getting
s t a r t e d

What's **inside** the case?

The processing hardware is all contained in one box called the system unit. The most important piece of equipment in the system box is the CPU (central processing unit). This is often referred to as simply the 'processor'. The CPU can be thought of as the brain, or engine, of the computer.
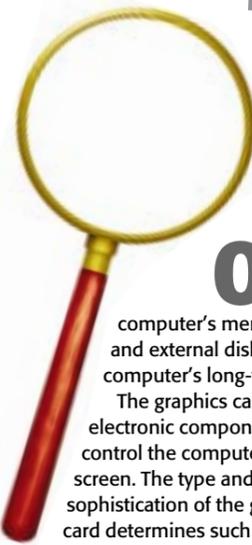
Other essential components inside the system unit are the graphics controller or card, the computer's memory (RAM), and the internal and external disk drives that form the computer's long-term storage.
  The graphics card is a set of electronic components that control the computer's screen. The type and sophistication of the graphics card determines such things as how many different colours you can display on the screen and how many coloured dots are used to make up the picture.
  Because a computer's working memory is blanked every time you switch off the system unit, the internal disk drive is used to store data so that it can be used again. These internal drives are called hard disks, for the rather prosaic reason that the data is magnetically stored on hard metal disks. Usually, you can't see the disk drive itself because it is mounted inside the system unit, but there is nearly always a light on the system unit to show that the hard disk is working.
  The external disk drive is for floppy disks. All modern computers use a 3$\frac{1}{2}$in floppy disk, encased in a rigid plastic holder. The disk fits into a slot in the system unit, behind which is the floppy disk drive itself. Hard and floppy disk drives work in essentially the same way, but hard disks are much faster, can store a lot more and cost hundreds of pounds.

most software today is supplied on CD. Software not supplied on CD will come on several floppy disks and, before you can use it, you have to copy the contents of each floppy disk onto the hard disk inside the computer.
  This process is called installation. Floppy disks can also be used to store extra copies of your work in case your hard disk breaks down, or to pass on to someone else.

Another type of drive fitted as standard to the majority of PCs is a CD-ROM drive. CD-ROMs look like ordinary music CDs and can hold the equivalent of around 600 floppy disks –
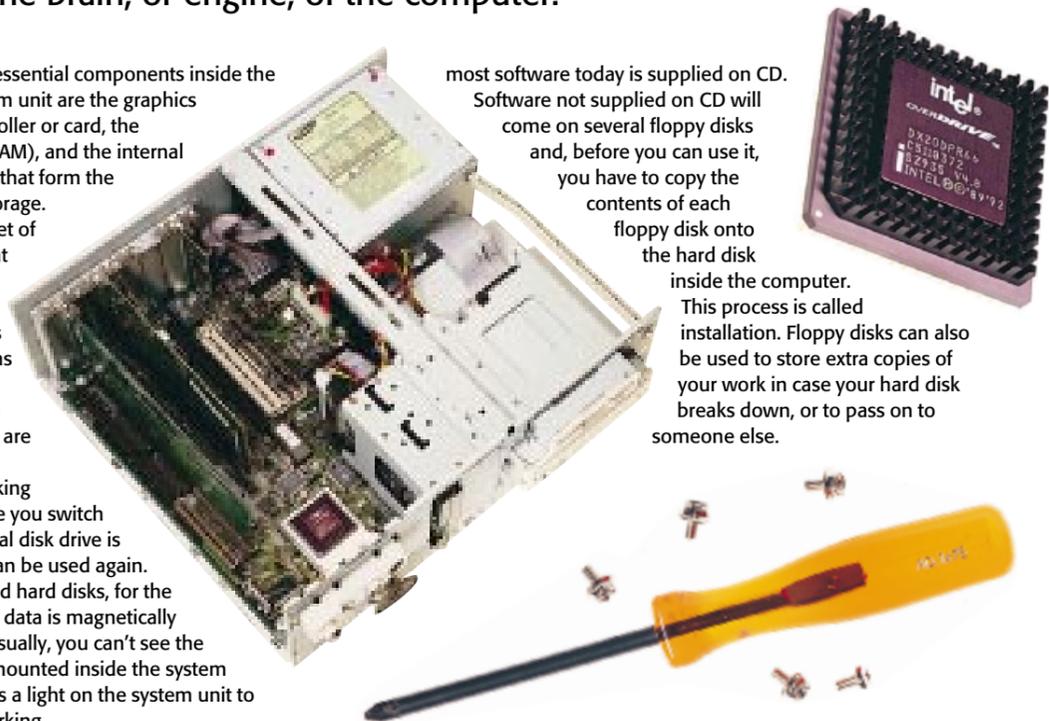
Other **essentials**

