Chapter Three

Hardware Basics: Peripherals

After reading this chapter, you should be able to:

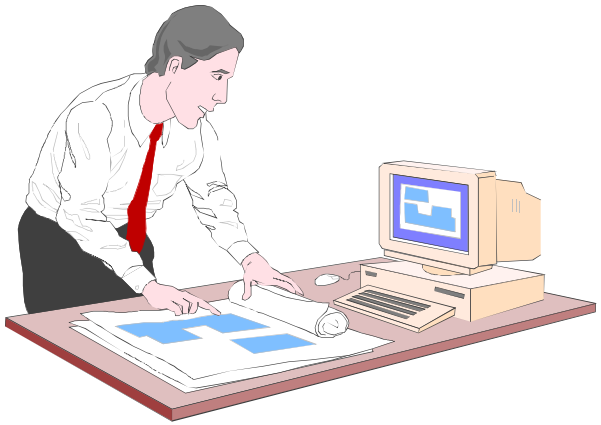
- List examples of input devices and explain how they can make it easier to get different types of information into the computer
- List examples of output devices and explain how they make computers more useful

After reading this chapter, you should be able to:

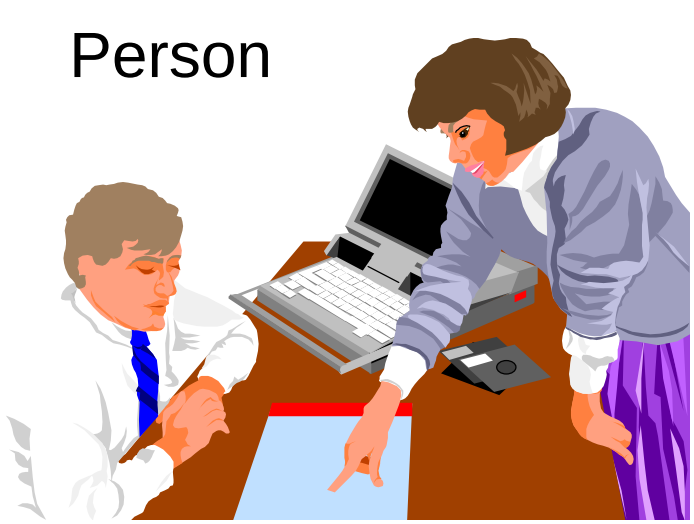
- Explain why a typical computer has different types of storage devices
- Diagram how the components of a typical computer system fit together

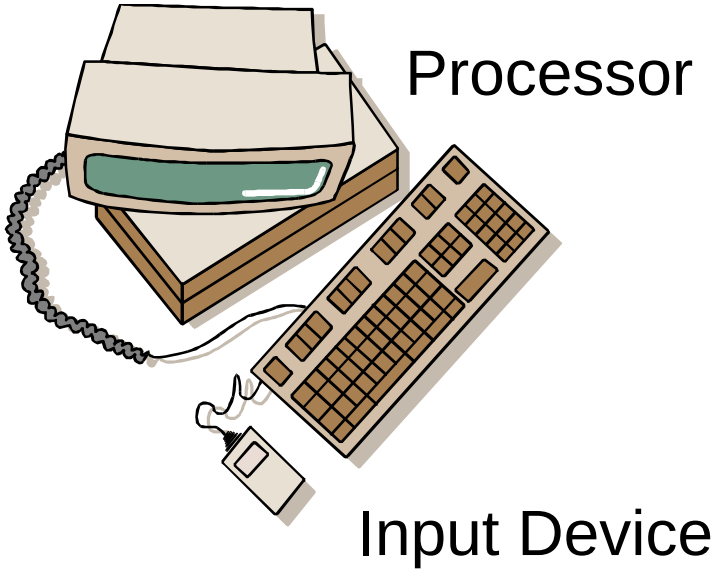
Chapter Outline

- Input: From Person to Processor
- Output: From Pulses to People
- Storage Devices: Input meets Output
- Computer Systems: The Sum of Its Parts



