one byte can store up to 256 different colours, while three bytes can produce 16.7 million different colours. Typical monitors have around 60-72 pixels per inch. (See also Visual Display Unit.)

## **Mouse**

An input device consisting of a ball in a small plastic box, which may be rolled across any flat surface to control the synchronised movement of a cursor on the screen of a personal computer. A mouse usually has at least one button, which is used to instruct the computer to record the position of the cursor. A mouse is used for pointing at objects on the screen and making selections.

## **Multimedia**

the integration of different types of computer information - for example, text, images, animation, sounds and music -- to make the information more appealing and probably easier to absorb.

## **N**

## **Network**

A set of interconnected computers, peripherals and terminals designed so that each computing service can be accessed from other computers and terminals. See Communications Network.

## **O**

## **Online**

Connected to a computer, or supplied by one. Can also mean connected to a network, particularly the Internet.

## **Operating System**

Software which runs permanently in a computer to handle basic tasks such as receiving input from mouse and keyboard, displaying output on screens, and managing files. Programs which perform actual tasks -- such as word processors, databases and spreadsheets -- sit on top of the operating system and use its services.

## **OS**

common acronym for 'Operating System'.

## **P**

## **Package**

A computer program, or set of programs, which provides the user with the means to perform a certain set of tasks, or for solving a particular set of computational problems. Examples include: a word-processing

package, a statistics package, a communications package, a business graphics package, a database package. See also Software and Program.

## **PC**

acronym for ‘Personal Computer’ and therefore strictly encompassing both Windows PCs and Apple Macintoshes, but taken now to indicate Windows PCs.

## **Pentium, Pentium II**

latest microprocessors from the Intel corporation, the manufacturers of the 80x86 chips which are widely used in Windows PCs. Pentium II's are newer and faster than Pentiums.

## **Personal computer**

A small computer system, providing facilities generally for only one user at a time. Advances in technology mean that a personal computer delivers better performance than the largest mainframes of a generation ago, and have enough power left over to operate a ‘user-friendly’ interface.

## **Processor**

The heart of any computer: a silicon chip which executes program instructions at very high speed. It receives input data from keyboard, mouse, disk and memory, processes it, and transmits its results to memory, disk, and screen.

## **Program**

An ordered sequence of instructions to cause a computer to perform some task or solve some specific problem.

## **Public Domain Software**

Programs which their authors make freely available to the general public, without restriction or need to pay a fee.

# **QR**

## **RAM**

Acronym for Random Access Memory

## **Random Access Memory**

A semiconductor (silicon chip) memory medium, in which suitably encoded instructions and/or data may be recorded, recovered, altered and re-recorded repeatedly, in a random fashion (that is, in no particular order relative to the addresses of the memory locations involved). When a computer is running, RAM holds the program (including the system) and data currently running.

## **Read-Only Memory**

A semiconductor (silicon chip) memory medium, in which suitably encoded instructions and/or data are recorded, immutably, during manufacture, and from which that information may be recovered repeatedly. This is useful for example in storing the basic Operating System of a computer, which must be loaded into it every time the computer is switched on but which must not be tampered with by the user. Usually called ROM.

## **ROM**

Acronym for Read-Only Memory.

# **S**

## **Scanner**

A device which converts text or images from a piece of paper into a form which can be used in a computer; essentially performing the reverse of the process carried out by a printer.

## **Shareware**

software which is widely distributed, like public domain software, but on the understanding that after a reasonable free evaluation period you will either stop using it or pay a fee to its author. The shareware scheme applies only to the British Isles, North America and Australasia; different rules apply to

shareware which is to be used outside this area.

### **Silicon Chip**

An integrated circuit made up of millions of transistors and other electronic components formed in a chip of pure silicon, encapsulated in a small insulating block, and provided with pins to carry signals in and out. As technology advances, the number and type of components which can be formed on a single chip increases, making the chip ever more powerful.

### **Software**

A general term for computer programs of all kinds, including the Operating System and individual application programs such as word-processors and games. In contrast to a computer's hardware, which is relatively fixed, software is easily modified or replaced to change a computer's performance or function.

### **Software licence**

The terms and conditions under which a piece of software may be used. See [Licence](#).

### **Spreadsheet**

A package which implements a table of columns and rows in which data may be entered and displayed, and a variety of calculations performed on it. Used initially as an accountancy tool, spreadsheets have become so sophisticated that they can now operate as databases and word-processing programs as well, and can often present results in sophisticated graphical form. Spreadsheets are a fundamental component of Integrated Packages. Excel is the best known spreadsheet package.

### **Standalone**

A computer system which can function independently of any other computer system or device.

## **TUV**

### **TCP**

Terminal Control Protocol'.

### **Terminal**

A device consisting of a screen and keyboard which enables a user to log on to and interact with a remote Host computer.

### **Terminal Emulator**

A communications program which enables a personal computer to act like a plain terminal by which to access a more powerful Host computer.

### **Tracker Ball**

an alternative to the mouse as a way of moving the pointer around the screen, with a ball which can be rolled to and fro in its socket, and a couple of buttons.

### **User friendly**

Any computing product - hardware or software - in which a lot of effort has been expended in making the product easy to use, especially by computer novices. Obvious examples are not letting anything go badly wrong, and offering easy ways to recover when some action didn't have the desired effect.

## **W**

### **Web**

See the World Wide Web.

### **Web browser**

A program which runs on a computer to display 'pages' (screensful) of information which has been created according to the rules of the World Wide Web. A browser displays text and images, and also links to other pages; by clicking on such a link a user can go straight to a new Web page.

### **WIMP**

"Windows, Icons, Menus and Pointer", or "Windows, Icons, Mouse and Pull-down menus" This is a

graphical interface which makes access to computers much more straightforward and intuitive than the main alternative, the command-line interface. The WIMP interface has been used on Apple Macintosh computers since they were invented, and are coming into use on PCs through Microsoft Windows and on Unix and other workstations through the X Window system.

### **Window**

A rectangular portion of the screen of a computer or console, within which all the interaction with one particular computer or application program is confined. Several windows can be open on a single screen simultaneously, allowing the user to manage several tasks at once. The term Window is also used to indicate that portion of a document or picture which can be displayed on the screen at any one time: in this case the screen is a "window" through which you view the document.

### **Word-processor**

A software package which enables the user to edit, format and print documents, and generally to process textual information. Many word-processing packages include useful extras such as a spelling checker, thesaurus, concordancing, mailing list management, and bibliographic reference retrieval.

### **World Wide Web**

A system of information which operates across the Internet. Web pages are written in HTML (a simple system of plain text, graphics and an embedded command language) and are displayed on a computer by a Web browser. One of the great attractions of "the Web" is that it uses the standard Internet addressing system which permits any computer in the world to be identified uniquely, so that a hypertext link on any Web page can be made to point to any other page of information in the world, and to fetch it transparently for the user. This is the 'Web' of information which spreads around the World.

### **WWW**

See the World Wide Web.

### **WYSIWYG**

"What You See Is What You Get" -- a description of systems or packages which faithfully represent on the screen what a document will look like when printed.

## **XYZ**

### **Zip Disk/Zip Drive**

Proprietary portable storage medium and the proprietary drive used to access it. Zip disks are similar in look and design to floppy disks, but have a higher storage capacity - about 100Mb.

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