Everything connects to the system unit, which draws its power from the mains. The keyboard and mouse plug directly into the system unit and do not require a power supply. The mouse can connect via the serial port or through a round 'PS/2' style socket. The monitor is connected to the graphics controller in the system unit via a 15-pin D-shaped plug. It also needs mains power, but many system units have an auxiliary connector on the back which supplies power to the monitor. Printers receive data from the computer via a cable connected to the system unit. Printers usually incorporate mains transformers and must draw their own power from the mains.

Bolt-on **goodies**

Modems are used to connect your computer to the telephone system, from where you can connect with other computers on the Internet, join an on-line service such as CompuServe, or connect with any other computer equipped with a modem.
Virtually all modems allow you to send and receive faxes, and many of the more recent ones can act as telephone answering machines by recording messages onto the PC's internal hard disk.
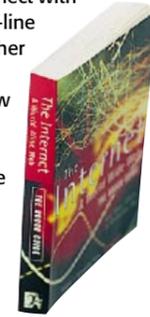
Scanners translate printed pictures or words into an electronic form so they can be stored and manipulated by the computer. For scanning photographs, you need a colour scanner capable of recognising at least 256 colours, but one described as 16-bit or higher can handle over 65,000 colours, which gives even more realistic results.
  The cheapest models are hand-held devices; these work well, but are too narrow to scan A4 paper without a lot of fuss. Next in price are sheet-fed or 'page' scanners that will handle A4, but these cannot scan bulky items from books or magazines unless you copy them onto A4 first. Flat-bed scanners are the dearest, but also the most useful in that they can scan from any printed source.

In **close-up**

The graphics controller
This is a circuit board (known as a card) fitted inside your computer and it determines how many different colours you can have on the screen at one time and also the number of dots used to produce the image (the resolution). More expensive cards generally work faster, use more colours and work at higher resolutions. Make sure the card is described as being accelerated local bus (it could be VL-bus or PCI) and that it has at least 1Mb of memory.

The processor
This is the component that actually does the computing and you should buy the fastest you can afford. Most PCs are powered by a member of a processor family designed by Intel. The best known of these is the Pentium, which has just been superseded by the Pentium MMX, but there is an older type of Intel processor called the 486. There are also two more powerful processors called the Pentium Pro and Pentium II.

RAM
Random Access Memory (RAM) is what counts. RAM is generally measured in megabytes and 16Mb is the minimum we'd recommend if you use Windows programs.

CD-ROM drive
Most drives today are eight-speed, but faster drives up to 24-speed (24x) are becoming more common.

The hard disk
The hard disk stores your software as well as the data you produce when working with your computer. At the moment, it's really not worth buying a disk smaller than 1Gb (gigabyte). Go for a larger disk if you can afford it. ▷▷