Input: From Person to Processor

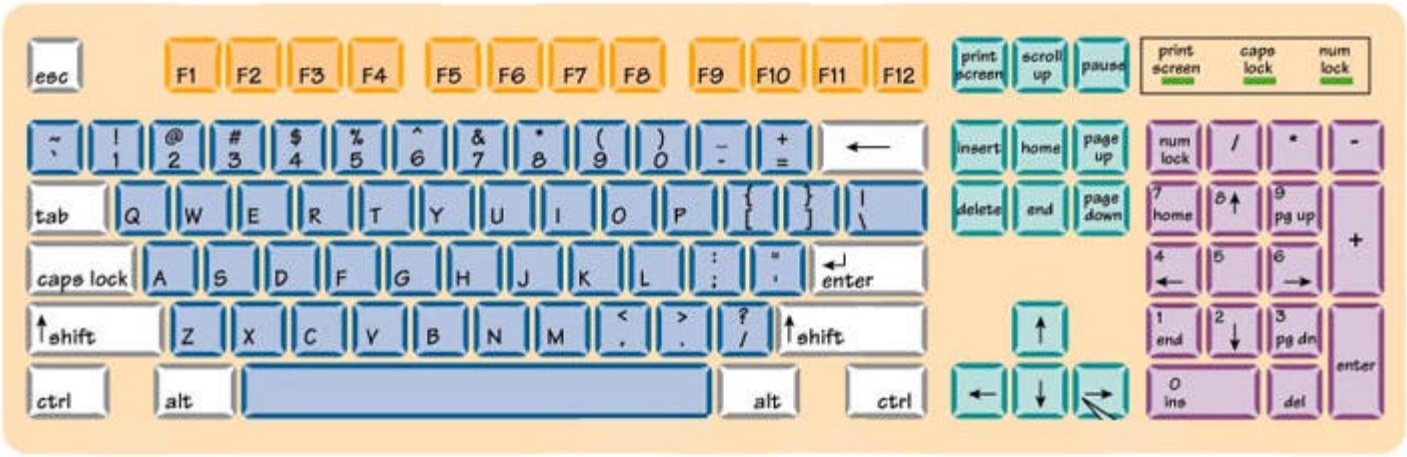




The Omnipresent Keyboard

Do you know where these keys are located on the keyboard and how to use them?

Letters, **Numbers**, **Cursor** Keys, **Delete** Key, **Enter** (Return) Key, and **Function** Keys



Pointing Devices

Mouse

Joystick

Touch Screen

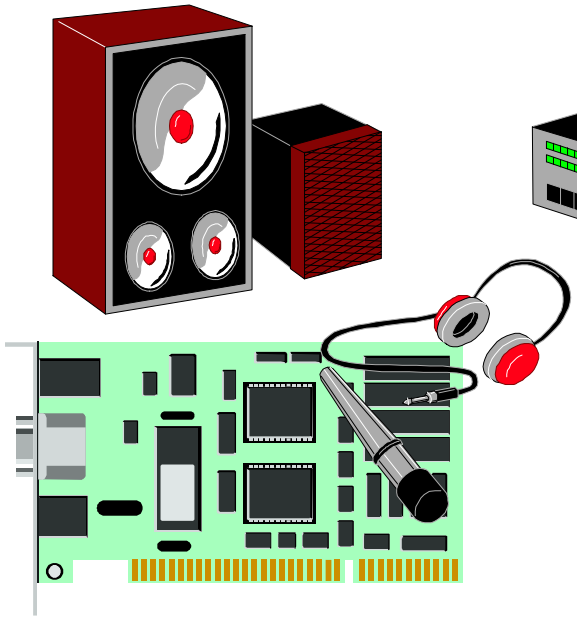
Trackball

Graphics Tablet

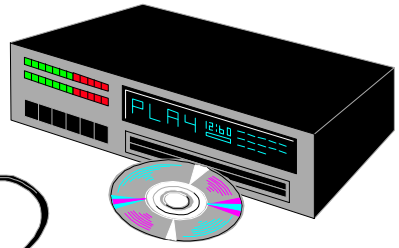
Reading Tools

- Optical-mark readers
- Bar-code readers
- Magnetic-ink character readers
- Wand readers

