

## Output Devices: The Most Common

An output device is a piece of computer hardware that receives data from a computer and then translates that data into a form that the user understands.

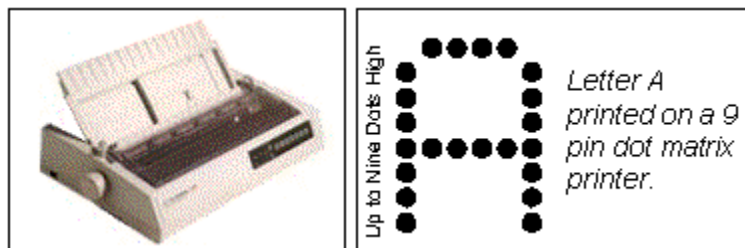
*VDU (monitor, screen)*



- VDU stands for visual display unit.
- Nowadays, monitors incorporate flat display technology.
- Monitors are made of different technologies e.g. LCD and plasma.
- Touch monitors are both input and output devices.
- Monitors can be:
  - Monochrome
    - Display two colours only.
    - The colours can be black and white, green and black, or amber and black.
    - Old CRT (cathode-ray tube) technology.
  - Coloured
    - They can display anywhere from 16 to over 1 million different colours.
- The images transmitted by a monitor are passed on by the video card.
- As with the sound card, the video card is an expansion card that slots into the motherboard.
- The video card processes images and video, enabling visuals to be seen on a display. Most computers have basic video and graphics capabilities built into the computer's motherboard, but for faster, more detailed graphics, a video card is required.

## Printer

- Personal computer printers can be distinguished as impact or non-impact printers. The best-known non-impact printers are the inkjet printer and the laser printer. The four printer qualities of most interest to most users are:
  - Colour: Colour printers are more expensive to operate since they use two ink cartridges (one colour and one black ink).
  - Resolution: Printer resolution is usually measured in dots per inch (dpi). Most inexpensive printers provide sufficient resolution for most purposes at 600 dpi.
  - Speed: If you do much printing, the speed of the printer becomes important. Inexpensive printers print only about 3 to 6 sheets per minute.
  - Memory: Most printers come with a small amount of memory (for example, one megabyte) that can be expanded by the user.
- Printer languages are commands from the computer to the printer to tell the printer how to format the document being printed. Two printer languages are Postscript and Printer Control Language (PCL).
- Some types of printers:
  - Dot-matrix printer:

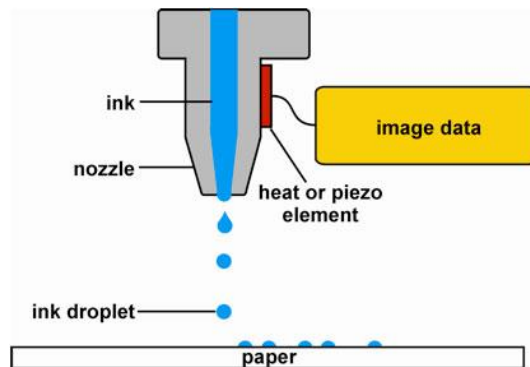


- Striking pins against an ink ribbon.
- Do not produce high-quality output.
- Can print to multi-page forms (that is, carbon copies), something laser and ink-jet printers cannot do.
- Impact printers
- Almost not used any more with personal computers.
- Thermal printer:
  - A thermal printer uses heat to transfer an impression onto paper.



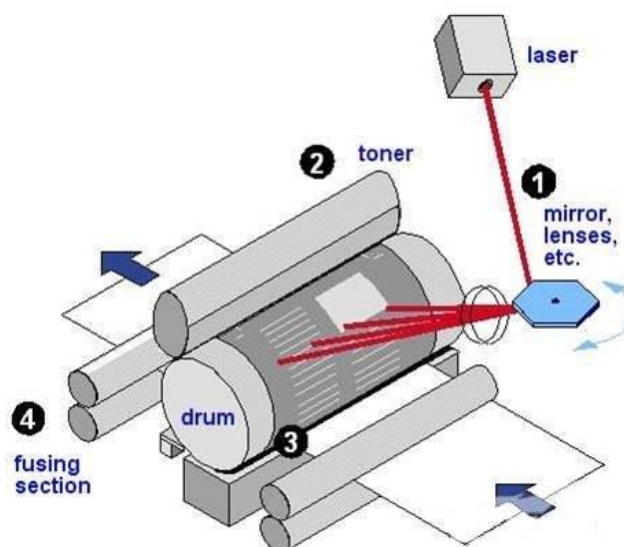
- They use one of various technologies. In one, a printer fixes a wax-based ink onto paper.

- Inkjet printer



- Propels droplets of ink directly onto paper.
- Colour printer.
- Not expensive.

- Laser printer



- Uses a laser to print a full page at a time.

- The laser "paints" a charged drum with light, to which toner is applied and then transferred onto paper.
  - Typically, resolution ranges from 300 to 1200 dpi, but specialty printers can reach 2400 dpi.
  - Low-end laser printers print in the 4 to 8 ppm (pages per minute) range, while typical office workgroup units print 17 to 32 ppm. Midrange units print in the 40-60 ppm range, with a large jump to high-end printers that print from 150 to more than 1,000 ppm.
- Line printer



- High-speed printer.
- Prints an entire line at one time.
- A fast line printer can print as many as 3,000 lines per minute.
- The disadvantages of line printers are that they cannot print graphics, the print quality is low, and they are very noisy (impact printers).