Floppy drive
For 3$\frac{1}{2}$in floppy disks.
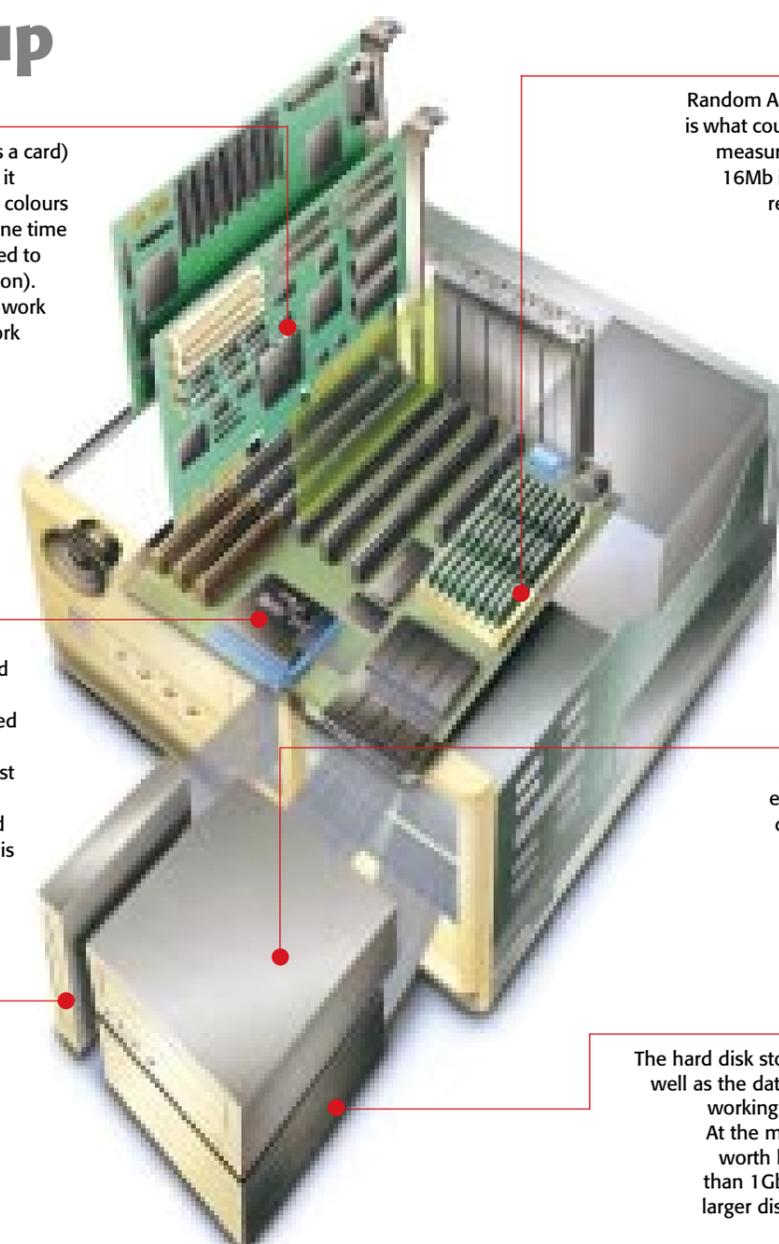
Output (viewing your work)

Output can take many forms. The primary output of a modern PC is via the screen on the monitor. Actually, the computer will work without a monitor, but if you can't see what's happening on the screen it's impossible to use.

Monitors vary in performance and price. The most significant factor affecting the price is the size of the screen: a 15in monitor may cost around £300, but every extra inch above this is very expensive. The average price for a 17in monitor is around £600; for a 20in or 21in model, expect to pay well over £1,000. A 15in monitor is really the minimum for day-to-day work.

Most work done on a PC will eventually end up on paper, so some sort of printer is essential (see the 'Buying a printer' section a few pages on). In fact, a PC can be used to drive almost any type of device, given the right connections, so the control of other machines also counts as output.

What is multimedia?

Multimedia is the buzzword of the moment. It usually means adding a sound card (a plug-in card with synthesiser chips in it), speakers, and a CD-ROM drive to a computer to enable you to record and play back voice, sound effects and music. CD-ROM sales are booming and many programs, reference works and libraries of artwork are available in this format. You can also use a CD-ROM drive to play conventional audio recordings. If you want multimedia capabilities, it's often cheaper to buy them built in than to add them later. Check with your supplier.

Whether you buy built-in multimedia or add it afterwards, make sure the CD-ROM drive is at least an eight-speed model and that you buy a 16-bit sound card for good-quality results. Many computers now come with 12- and even 16- or 24-speed CD drives.

What is software?

It doesn't matter how powerful a computer is, without software it is useless. Software is to a computer what an audio CD is to a CD player, or a video cassette to a VCR – you need both if they're to do anything.

