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OUTPUT DEVICES

Output Devices are peripheral devices. They are used to display information or result. These devices receive processed data in machine format from the CPU. Then, they convert received data into user understandable form. Printer, monitor and speakers are the commonly used output devices.

TYPES OF OUTPUT DEVICES

Output can be viewed on a monitor. It can be printed on a printer, or it can be listened through speakers. All these types of output devices can be divided into two forms:

- Softcopy Output Devices
- Hardcopy Output Devices

Soft Copy Output Devices:

The **electronic version** of output is called soft copy. It usually **resides in computer memory**. Soft copy is **not a permanent form** of output. It is usually displayed on the screen. This kind of output **cannot be touched**. Soft copy output includes **audio and visual form** of output. So, those devices which produce soft copy of output are called Softcopy Output Devices. Monitor, projectors, speakers are the example of softcopy devices.

MONITOR:

Monitor is the most commonly used output device. It is the standard output device. It is used to display results. It has a TV like shape. It produces the softcopy of the output. It is also called **VDU (Visual Display Unit)**. It creates images from tiny dots. These tiny dots are called **pixels**. The sharpness of the image (screen resolution) depends upon the number of pixels.

There are two types of viewing screen used for monitors:

- Cathode-Ray Tube (CRT)
- Flat-Panel Display

Cathode-Ray Tube (CRT) Monitor

CRT monitor has a **phosphor coated screen**. A **beam of electron** is directed on to the phosphor coated screen to display output. This electron beam is called **Cathode Ray**. Therefore, these devices are called CRT Monitors. CRT shows the output in the form of small **pixels**. Image clarity of picture depends on the size of pixel. Smaller pixels make better quality of image. CRT has many limitations. Some of common limitations are:

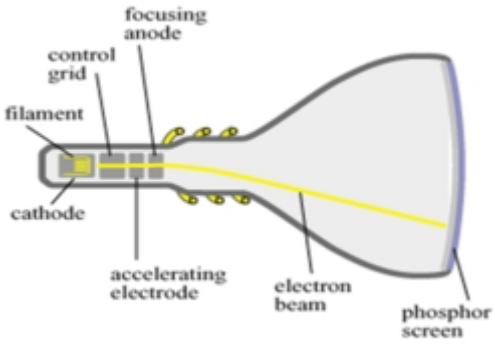

Fig: Cathode Ray Tube

- They are **larger in size**
- They have **high power consumption**

Flat-Panel Display Monitor:

The flat-panel display refers to a class of video devices. These devices have reduced volume, weight and power requirement as compared to the CRT. We can hang them on walls. Current uses for flat-panel displays include calculators, video games, monitors, laptop computer.

The flat-panel displays are divided into two categories:

Emissive Displays – These displays convert electrical energy into graphics pattern. Examples are: plasma panel and LED (Light-Emitting Diodes) etc.

Non-Emissive Displays - These displays convert sunlight or surrounding light into graphics patterns. Example is LCD (Liquid-Crystal Device)

Hard Copy Output Devices:

The **physical form of output** is known as hard copy. Hard copy output is **permanent**. So those devices which produce hard copy of output are called Hardcopy Output Devices. Output printed on paper is the good example of hardcopy. Printers and plotters are the examples of hardcopy output devices.

PRINTERS:

Printer is an important output device. They are the hardcopy output devices. They are used to print information on the paper. Printers are classified into two types:

- Impact Printers
- Non-Impact Printers

IMPACT PRINTERS:

Impact printers use the typewriter printing mechanism. They are based on the hammer technique. To print the characters, hammer strikes against the paper through ribbon. These printers produce noise during printing. Dot-matrix printers, character printers, line printers are the examples of these printers. Impact Printers have the following features:

- These printers have very low printing costs
- These printers are very noisy
- These printers are very useful for bulk printing due to low cost

These printers are of two types:

- Character printers
- Line printers

Character Printers:

These are the impact printers. They print one character at a time. These printers are based on the hammer technique. To print the characters, hammer strikes against the paper through the ribbon. These printers produce noise during printing. **Dot Matrix Printer (DMP) and Daisy Wheel printers** are the best examples of character printers. These printers are explained below:

Dot Matrix Printer (DMP):

These are the impact printers. These printers are very popular due to their low printing cost. These printers are character printers. Each character is printed in the form of dots. Its head consists of a Matrix of Pins. These pins are of different sizes, e.g. 5x7, 7x9, 9x7 or 9x9 etc. This matrix of pins forms a character. Therefore these printers are called Dot-Matrix Printer.

