CSCA0101
COMPUTING BASICS

Chapter 4
Output Devices

Output Devices

Topics:

- Output Devices

- Examples of Output Device

- Printer

- Monitor

- Speakers

- Projector

Output Devices

Output Devices

- Any peripheral that receives or displays output from a computer.

- Computer hardware equipment used to communicate the results of data processing carried out by a computer to the outside world.

Output Devices

Examples of Output Device

- Monitor

- Printer

- Speakers

- Projector

Output Devices

Monitor

- The device which displays computer output.

- The monitor displays the video and graphics information generated by the computer through the video card.

- Monitors are very similar to televisions but usually display information at a much higher resolution.

Output Devices

Monitor

Monochrome Monitor

- A **monochrome monitor** is a type of CRT computer display which was very common in the early days of computing, from the 1960s through the 1980s, before color monitors became popular.

- They are still widely used in applications such as computerized cash register systems

Output Devices

Monitor

Monochrome Monitor

- Monochrome monitors actually display two colors, one for the background and one for the foreground.

- The colors can be black and white, green and black, or amber and black.

Output Devices

Monitor

Color Monitor

- Color monitors can display anywhere from 16 to over 1 million different colors.

- Color monitors are sometimes called RGB monitors because they accept three separate signals -- red, green, and blue.

Output Devices

Types of Monitor

- Cathode Ray Tube (CRT)

- Liquid Crystal Display (LCD)

- Light-emitting Diode (LED)

Output Devices

Types of Monitor

Cathode Ray Tube (CRT)

- Large
- Heavy
- Produce heat
- Not expensive

Output Devices

Types of Monitor

Liquid Crystal Display (LCD)

- Less space

- Lighter

- Low power consumption

- Expensive

- Limited viewing angle

Output Devices

Types of Monitor

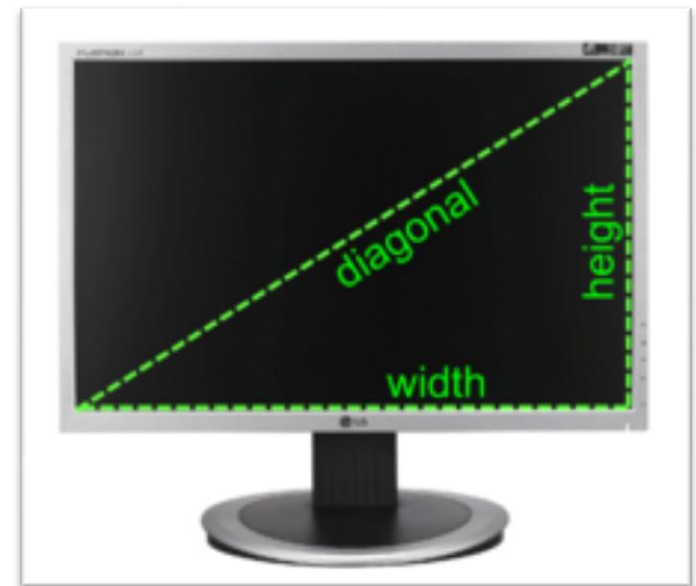## Light-emitting Diode (LED)

- Less space

- Lighter

- Very expensive

- Provide higher contrast and better viewing angles than LCD monitor

Output Devices

Monitor Features

Screen Size

- The actual amount of screen space that is available to display a picture, video or working space