Whereas 'hardware' refers to any physical piece of computer equipment, 'software' is the collective term for computer programs, or 'applications', as they are usually known.

Software is usually supplied on floppy disk or CD-ROM, though an increasing amount can be had from the Internet.

In most cases, software must be 'installed' onto a computer before it can be used. Installing an application means transferring all of the information needed to use it from the original disks to the computer's hard disk. The original disks can then be put away for safekeeping.

Many new PCs are supplied with software pre-installed. You may or may not get the original disks but the software can be used as soon as the PC is unpacked. Even if a PC comes with no 'bundled' software, it will always come with an operating system.

What are applications?

Windows 95 by itself isn't much use when it comes to doing something useful, so any PC needs additional software or 'applications'.

An application is a program or piece of software that meets a specific need. A word processor, for example, is for producing pages of text for such things as letters, reports and books. A spreadsheet, on the other hand, is designed for working with numbers and can automatically perform calculations that would take forever using a calculator.

Not all applications are intended for everyday use though, and 'utilities' are another type of software. Intended to meet occasional needs, they do such things as connect your PC to another one, tidy up the contents of your hard disk and check for viruses.

Applications need not be serious. Games are applications and there are hundreds of encyclopaedias, dictionaries and other reference works on the market.

Unfortunately, just like a film at the cinema, you don't know how good software is until you try it. Fortunately, software is reviewed in magazines like *What PC?*. If you like the sound of the software as reviewed, buy it. Some manufacturers give away demo copies of software, so you *can* try before you buy and the Internet is a good place to find such offers, along with our cover disc.

The Internet is also a good source of 'shareware'. This is software distributed for free on the basis that if you like it, you then pay a small registration fee to keep on using it. Most shareware software offers an incentive for registration – usually a printed manual or a new version of the software which has more features.

Internet Explorer

Excel

Kai's Photo Soap

WinFax PRO

Adobe Illustrator 7.0

Microsoft Windows 95

A PC needs software before it can do anything useful, and it needs an operating system before it can do anything at all. The operating system used by most PCs is Microsoft's Windows 95. This is supplied pre-installed and usually also comes on a CD-ROM, in case of emergencies.

An operating system is an interface between you and your PC and you use it to tell the computer what to do. In the case of Windows 95, you use a mouse that controls a pointer on the screen. By clicking on icons (small pictures that represent programs), selecting options from menus and typing on the keyboard, you control the PC and give it instructions.

When a piece of software is described as 'for Windows 95', it expects to find Windows 95 running on the PC and without it, it won't install, let alone run. Software designed for Windows 3.1 (Windows 95's precursor) or MS-DOS (older still) will work on a PC that has Windows 95 but it won't take advantage of its new features.
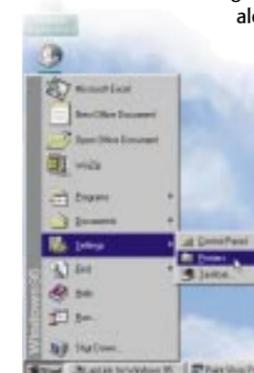
Windows 95 (and other software that requires it) makes great demands on a PC, which is why a powerful PC is important. As operating systems and software get more sophisticated (the next version of Windows is due early next year), yet more power is needed, which is why all PCs eventually become obsolete.

Left: Microsoft Word.

Buying a **printer**

Unless you have bought a PC solely to play games, you will eventually want to get your work onto paper. For this, you'll need a printer. Almost everything a computer can be used to produce has a real-world equivalent: for example, letters, invoices, record cards and pictures. While all these might look wonderful on the screen, if you can't print them out and give or send them to other people, they are ultimately worthless.

Choosing a printer

Choosing the right printer is not just a question of how much you are prepared to pay to get your words and pictures onto paper. Each printer has its strengths and weaknesses. For most people, finances permitting, a laser printer is the best all-rounder, provided you don't need colour.