Printer head moves on a cartridge. To print the characters, head strikes against the paper through the ribbon. These printers are normally used to print text. They print the graphics in low quality. DMP are available in two sizes. They can be 80 columns or 132 columns wide. Printing speed is measured in cps (characters per-second).

Advantages:

- These printers are less costly
- They are still widely used
- These printers can also print characters of other language.
- These printers can be used to produce multiple printouts at a time.

Disadvantages:

- These printers have slow speed
- These printers produce noise during printing
- These printers have poor printing quality

Daisy Wheel Printer:

It is an **Impact Printer**. It prints one character at a time. Therefore, it is also called **Character Printer. These** printers use a metal or plastic disk/wheel. This disk/wheel contains letters, numbers, and other characters. When something is printed, the printer rotates the disk. Then, a hammer strikes the character onto an ink ribbon. In this way, ribbon ink is shifted to the paper to print the character. The wheel is like petals of Daisy (flower name). That is why it is called Daisy Wheel Printer. Daisy-wheel printers cannot print graphics. These printers are noisy and slow. Its speed is measured in cps (characters per second).

Advantages:

- These printers are more reliable than DMP's
- The characters of wheel can be easily changed.
- These printers can be used to produce multiple printouts at a time.

Disadvantages:

- These are slower than DMP's
- These printers produce noise during printing
- More expensive than DMP's

Line Printers:

These are Impact printers. They print one line at a time. Therefore these printers are also known as Line Printers. They are used for producing very large amount of print-outs. They are very fast. Their speed is measure in lpm (lines per minute). These are of further two types:

- Drum Printer
- Chain Printer

Drum Printer:

These printers are line printer. These printers use hammer technology for printing. This printer is like a drum in shape. So, it is called drum printer. The surface of drum is divided into number of tracks. Total tracks are equal to size of paper. One rotation of drum prints one line. Drum Printers are fast in speed. They print 300 to 2000 lines per minute.

Advantages

- These printers are faster than character printers.
- These printers can be used to produce multiple printouts at a time.

Disadvantages

- These printers were very expensive
- These printers produce noise during printing

Chain Printer:

These printers are line printer. These printers use hammer technology for printing. This printer uses a chain of character sets for printing. So, they are called Chain Printers. These printers are fast in speed.

Advantages

- Character can easily be changed.
- Symbols of different languages can be used with the same printer.
- These printers can be used to produce multiple printouts at a time.

Disadvantages

- These printers were very expensive
- These printers produce noise during printing

NON-IMPACT PRINTERS

Non-impact printers do not use hammer technique for printing. They do not touch the paper while printing. They use chemical, heat or electrical signals for printing. These printers print a complete page at a time. Therefore, these printers are also called Page printers. These printers are of two types:

- Laser Printers
- Inkjet Printers

DeskJet/Inkjet Printers:
These are non-impact printers. They make less noise. These printers do not use hamming technique for printing. They print characters by spraying small drops of ink. These printers produce high quality output. We can print in different colors using these printers. Special type of ink is used for printing. This ink contains high iron content.

Advantages:

- These printers are faster
- These printers are used for high quality printing
- These printers are used for colorful printing
- These printers support many fonts and different character size.

Disadvantages:

- Printing cost is high
- These are slower than laser printers
- These printers cannot be used to produce multiple printouts at a time.

Laser Printer:
These are non-impact printers. They make less noise. These printers do not use hamming technique for printing. Laser Printers can print one page at a time. They are fast printers. Their printing speed is measure in ppm (pages per minute). The printing quality is very high. The printing quality is measured in dpi (dots per inch). They are more expensive. These printers use laser technique for printing. Therefore, these printers are called as the laser printers.

Advantages:

- These printers are faster.
- These printers are used for high quality printing
- These printers support many fonts and different character size.

Disadvantages:

- These printers are expensive
- These printers cannot be used to produce multiple printouts at a time.

PLOTTER:
Plotters are hard copy output devices. Plotters are used to print high quality graphics. These devices are used in the field of engineering and scientific applications. Plotters are generally used to print charts, drawings, maps etc. There are two types of plotters:

1. **Flat Bed Plotters**:

These plotters print the graphics by moving the pen on stationary paper or cloth. They produce very accurate drawings.

2. **Drum Plotters**:

These plotters print graphics by moving both the pen and the drum having paper. They do not produce accurate drawings like flatbed plotters.

Plotters are more expensive than printers. These devices could print full-size engineering drawings. They are used for CAD (Computer-Aided Design) and CAM (Computer-Aided Manufacturing).