Output Devices

Output devices are those devices used by the computer system communicate information back to the user. An output that is tangible (can be touched) is called a Hard Copy. The output from printers and plotters is therefore referred to as Hard Copy. Output on the Monitor (VDU, Visual Display Unit) is referred to as Soft Copy as it is not permanent and cannot be touched.

Printers

There are various printers and one has to consider issues such as speed, noise, quality and cost when choosing an appropriate printer. The speed of a printer is measured in ppm, pages per minute.

Printers are divided in 2 categories i.e. Impact and Non-Impact printers.

Impact Printers: This type printer uses a hitting mechanism that hits a ribbon, in some way or other, which in turn leaves a mark on paper. These types of printers are obsolete ie. they are not in use anymore.

Non-Impact Printers: The non-Impact Printers do not use any striking mechanism. The printing operation is almost silent, and speeds can be high, but with this technique no multiple i.e. carbon copies can be printed.

Dot Matrix Printer

A dot matrix printer is an impact printer, producing its image by striking the paper through a ribbon. Its print head consists of a number of small pins varying between 9 and 24. As the print head moves across the page, one or more pins strike the ribbon and make a dot on the paper. The figure shows how the letter F is produced.

Advantages
- cheap to buy and low running cost
- can print graphics
- can print multiple copies (example an invoice)

Disadvantages
- low resolution therefore low quality
- too noisy
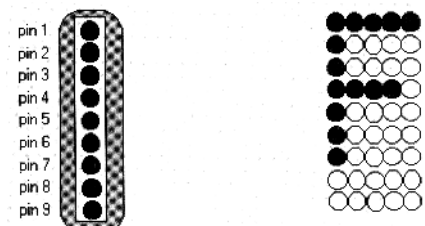
These pins hit the ribbon and form a character

Ink Jet Printers

An inkjet printer produces hard copy by spraying ink onto paper. Many models include other devices such as a scanner and photocopier along with the printer in a single device.

In the inkjet printing mechanism, the print head has several tiny nozzles, also called jets. As the paper moves past the print head, the jets spray tiny droplets of ink onto it, forming the characters and images. The ink-cartridges containing the ink can be replaced or refilled when empty. These are the most common printers for home use.

Advantages
- their cost is relatively low
- quality produced is very good
- quite silent

Disadvantage
- the running cost is quite expensive because the ink cartridges run out quickly and therefore they need to be replaced frequently

Laser Printer

A laser printer uses a non-impact (keys don't strike the paper), photocopier technology to print. When a document is sent to the printer, a laser beam "draws" the document on a selenium-coated drum using electrical charges. After the drum is charged, it is rolled in toner, a dry powder type of ink. The toner adheres to the charged image on the drum. The toner is transferred onto a piece of paper and fused to the paper with heat and pressure. After the document is printed, the electrical charge is removed from the drum and the excess toner is collected. Most laser printers print only in monochrome. A color laser printer is up to 10 times more expensive than a monochrome laser printer.

Advantages:
- quality produced is excellent
- very silent
- very fast
- can print a lot of pager per toner

Disadvantages
- more expensive to buy than ink jet printers

Plotters

A plotter is a printer that interprets commands from a computer to make line drawings on paper with one or more automated pens. Unlike a regular printer, the plotter can draw continuous point-to-point lines directly from vector graphics files or commands. There are a number of different types of plotters: a **drum plotter** draws on paper wrapped around a drum which turns to produce one direction of the plot, while the pens move to provide the other direction; a **flatbed plotter** draws on paper placed on a flat surface; and an **electrostatic plotter** draws on negatively charged paper with positively charged toner.

A drum plotter

As a rule, plotters are much more expensive than printers. They are most frequently used for CAE (computer-aided engineering) applications, such as CAD(computer-aided design) and CAM (computer-aided manufacturing). In fact, plotters are mainly used by architects, designers and engineers.

The major advantages of a plotter:

1. continuous lines not made up from dots
2. can print on large paper
3. hundreds of colours possible, limited only by the ink, but only a few at a time
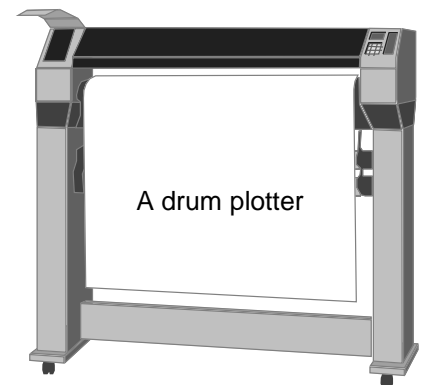
VDU (visual display unit)

A VDU displays images generated by a computer or other electronic device. The term VDU is often used synonymously with "monitor". Visual display units may be peripheral devices or may be integrated with the other components. For example, the Apple iMac uses an all-in-one design, in which the screen and computer are built into a single unit. The size of a monitor is measured by the length of the diagonal from the top corner to the opposite bottom corner in inches.

Early VDUs were primarily cathode ray tube (CRT) displays and typically had a diagonal size of 13 inches or less. During the 1990s, 15" and 17" displays became standard, and some manufacturers began producing displays over 20" in size. At the turn of the century, flat panel displays became more common, and by 2006, CRT displays were hard to find.

Today, it is common for computers to come with VDUs that are 20" to 30" in size. Thanks to the recent growth in LCD, plasma, and LED technology, manufacturing large screens is much more cost effective than before.

LCD Projectors

A projector is very similar to a monitor which however, projects the image on a wall or a vertical large screen. Projectors are used mainly to project an output that has to be viewed by a large crowd, such as when delivering a presentation. This is because the projected image is very large. It would be too expensive to buy a very large monitor instead of using a projector. LCD Projectors are portable as they are not that heavy, but they cannot be used in brightly lit environments, such as outdoors.