Dot-matrix printers have a capability that neither inkjets nor lasers possess – they can print on multipart paper. This is invaluable if your primary output is going to be invoices and statements from an accounting program. However, you should be warned that the noise from even a modern dot-matrix becomes very annoying after a couple of minutes' printing. They are noisy because they print by firing metal pins onto an ink ribbon. The pins then press the ribbon against the paper to produce the image. For this reason, dot-matrix printers are said to be impact printers.
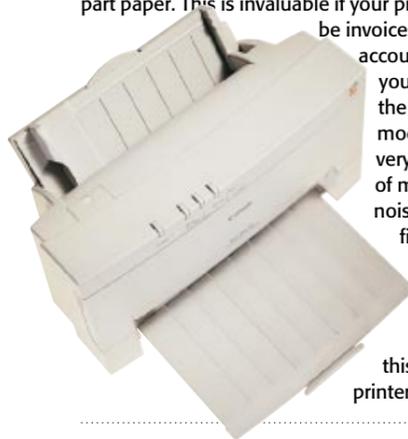
Inkjets work by spraying either black or coloured ink onto the paper. This makes them virtually silent, but also accounts for their high running costs: ink cartridges are expensive, although prices are falling.

The paper comes out of the printer with wet ink on it and, unless you leave each page to dry for a few seconds, it will smudge if you touch it. Inkjet technology, which is capable of producing high-quality output, thus carries its own insuperable disadvantages and will never be able to match the speed and convenience of a laser printer.
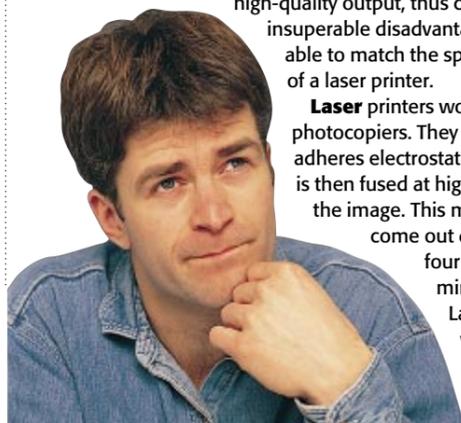
Laser printers work pretty much like photocopiers. They use toner which adheres electrostatically to the paper and is then fused at high temperatures to form the image. This means that the copies come out quickly (at between four and 16 pages per minute) and they are dry. Laser technology is now well established and, despite their fast output, laser printers are very reliable.

What is **resolution?**

Resolution is expressed in dots per inch, horizontally and vertically. It's a measure of how many dots it takes to print a solid black one-inch square. A printer described as 300x300 will use 300 rows, each consisting of 300 dots, to print the square. That's a lot of dots: 90,000 to be precise.

A simple rule of thumb is, the more dots that are used, the clearer and finer the printed image will be. Most cheap lasers print at 300x300 dots per inch. More expensive ones print at 300x600 or even 600x600.

If you compare resolutions, only do so within a particular printer family. For example, the output of a dot-matrix printer will never equal that of a laser, however high a resolution the dot-matrix uses.

Similarly, many inkjets are capable of 360x360dpi, but you should not assume this makes them better than a laser of 'only' 300x300dpi. Lasers place their dots more accurately.

A A
Dot-matrix

A A
Inkjet

A A
Laser

Inkjet

Laser

Printing **costs**

Dot-matrix printers are the cheapest to run, requiring little attention other than a new ribbon every couple of months. Inkjet printers use ink voraciously, especially when used to print graphics.

Ink can be expensive, especially if you buy a colour printer where all the ink comes in one cartridge that has to be thrown away when just one colour runs out. Find out how much new ink cartridges cost, and whether they can be refilled in order to save yourself money.

Laser printers need replacement toner, usually every two to five-thousand pages, depending on the make of printer. Some models use an all-in-one cartridge containing both toner and a new electrostatic drum. Every time you replace the toner, you throw away what could be a perfectly good drum; others use separate toner and drum systems, so you only need to replace the drum when it wears out, usually after around 10,000 pages.

Whatever printer you are considering, don't be fobbed off with vague promises about running costs. Ask about ink, cartridge, toner and drum prices and how often they need changing.