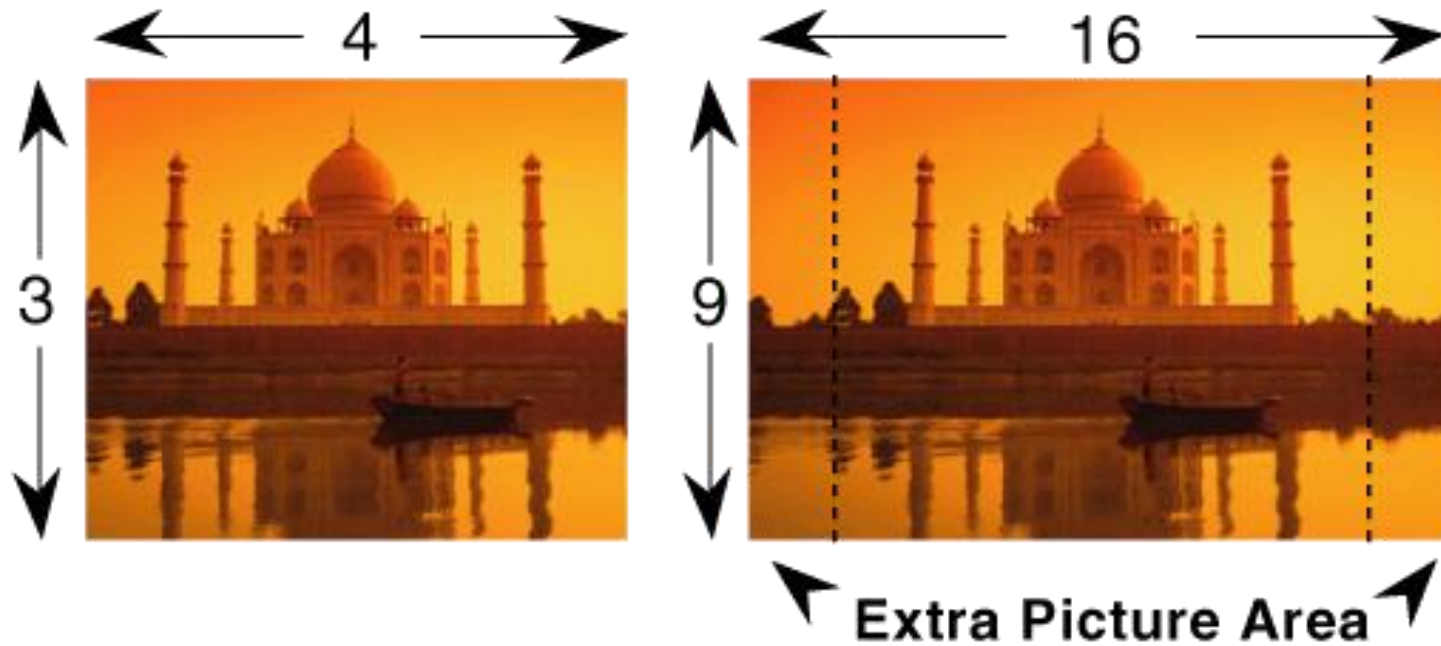- Desktop screens are usually 14 - 25 inches by diagonal measurement.

Output Devices

Monitor Features

Aspect Ratio

- The aspect ratio of a display is the fractional relation of the width of the display area compared to its height.

- Two common aspect ratio:
    - 4:3
    - 16:9

Output Devices

Monitor Features

Aspect Ratio

Extra Picture Area

Output Devices

Monitor Features

Display Resolution

- The resolution of a monitor indicates how densely packed the pixels are.

- In general, the more pixels (often expressed in dots per inch), the sharper the image.

- Most modern monitors can display 1024 by 768 pixels, the SVGA standard.

- Some high-end models can display 1280 by 1024, or even 1600 by 1200.

Output Devices

Monitor Features

Display Resolution

Output Devices

Monitor Features

Refresh Rate

- The refresh rate is the number of times in a second that a monitor draws the data.

- The *refresh rate* for a monitor is measured in hertz (Hz)

- The standard refresh rate is 75Hz, this means that the monitor redraws the display 75 times per second.

- A flickering monitor can contribute to eyestrain and headaches.

- The faster the refresh rate, the less the monitor flickers.

Output Devices

Monitor Features

Refresh Rate

Monitor flickering

Output Devices

Monitor Features

Color Depth

- Color depth describes how many colors that can be displayed on a monitor's screen.

- Common color depths used by monitor:
  - 4-bit (EGA) = 16 colors
  - 8-bit (VGA) = 256 colors
  - 16-bit (High Color) = 65,536 colors
  - 24-bit (True Color) = 16 million colors

Output Devices

Monitor Features

Color Depth

EGA Monitor   VGA Monitor

Output Devices

Printer

- Printer is an external hardware device responsible for taking computer data and generating a hard copy of that data.

- Printers are one of the most used peripherals on computers and are commonly used to print text, images, and photos.

Output Devices

Types of Printer

Printers can be categorized into:

- Impact Printer
- Non-Impact Printer

Output Devices

Impact Printer

- It strikes paper and ribbon together to form a character, like a typewriter.

Advantages	Disadvantages
• Less expensive • Can make multiple copies with multipart paper	• Noisy • Print quality lower in some types • Poor graphics or none at all • Slow

Impact Printer

Daisy-wheel

- Similar to a ball-head typewriter, this type of printer has a plastic or metal wheel on which the shape of each character stands out in relief.

- A hammer presses the wheel against a ribbon, which in turn makes an ink stain in the shape of the character on the paper.

- Daisy-wheel printers produce letter-quality print but cannot print graphics.

Output Devices

Impact Printer

Daisy-wheel

Output Devices

Impact Printer

Dot-Matrix

- Creates characters by striking pins against an ink ribbon.

- Each pin makes a dot, and combinations of dots form characters and illustrations.

Output Devices

Impact Printer

Dot-Matrix

Output Devices

Non-Impact Printer

- It uses ink spray, toner powder or inkless

Advantages	Disadvantages
- Quiet - Can handle graphics and often a wider variety of fonts than impact printers - Fast	- More expensive - Occupies a lot of space - The cost of maintaining it is high

Output Devices

Non-Impact Printer

Laser Printer (Toner-based)

- A laser printer rapidly produces high quality text and graphics.

- Laser printers are often used in corporate, school, and other environments that require print jobs to be completed quickly and in large quantities.

Output Devices

Non-Impact Printer

Multifunction Printer (Toner-based)

- An **MFP** is an office machine which incorporates the functionality of multiple devices in one.