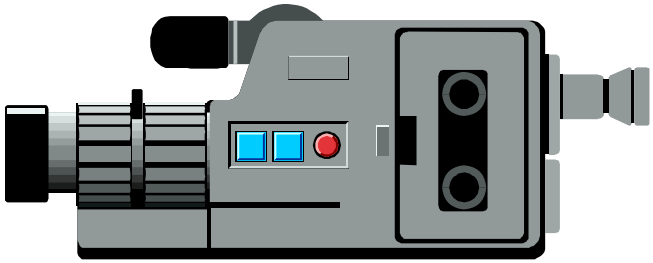
Digitizing the Real World

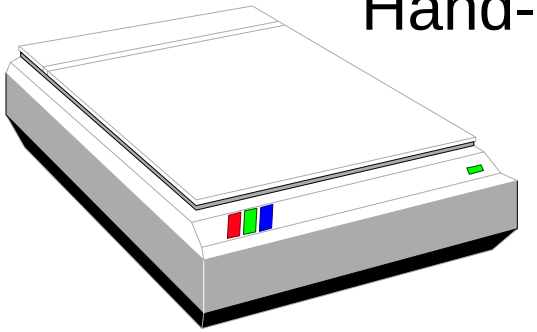


Audio digitizing



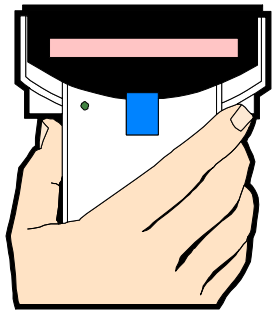
Video digitizing



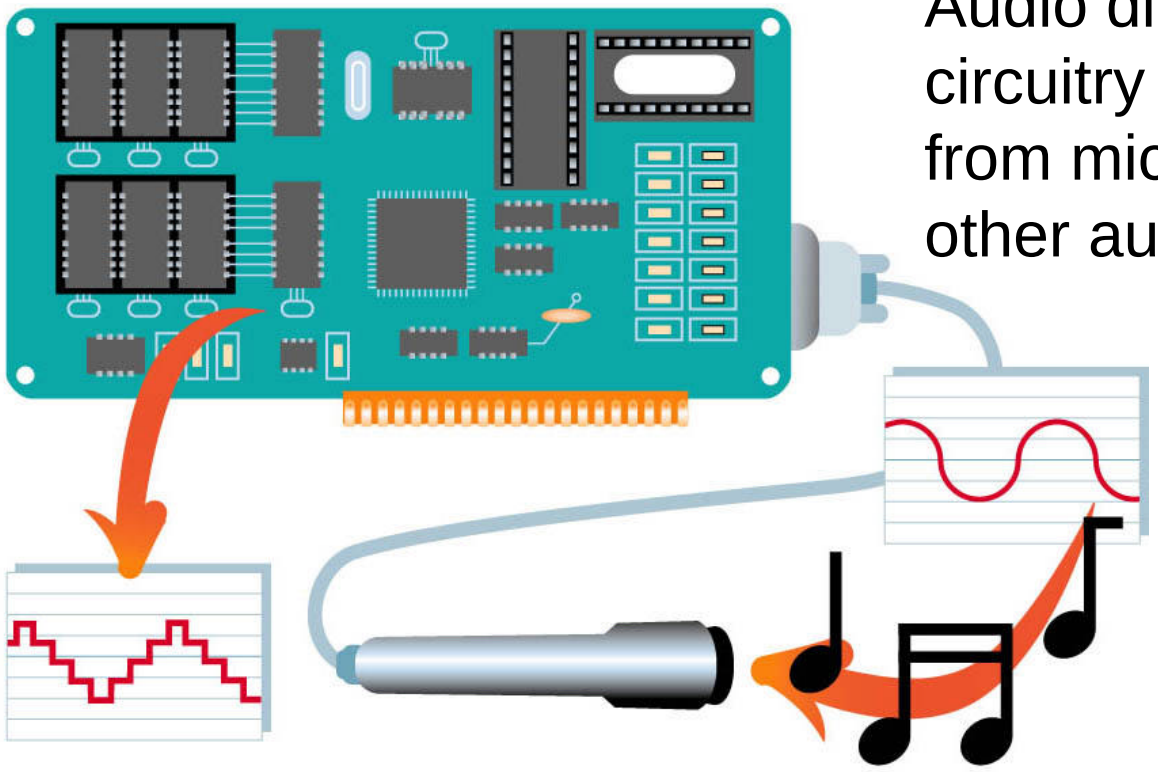


Flatbed Scanner

Hand-held Scanner

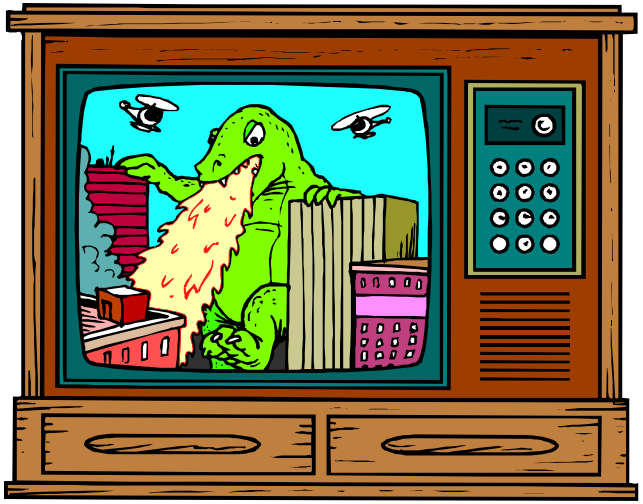


Audio Digitizers



Audio digitizers contain circuitry to digitize sounds from microphones and other audio devices.

