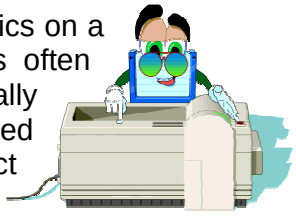
Output Devices

glossary pg.147

Output is data that has been processed into a used form, called information. An **output device** is any hardware component that can display information to a user. The main and most common output devices in a computer system are the Printer and the V.D.U.

Printer

glossary pg.156



A **printer** is an output device that produces text and graphics on a physical medium such as paper. Printed information is often called ***hard copy*** because the information exists physically and is a more permanent form of output than that presented on a VDU (Monitor). Printers can be grouped into impact and non-impact printers.

- An **impact printer** forms characters and graphics on a piece of paper by striking a mechanism against an ink ribbon that physically contacts the paper.
- A **non-impact printer** forms characters and graphics on a piece of paper without actually striking the paper.

The printing speed of a printer is usually expressed in **pages per minute** (ppm). Printer resolution is often expressed in dpi (**dots per inch**). The larger the number, the higher the **resolution**.

Advantages of printers include

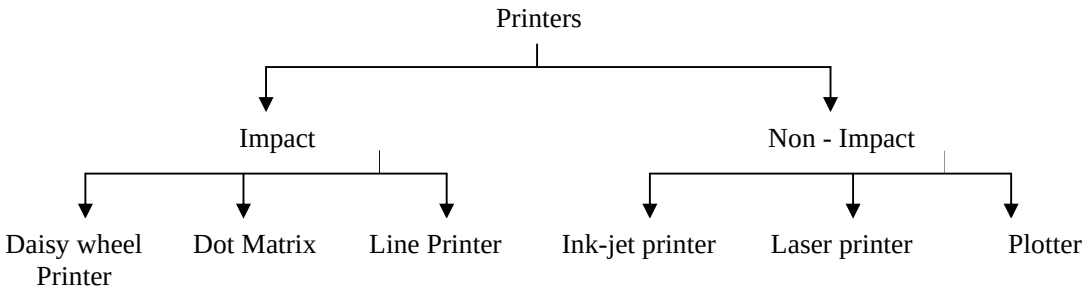
- Information produced is permanent.

Disadvantages of printers include

- The time to get the printout is slow, when compared with display devices.
- Paper is wasted for obtaining the output.
- Printers are generally noisier than display devices.

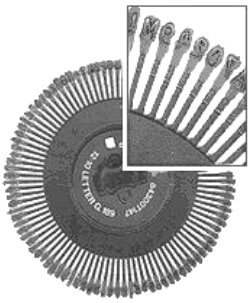
The following types of printers will be considered in more detail;

1. Daisy wheel Printer
2. Dot-matrix printer
3. Line printer
4. Ink-jet printer
5. Laser printer
6. Plotter



Daisy Wheel printer *glossary pg.157*

A **daisywheel printer** is an impact printer that uses a wheel as a print head. As the wheel rotates, a hammer strikes the backside of the spoke and presses it against the paper to print a character.

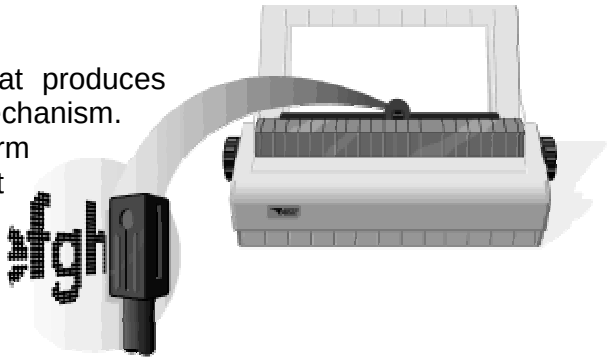


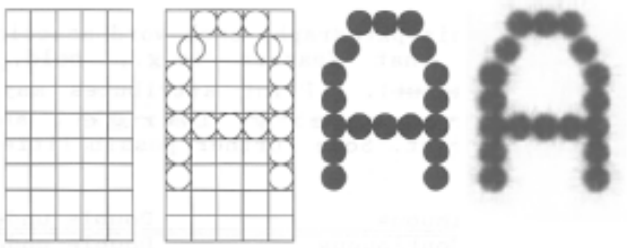
Advantages of a daisywheel printer
- Can print letter quality characters.

Disadvantages of a daisywheel printer
- Printing speed is very slow.
- Cannot print graphics.

Dot-Matrix Printer *glossary pg.157*

A **dot-matrix printer** is an impact printer that produces printed images with a print head striking mechanism. Most dot-matrix printers use continuous-form paper. A higher number of pins on the print head means more dots are printed, which results in higher print quality (i.e., a 24-pin printer has better print quality than a 9-pin printer).





The diagram above shows the grid (or **dot matrix**), the way the letter A is designed on this matrix, how the letter A is formed on paper, and what a close up of the printout would look like. Note that the final image is fuzzy and not cleanly formed because the cloth ribbon and the paper texture cause the ink to smear, and also because of slight misalignment of the pins.

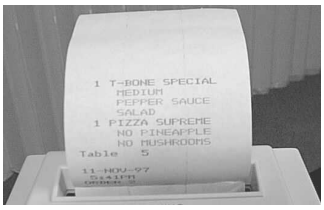
The speed of a dot-matrix printer is normally measured by the number of **characters per second (cps)** it can print.

Advantages of dot-matrix printers
- Dot-matrix printers can print multipart forms.
- Dot-matrix printers can withstand dusty environment, vibrations, and extreme temperature.

Disadvantages of dot-matrix printers
- Dot-matrix printers are generally noisy because of the striking mechanism.
- Print quality of dot-matrix printers is not as good as those from ink-jet printers and laser printers.