Colour printers

All three types of printer can be bought in versions capable of producing colour. A colour printer can also be used to print in monochrome, though this can work out to be more expensive than using a designated mono printer. If you want good-quality colour, the only affordable option is an inkjet.
● Colour laser printers do exist and they produce terrific output, but you'll need the best part of £5,000 to get hold of one.
● Colour dot-matrix printers can be bought for only £20-£30 more than monochrome versions, but they are only suitable for the simplest type of output.
● For colour work, the inkjet is once again a compromise between the desirable laser and the disappointing dot-matrix machines. However, for only £50-£100 more than the price of a monochrome machine, it's possible to buy an inkjet printer capable of producing quite acceptable colour, even if the cost per page is high.

10 things to do with a **PC**

The flexibility of a modern PC is so great that, once you get to grips with it, you can use it for thousands of purposes. Here's what our readers tell us they do with their computers:

1 **Surf the Internet** More and more people are getting onto the Internet. You'll need a modem to plug your computer into the phone system, and you'll have to pay around £12 a month to a service provider for a connection. Once on line you can retrieve information, get free software, join special-interest groups from all over the world, and send and receive e-mail.

2 **Send and receive faxes** Any document you create on your computer, whether it contains words or pictures and regardless of what sort of software you used to create it, can be faxed directly from your PC without ever existing on paper at all. You can also receive faxes from other computers or from ordinary fax machines. You'll need a modem to send and receive faxes.

3 **Work from home** You can bring work home from the office on a floppy disk and take it back the same way, or you can go the whole hog and work entirely from home using a PC with printer, scanner and modem as your combined fax, answering machine, copier and electronic mail system. You need never go to the office at all!

4 **Create music** Plug any digital instrument with a MIDI interface (most electronic keyboards have one) into your sound card and you can edit and experiment with the music, play it back and, with the right software, even print it out in musical notation.

5 **Edit pictures** If you have a scanner, you can copy any of your own pictures into the computer and electronically enhance them, then view them as an on-screen slideshow or include them in the letters and documents you create. Even if you haven't got a scanner, many photo developers will transfer your films onto a Photo-CD at a reasonable cost.
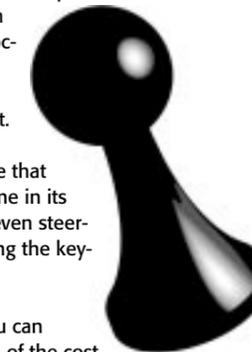
6 **Play games** There's hardly a PC anywhere that isn't used as a games machine at some time in its life. Serious games players plug joysticks (and even steering wheels) into their computers instead of using the keyboard and mouse.

7 **Build an electronic reference library** You can assemble a world-class library for a fraction of the cost of real books. Encyclopaedias, atlases, massive reference works and even fiction are all available, many with sound and moving pictures too.

8 **Help kids with their schoolwork** At one level, just giving young minds access to a word processor with a spell-checker is enough to stimulate a new enthusiasm for studying, but there's a wealth of special programs covering most school subjects and some really excellent reference titles aimed specifically at children.

9 **Keep accounts** For many small businesses, keeping accounts is the justification for buying a PC in the first place. Computerising your accounts won't necessarily save you money, but you'll always know exactly where you stand.

10 **Run a club or society** With a simple set of software or an integrated package you can keep membership lists and addresses, track subscriptions and publish your club's newsletter.

Buying a **notebook**

A notebook PC is a portable computer that is approximately the same size as the magazine you are holding, but around three or four times thicker. The term 'notebook' has long since replaced 'laptop', which referred to bulky portable computers the size of a small suitcase.

What is there to **gain?**

The main reason for buying a notebook PC is obviously portability. Small and usually light, a notebook PC can be easily carried from place to place, making it ideal for people who need to work on the move.

A notebook PC's compactness can also make it ideal for places where space is at a premium. Completely self-contained, it takes up little space on a desk or table and can be folded up and put away when it isn't needed.

