INTRODUCTION TO COMPUTERS

Hardware

Any physical device connected to computers is referred to as hardware. Examples of hardware are:

Keyboards

Mice

The CPU

Printers

Monitors

The Keyboard

The keyboard is essentially based on the standard QWERTY keyboard used by typists. The main differences are the additions made by computer manufacturers. The first thing to notice is that the keyboard has three main sections. The first section is the main QWERTY keyboard, which has three extra keys. The most important of these extra keys is usually marked "ENTER" or "RETURN". The enter key is on the right side of the keyboard and is used to tell the computer that you have finished typing and wish either to move to a fresh empty line or that you want the computer to carry out the typed instruction. The other two additional keys are the "ALT" and the "CONTROL" keys ("CTRL"). These act in the same way as the shift key on the typewriter and so allow normal keys to have a number of different effects.

The second part of the keyboard is the FUNCTION keys. There are always at least ten and sometimes twelve of these labelled F1 to F10 or F12, which are grouped together on the left of the keyboard or along the top of it. They are used by programs like word processors or spreadsheets to give instructions to the computer. They do not normally produce an effect on the screen but can do in some programs.

The third part of the keyboard is the numeric keypad. This is situated on the right of the keyboard and serves two functions. Firstly to move the cursor and secondly to type numbers into the computer. The keys on the keypad usually contain the numbers 0 to 9, the decimal point and the mathematical symbols. The key marked "NUMLOCK" is used to tell the computer if the pad is used to enter numbers (NUMLOCK ON) or to move the cursor (NUMLOCK OFF).

The Mouse

A mouse is a device that can provide an alternative to the keyboard. The mouse itself has a small ball in its base which, when pulled across a smooth surface, moves a special "cursor" across the screen. This cursor can be used to draw or point and is especially effective in providing an easy to use interface for those who have difficulty with keyboards etc.

The Central Processing Unit

Inside the microcomputer is a tiny silicon chip called the Central Processing Unit or CPU: this can be regarded as the "brain" of the entire system. With the help of the computer's internal memory it executes the instructions in a program by performing simple logical operations at very high speeds ‑ typically an instruction will be performed in millionths of a second.

The chip containing the Central Processing Unit or CPU is the place where the computer does its "thinking". The CPU processes information by fetching a program instruction stored in the computer's memory, executing the instruction and proceeding to the next step in the program. The CPU contains (1) a program counter that tells the CPU where it is in the program. (2) an instruction register that stores the current program instruction. (3) a control unit that decodes the contents of the instruction register. (4) data registers that store the small units of information the CPU is currently processing. (5) a memory address register that holds the address or memory location of the information in its data registers. (6) an Arithmetic and Logic Unit (ALU) that actually performs each small step in the program, and (7) a status or flags register that reports on the work of the ALU. The size or power of a CPU is determined by the length of its registers: 8‑bit processors work on information in 8‑bit groups; 16‑bit processors have registers that hold 16 bits and are twice as fast. 32‑bit processors provide even more computing speed, and so on.

Printers

Printers receive electrical codes from the computer and then print the corresponding letter or number on paper. The result is called hard copy. Plotters and some printers can even reproduce computer graphics on paper.

Ink Jet Printers

Ink jet printers work as their name suggests, by squirting jets of ink onto the paper through tiny nozzles. Ink‑jets provide good quality output (on average 600 dots per inch) at reasonable speed and at relatively low cost.

Laser Printers

A laser printer is essentially a photocopier attached to the computer as an output device. Laser printers are capable of high quality output (around 720 dots per inch), at high speed. They can be bought from as little as around £100.

Monitors (Visual Display Units)

Monitors (V.D.U.s) are the most frequently used output device. The display is transmitted from the computer to the surface of a cathode ray tube, which is rather like a television screen. Slim, flat screen monitors are also available. The display consists of very small phosphorescent dots combined in different patterns to form words, numbers, and pictures. Monitors vary in their resolution (clarity), more dots on the screen means a higher resolution but obviously costs more. The range of resolutions is CGA, EGA and the highest resolution VGA.

Floppy Disks

A floppy disk is 3 ½ inches square. Inside its protective case or sleeve, each floppy disc is a circle of flexible plastic whose surface is covered with magnetic oxide. When you use a disc for the first time, you must use a special program called an operating system to format the disk's surface by creating circular tracks divided into pie‑shaped sectors. A hole punched near the hub of the disk lets the computer know where the first sector is. A track on each disk stores a directory that tells the computer where to find what information. This means that it can go directly to the correct part of the disk instead of wading through all of its contents to find the information it wants. A typical floppy disk can store around 200 pages of typewritten text, depending on how tightly the information is packed. If pictures are stored on disk, they take up a lot of room.