- A typical MFP may act as a combination of some or all of the following devices:
  - Printer
  - Scanner
  - Photocopier
  - Fax

Output Devices

Non-Impact Printer

Ink-jet Printer

- Inkjet printer operates by propelling variably-sized droplets of liquid or molten material (ink) onto almost any sized page.

- They are the most common type of computer printer used by consumers.

Output Devices

Non-Impact Printer

Thermal Printer (Inkless)

- Thermal printers work by selectively heating regions of special heat-sensitive paper.

- These printers are commonly used in calculators and fax machines; and although they are inexpensive and print relatively fast, they produce low resolution print jobs.

Output Devices

Printing Speed

The printing speed is measured in:

- **cps** (characters per second)
- **lpm** (lines per minute)
- **ppm** (pages per minute)

Output Devices

Plotter

- The **plotter** is a computer printer for printing vector graphics

- Plotters are used in applications such as computer-aided design such as diagrams, layouts, specification sheets and banners

- The plotter is capable of producing color drawings in a matter of minutes

- Plotters differ from printers in that they draw lines using a pen

- Plotters are considerably more expensive than printers

Output Devices

Plotter
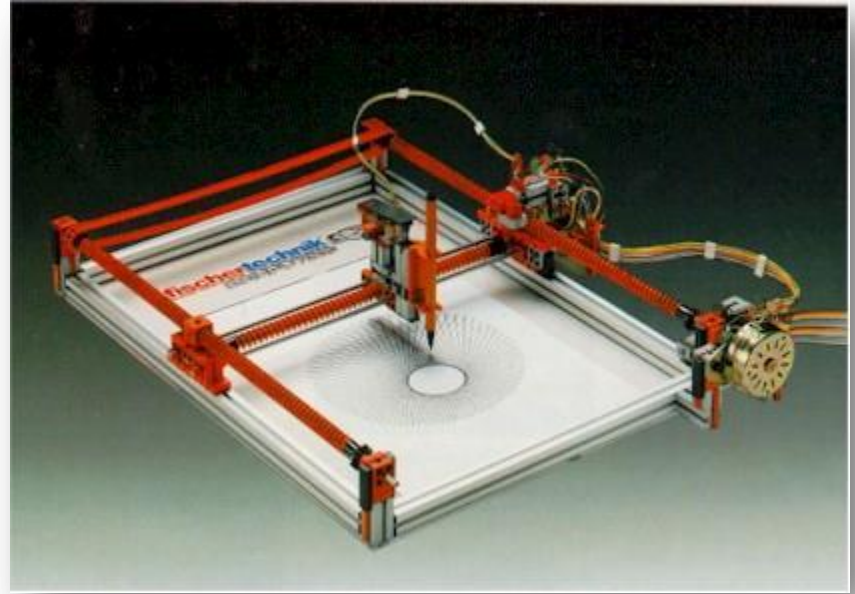
Output Devices

Speakers

- A hardware device connected to a computer's sound card that outputs sounds generated by the computer.

- Speakers can be used for various sounds meant to alert the user, as well as music and spoken text

Output Devices

Headphones

- Headphones give sound output from the computer.

- They are similar to speakers, except they are worn on the ears so only one person can hear the output at a time.

Output Devices

Projector

- An output device that can take the display of a computer screen and project a large version of it onto a flat surface.

- Projectors are often used in meetings and presentations so that everyone in the room can view the presentation.

Projector

Types of projector

- Cathode Ray Tube (CRT) projector
- Liquid Crystal Display (LCD) projector
- Digital Light Processing (DLP) projector

Output Devices

Projector

Cathode Ray Tube (CRT) projector

- In the early days of projectors, CRT projectors were commonly used.

- They utilized three tubes, one for each of the primary colors.

- Due to their large size, low light output and the frequent need to converge and align the images projected from each of the three tubes, they are no longer commonly used.

Output Devices

Projector

Cathode Ray Tube (CRT) projector

- Long service life; CRT tubes maintain good brightness to 10,000 hours.

- CRT projectors are both considerably larger and heavier than comparable LCD and DLP projectors.

- CRT projectors require far more time to set up and adjust than LCD and DLP based projectors.

Output Devices

Projector

Liquid Crystal Display (LCD) projector

- LCD projectors work by utilizing polarized mirrors that pass and reflect only certain colors of light.
- This causes each channel of red, green and blue to be separated and later re-converged via a prism after passing through an LCD panel that controls the intensity and saturation of each color.

Projector

Liquid Crystal Display (LCD) projector

- An LCD projector can achieve greater brightness at a lower energy consumption

- Smaller than CRT projectors

Output Devices

Projector

Digital Light Processing (DLP) projector

- DLP projectors can be classified as one-chip or three-chip.

- One-chip DLP projectors can produce more than 16 million colors while three-chip models can produce more than 35 trillion colors.

- This allows DLP projectors to reproduce more natural and lifelike images.