Video Digitizers



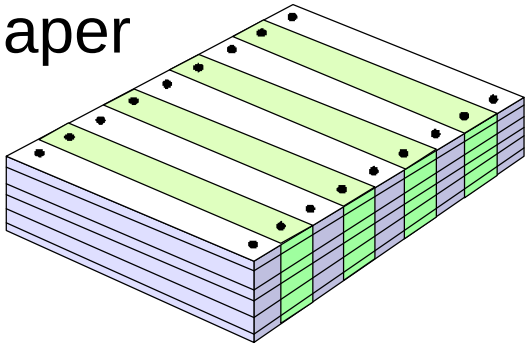
Video digitizers contain circuitry to digitize frames from camcorders and other video sources.

Scanners

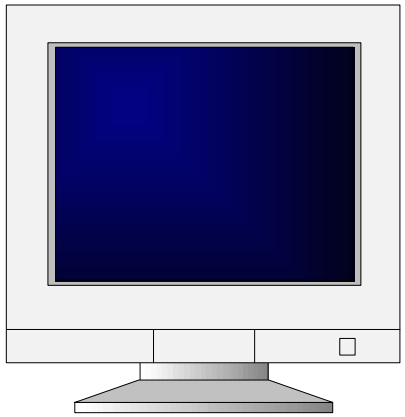
Scanners capture and digitize images from external paper sources.