What to **look** for
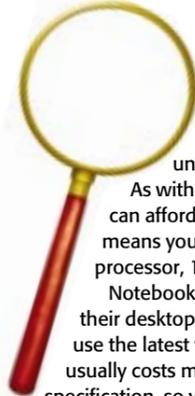
The notebook PC market now caters for almost every requirement. There are high-end models with large screens, integral floppy and CD-ROM drives and full multimedia, but these are expensive and heavy. Conversely, there are small, lightweight models with no internal drives, designed to be almost unnoticeable when slipped into a briefcase.

As with a desktop model, you should always buy the best notebook PC you can afford. Unless you're buying an old model at a reduced price, this means you should not buy anything with less than a Pentium 120 processor, 16Mb of RAM and 1Gb hard drive.

Notebook PC specifications usually lag a little behind that of their desktop counterparts but models are available that use the latest technology. Unfortunately, a notebook PC usually costs much more than a desktop PC of a similar specification, so you may have to rethink your requirements if you're working to a tight budget.
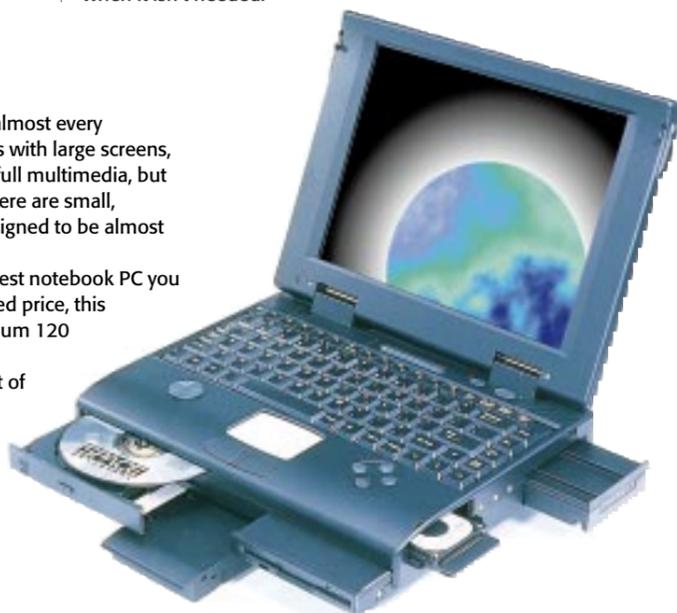
Buying *tips*

1 A notebook PC is harder to upgrade than a desktop, so don't skimp on features. By buying the most powerful model you can afford, you'll prolong its useful life.

2 If you want to carry it around a lot, buy a lightweight notebook with a lithium ion battery. Disk drives (floppy and CD-ROM) that connect externally cut down on size and weight too, without restricting functionality.

3 Take care when buying a notebook you haven't seen or used. Since the screen, keyboard and pointing device can't be changed afterwards, you should be completely happy with them.

4 If you want to use a notebook as a main computer, consider buying a docking station. Connect a normal screen, keyboard and other peripherals to this and with the notebook temporarily 'docked', you almost have a traditional desktop PC.

Types of **screen**

Few notebook PCs are available with a monochrome screen these days and colour is obviously preferable. Cheaper notebooks have dual-scan (or DSTN) colour screens. Although fine for 'static' applications like word processing, spreadsheets and image editing, they become very blurry when they are displaying moving graphics.

TFT colour screens are much better, but are much more expensive than dual-scan ones. A TFT screen displays clear, bright colours and can easily cope with the fast-moving graphics of games and the like.

Notebook screen sizes start at around 10.4in (measured diagonally) and go up to around 13.3in. Similarly, resolutions range from 800x600 pixels to 1,024x786 pixels, with a few 1,024x800 models in between.

Battery technology

All notebook PCs have one or more internal batteries that allow them to be used away from the mains. The cheapest are NiCad (Nickel Cadmium) batteries but these have largely been replaced by better NiMH (Nickel Metal Hydride) batteries. Thankfully, batteries are supplied with a notebook when you buy it. More sophisticated (and more expensive) notebooks PCs have lithium ion (Li-ion) batteries. These are lighter than other types, last longer between charges and also recharge more quickly.