Hard Disks

All modern PCs have hard disks, which can store vast amounts of information – this varies depending upon their size. Although they operate on the same basic principles as floppies, hard disks spin many times more quickly allowing the read/write head to pass only fractions of an inch over the disk's surface. Hard disks are hermetically sealed in special chambers to prevent dust particles from ruining the disk's surface.

Modems and Networks

With the help of a modem, your computer can link up and communicate with other computers all over the world. The modem translates the computer's language of ons and offs into tones of different frequencies, which are then transmitted across telephone lines. At the receiving end the process is reversed: a modem converts tone variations back into the computer's digital code. Computer networks are systems of computers linked together in this way: they are used to send and receive electronic mail, and to allow small personal computers access to the vast data libraries of larger computers, via the Internet.

Software

Computer software usually falls into one of two categories:

Operating Systems

Applications

Operating Systems

A computer is really a system of interconnected parts: a keyboard or input device; internal memory (RAM and ROM); a processor; disks and disk drives; output devices like a monitor and a printer; and, of course, software. A special kind of program called an operating system controls the flow of information between these different components. One of its most important jobs is to enable your hardware to understand the instructions of your software. When you buy a computer, you must be sure that its design or architecture is compatible with the operating system for which the software you want is written. The operating system manages the files on your disks and offers utilities such as formatting blank disks, listing the directory of files on a disk, as well as copying, renaming, and deleting files. Sometimes operating systems are permanently installed, but if the operating system is pre-packaged on a disk, its contents must either be loaded separately into the computer or written onto every disk used, during the formatting process. Windows 95 and Windows 98 are the most common operating systems used today.

Application Packages

These are programs that actually perform the tasks that the user wishes to be done. The tasks are usually so complicated that several programs are required and these are collectively called a 'suite' of programs. Typical examples of applications are Stock Control, Databases, Order Processing, Word Processing, Airline Booking Systems, Spreadsheets, Viewdata Systems and Point of Sale Systems. Each package will now be discussed in turn, to give a general explanation of what they are, when they are used and for what purpose.

Stock Control

A stock control system keeps track of all the stock currently held by the company. The computer is informed through the till when each item is sold. It is then an easy matter to deduct the number sold from the current stock level to give a new stock level. If this level is below a re‑order level, which again is held by the computer, then the computer can automatically print a re‑order letter to the supplier.

The number of each item to be supplied is stored and when the supplier delivers, the number of items delivered is added to the amount in stock. Therefore the company, in theory, should never, through its own efforts, run out of any item of stock and should at all times know how much stock it has, in the warehouse, in storage at a retail outlet and on the shelves. Losses through theft are easily calculated through a manual shelf count, and corrective action to reduce losses can be implemented quickly.

Database

A database is a store of information made up of records. A record contains information relating to one person or one company and is made up of individual pieces of information called fields. For example, you may create your records having the following fields: company name, address, telephone number, credit limit, amount owed, payment due etc.

When all the information has been entered the database may then be used by searching for particular information, called cross‑referencing (e.g. to find out at the end of the month who the company owes money to and how much, in order to settle their accounts). New information can be fed in and the database is changed (updated) to include the new data, so that it is always up to date. Large databases are best used with static information (remains the same), with new records being added to the end. An example of this type is a Library with records on all the books in stock.

The computer operated by the DVLA in Swansea (Driving Vehicle Licensing Authority) might be an example of a large database. Information relating to every motor vehicle in the U.K. is stored on computer and can be sorted or searched to find out, for example, who owns a particular car.

Word Processing

In word processing a computer behaves like a much enhanced form of typewriter. Facilities are provided for entering, manipulating, storing and retrieving blocks of text. This means that standard letters and lists of names and addresses can be generated separately and then letters to everyone on the list can be printed without retyping the document. The processor retrieves the letter and the first name and address, prints the letter, retrieves the next name and address, changes the information in the letter, prints the next letter and so on.

Real‑Time Systems

An example of a real‑time system is Airline Booking. This is a system which updates the data immediately it changes. All the terminals in all the booking offices are connected via a telephone line to a large computer in the head office of the company. This is so that information can be accessed immediately and be changed on confirmation of a booking immediately. For example, if you wanted to book a flight, you would feed details into the terminal about the flight, and back would come a message saying perhaps that only two seats remain on that flight. If you then take these seats by sending that information back, confirmation would take place and then no‑one anywhere in the world would be able to book a seat on that particular flight (even if they tried to book only ten seconds after you).

Spreadsheet

A spreadsheet is a special application package which allows the user to set up tables of information and add up rows and columns which make up the table. They are used mainly for displaying cash forecasts of companies, in the form of a table where all the figures are interconnected. Each intersection of a row and a column is called a 'cell'. The cells are filled with figures and then changes can be made and the spreadsheet calculates all the related cells, alters and reprints them. Figures can be changed and the overall effect on the complete table can be seen immediately.