Output: From Pulses to People

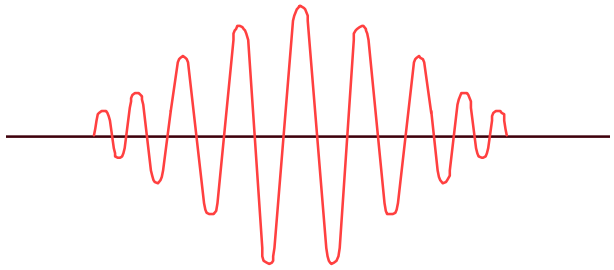
Paper

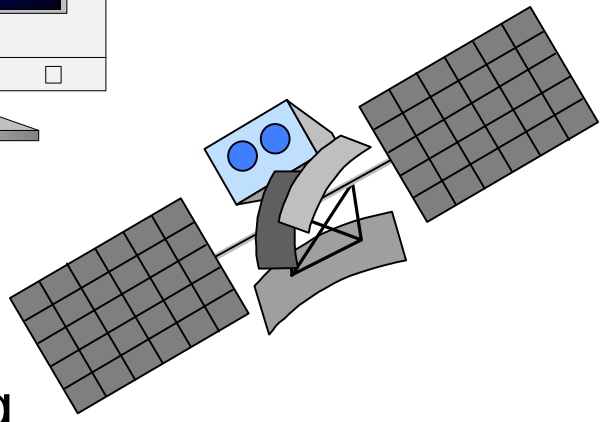


Video Monitor



Sound





Controlling
Other Machines

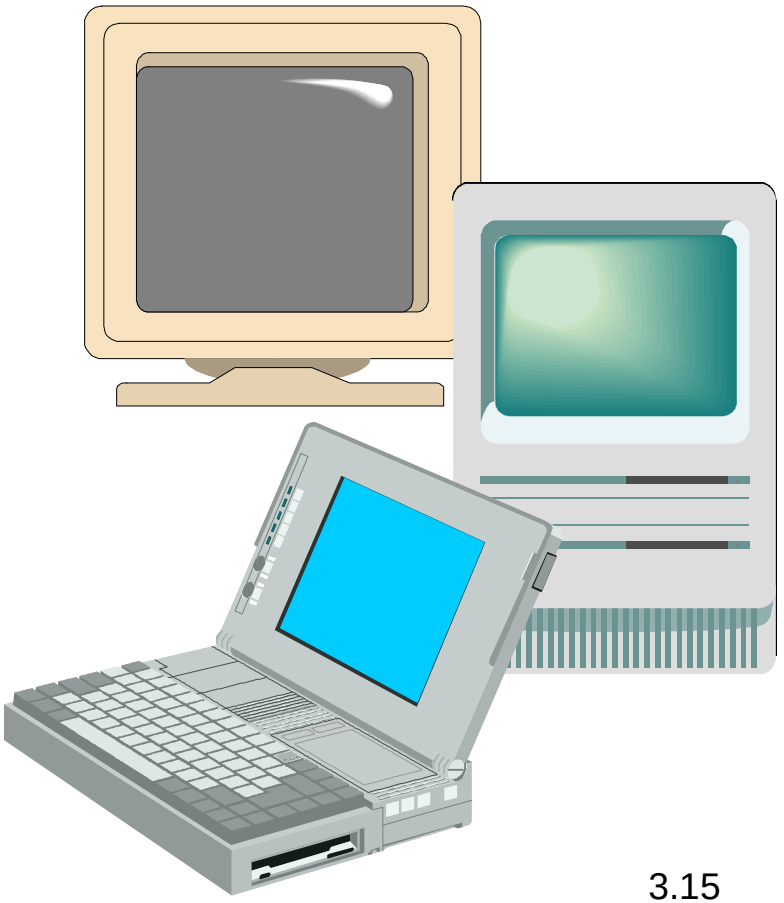
Digital Cameras

Digital cameras turn real-world scenes into digital images that can be stored and manipulated by the computer.

The images, stored in memory, can be transferred to a computer for either editing or storage.

Screen Output

- Video Monitor
  - Also called Video Display Terminal (VDT)
  - Image exists in video memory—VRAM
  - Monitor size is measured diagonally across the screen



Pixels

- Images are made up of dots called p**ixels** for picture elements
- The number of pixels affects the resolution of the monitor
- The higher the resolution, the better the image quality

Color Depth (Pixel Depth)

- The amount of information per pixel is known as the color depth
  - Monochrome (1 bit of information per pixel)
  - Gray-scale (8 bits of information per pixel)
  - Color (8 or 16 bits of information per pixel)
  - True color (24 or 32 bits of information per pixel)

Examples of Color Depth

1-bit depth

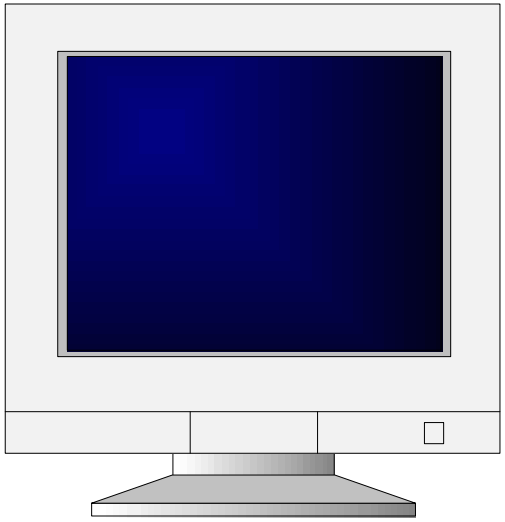
4-bit depth

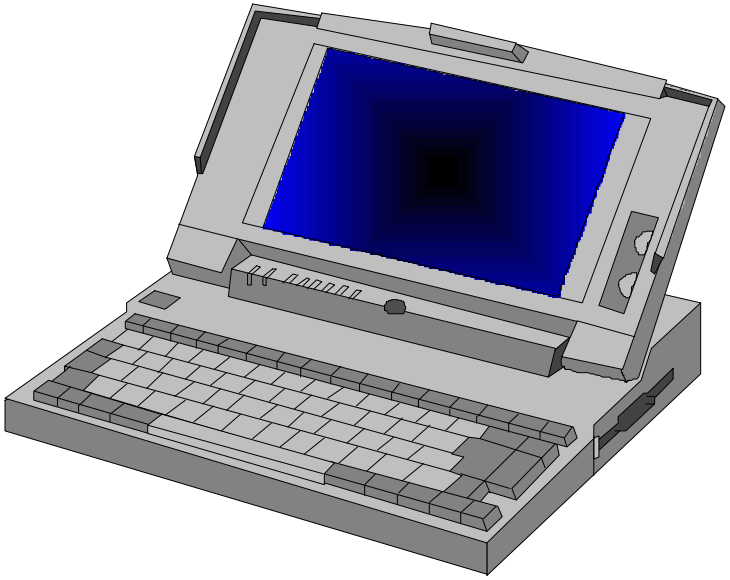
8-bit depth

16-bit depth

Classes of Monitors

CRT (cathode ray tube)