Line Printer

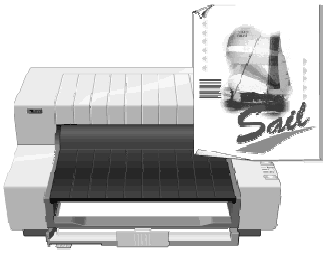
glossary pg.158



A **line printer** is a high-speed impact printer that prints an entire line at a time. The speed of a line printer is measured by the number of **lines per minute (lpm)** it can print. Line printers are often used with mainframes, minicomputers, or with a network in applications such as manufacturing, distribution, or shipping.

Ink-Jet printer

glossary pg.157



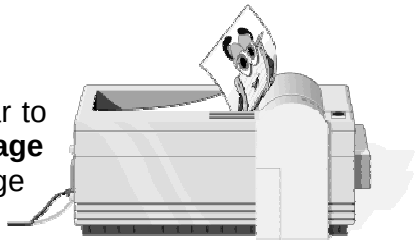
An **ink-jet printer** in a non-impact printer that forms characters and graphics by spraying tiny drops of liquid ink onto a piece of paper. Ink-jet printers can produce **letter-quality** text and graphics in both black-and-white and colours. Some ink-jet printers can print photo-quality images on any type of paper. Printer resolution is measured in **dots per inch (dpi)**. The speed of an ink-jet printer is measured in **lines per minute (lpm)**.

Advantages of inkjet printers include
- Inkjet printers are generally quiet.
- Inkjet printers can produce high quality colour output.

Disadvantages of inkjet printers include
- Specialized papers are required to produce high quality colour output.
- The ink cartridges and specialized papers are expensive.
- The ink may smear when printed on ordinary paper.

Laser Printer

glossary pg.158



The mechanism of how a **laser printer** works is similar to a **photocopier**. Laser printers are also known as **page printers** because they process and store the entire page before they actually print it. Most laser printers today can print text and graphics in very high quality

resolutions, ranging from 600 dpi to 1200 dpi. Laser printers can print text at speeds of four to over thirty pages per minute.

Advantages of laser printers include

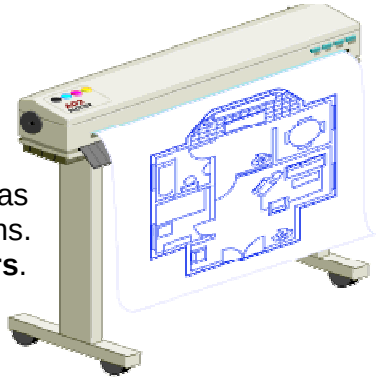
- Laser printers are generally quiet and fast.
- Laser printers can produce high quality output on ordinary papers.
- The cost per page of toner cartridges is lower than other printers.

Disadvantages of laser printers include

- The initial cost of laser printers can be high.
- Laser printers are more expensive than dot-matrix printers and ink-jet printers

Plotter

glossary pg. 159



A **plotter** is a large printer that generates high-quality documents by moving ink pens over the surface of a page. Plotters are particularly useful to engineers and architects, as they produce high-quality blueprints, maps, and floor plans. Two basic types of plotters are **pen plotters** and **X-Y plotters**.

Advantages of plotters include

- Can print on large printers.
- High quality printing

Raster vs Vector Devices

Dot-matrix, inkjet and laser printers are called **Raster imaging** devices, because they construct the image from a matrix (raster) of dots.

Plotters are **Vector imaging** devices – it constructs the image from a series of line segments produced by dragging a pen over a sheet of paper under computer control. A Vector in computer graphics is a line that is defined by its start and end point.

A Comparison of Impact and Non-impact Printers

	Impact Printer	Nonimpact Printer
Advantages	☑ Ideal for printing **composite forms** because they can easily print through many layers of paper. ☑ Can normally withstand dusty environment, vibrations, and extreme temperature.	☑ Generally much quieter than impact printers because there is no striking mechanism. ☑ Can produce high quality output.
Disadvantages	☒ Generally noisy because of the striking activity. ☒ Produce **near letter quality** print only, which is just suitable for printing mailing labels, envelopes, or invoices.	☒ Cannot print composite forms.

Selecting the Appropriate Printer

Various factors must be considered when choosing a printer.

Cost

This is always an important consideration. As well as the purchase price of the printer, the cost of cartridges, toners, paper, maintenance etc. need to be taken into consideration. Some printers, such as laser printers, have a limited life. The cost of a good printer can cost a lot. Nowadays inkjet printers are cheap whereas laser printers are more expensive.

Speed

A wait of a minute might be acceptable to a typist who wants to print out a document on a word processor, however this would be unacceptable if several hundred documents (ex. Invoices and bills) need to be printed. The fastest printers are usually more expensive and this need to be considered along with the volume of work they have to do.

Print Quality

Good print quality is needed for letters and other documents which go out to customers, Such documents are usually printed using laser nowadays. However a programmer might want a quick hard copy of the listing of a program. For this he/she would probably use a dot matrix printer.

Ability to print graphics

High quality graphics such as logos, diagrams, charts and even photographs can be produced quickly using a laser printer. Dot matrix printers can produce lower qaulty graphics. Daisy wheel printers can only print text.

Ability to produce text and graphics in colour

Inkjet printers are the commonly used printers, which can print in colour, unless you are rich to buy and maintain a colour laser printer.

Ability to produce multiple copies (carbon copies)

Many organizations need to produce several copies of a document (ex. The yellow copy to accounts, blue copy to the warehouse and white copy to the customer). Multiple copies are usually printed on a type of impact printer.