What is the **Internet?**

The Internet is an international network of computers that you can connect your PC to via an ordinary telephone line. Once you're linked in it gives you access to vast amounts of information stored on those computers around the world, and allows you to send messages to other users via electronic mail (e-mail).
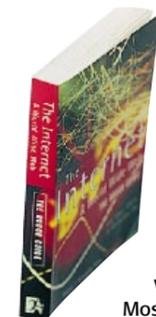
The most popular part of the Internet is the World Wide Web, which is made up of pages of highly graphical information. These pages or 'Web sites' can be created by anyone, and thousands have already been set up by companies and individual users alike. Many even include sounds, animations and videos as well as text.

Most Web sites, especially those run by companies such as Microsoft, also have files that you can download onto your PC.
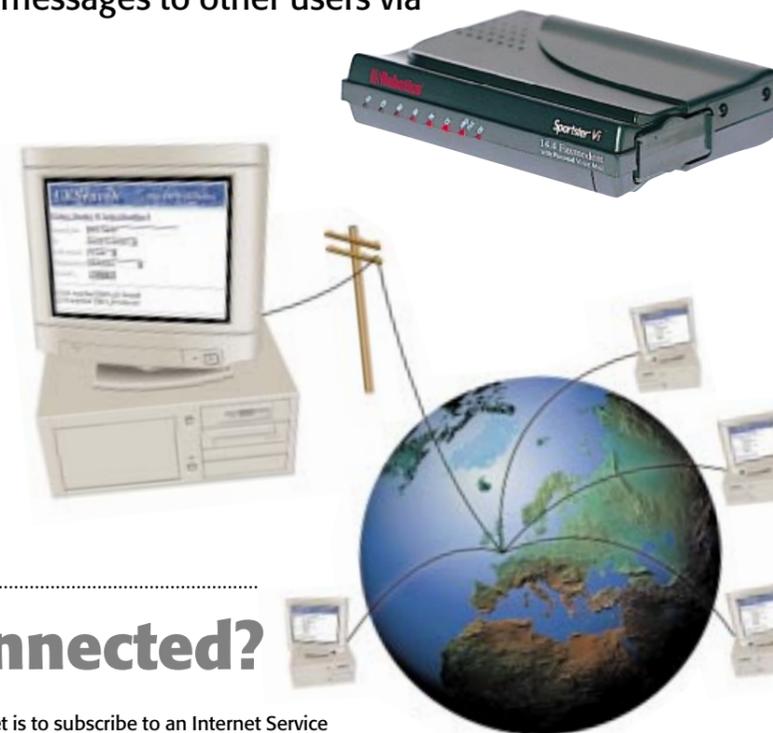
How do I get **connected?**

The easiest way to connect your PC to the Internet is to subscribe to an Internet Service Provider (ISP). This costs around £12 a month and in return you get some software, including a 'browser' program which lets you view the information on the Internet, and a telephone number that your PC can dial with a modem to access an Internet gateway. Most ISPs provide a telephone number that is charged at local rates, no matter where in the UK you happen to call from.
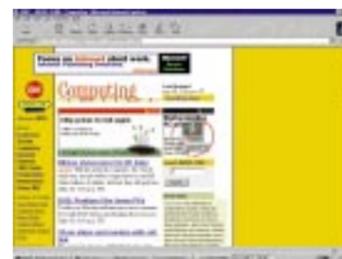
Another way to connect is to subscribe to an on-line service, such as AOL. As well as full access to the uncensored, randomly stored information on the Internet, these services offer their own more organised information pages, such as discussion forums, that are only available to members.

What is a **URL?**

URL is short for Uniform Resource Locator. More usually called an address, it defines a location on the Internet. For example, the URL for *What PC?* is: http://www.whatpc.co.uk – you just type it into your Internet browser to connect to and view this site.

What is **e-mail?**

In addition to Internet access, your ISP or on-line service will also provide you with a unique e-mail account, for sending and receiving messages around the globe. Your e-mail address is usually along the lines of *username@ISP_name.com* or *username@ISP_name.co.uk.* E-mail sent to this address will then be stored on your ISP's computer system until you make a connection and download it to your PC.

E-mail messages can include pictures as well as text, and you can even attach files to them which can then be downloaded by the recipient.