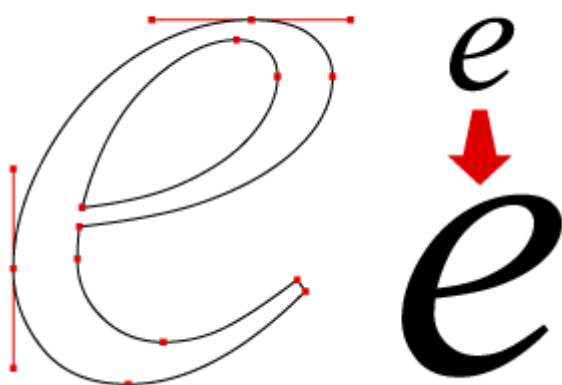
## *Headphones*



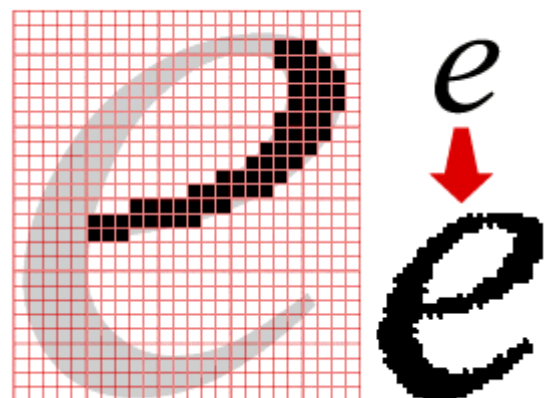
- Headphones were popularized for mainstream use in 1979 by Sony Walkman.
- Some are wireless.
- Some variations of headphones include headsets (headphones and microphone) and earphones.
- The sound card controls the output of sound signals, enabling devices like speakers and headphones to work. The sound card is known as an expansion card, which means it can be added to the motherboard.
- When computer data is sent through a sound card, it is sent to the card digitally. The sound card then translates the digital information (in the form of binary, or 0s and 1s) into analogue information: vibrations, output in the form of sound.

### *Difference between Vector and Raster Devices*

**VECTOR GRAPHICS**



**BITMAPPED (RASTER) GRAPHICS**



- Raster images are made up of pixels, while vector images are formed by mathematical curves and paths.
- Raster images are bitmap images i.e. it is made up of a rectangle of pixels. This is how pictures are formed on computer and TV screens.
- Each pixel has a colour and when combined all pixels together form an image.
- The more pixels in an image (resolution) the higher is the quality of the picture.
- The set of available colours is called a palette.
- The file size of a raster image is proportional to the number of pixels.
- Raster files are saved in various formats e.g. pdf, jpeg and bmp.

- Vector images are made of paths and curves dictated by mathematical formulas.
- Vectors are infinitely scalable. Even if the image is enlarged, it will still be smooth and not pixelated.
- The file containing a vector image is much smaller than its raster counterpart.
- An application for vector images is logos. You might use a logo on something as small as a business card or something as large as a billboard.
- Examples of vector file formats are: .ai, .eps, etc.
- A plotter draws vector images while the screen and printers work with raster images.

### *Plotter*

- A plotter is a graphics printer that draws images with ink pens.
- It actually draws point-to-point lines directly from vector graphics files.



### *Loudspeakers*

- They transform the signal from the computer's sound card into audio.
- The signal used to produce the sound that comes from a computer speaker is created by the computer's sound card.



### *Data Projector*

- Similar in its look to an overhead projector but it gets the information to project from a computer.
- 3D projectors are designed to project two images of the same thing from different angles at the same time. Wearing 3D glasses, the viewer can see a 3D projection composed of multiple superimposed images.
- There are various technologies with their relative advantages and disadvantages. Three of these technologies are LCD, LED and DLP.



### *GPS*

- Stands for Global Positioning System
- It is a network of about 30 satellites orbiting the Earth at an altitude of 20,000 km.
- Wherever you are on the planet, at least four GPS satellites are 'visible' at any time. Each one transmits information about its position and the current time at regular intervals. These signals are intercepted by your GPS receiver, which calculates how far away each satellite is. Once it has information on how far away at least three satellites are, your GPS receiver can pinpoint your location.

- The receiver's memory holds maps and by means of them it can tell you the way forward in your path.



### Questions:

- (1) Monitors can be output-only and also input-output devices. Mention one application which would require just an output-only monitor and another application for a touch-monitor.
- (2) Name one impact and one non-impact printer.
- (3) Name three features that you would look at when buying a printer.
- (4) Name one advantage of headphones.
- (5) Name two differences between vector and raster images.
- (6) An architect would like to print a document and also print a design prepared by a CAD program. He has both a printer and a scanner. Which one would he use to print the document and which one to draw the design?
- (7) A sound card is used both during input and during output. Name one input device and one output device that make use of the sound card.
- (8) Name one use of a data projector.
- (9) What is the role of a GPS?