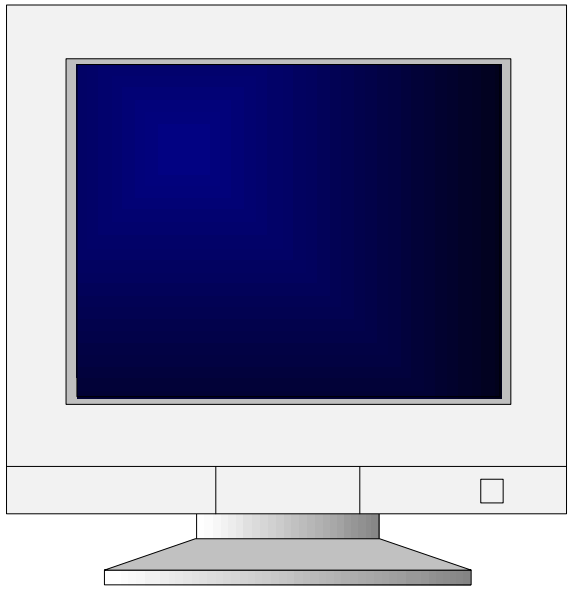




LCD (liquid crystal display)

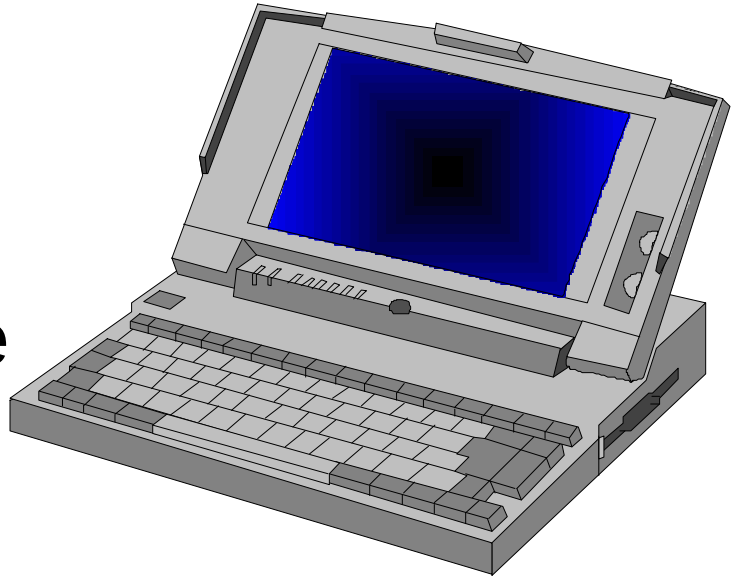
CRT (Cathode Ray Tube)

- A CRT is a television-style monitor
- Its features include:
  - Clear image
  - Quick response time
  - Low cost
  - Very popular



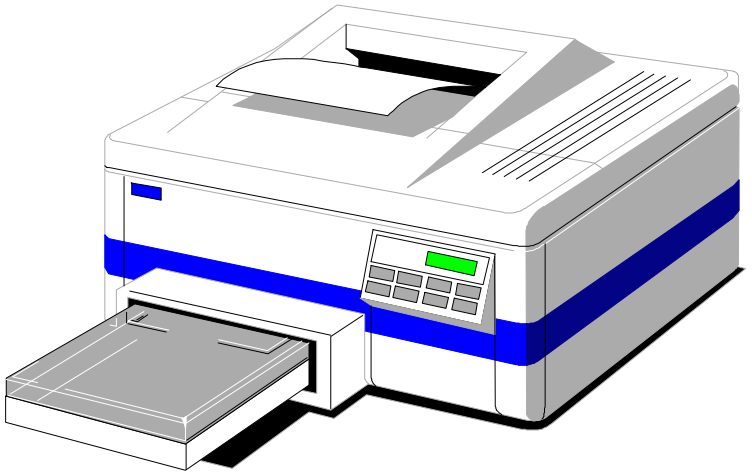
LCD (Liquid Crystal Display)

- LCDs comprise flat-panel monitors
- Features of flat-panel monitors include:
  - Lighter weight
  - More compact
  - More expensive
  - Dominate the portable computer market



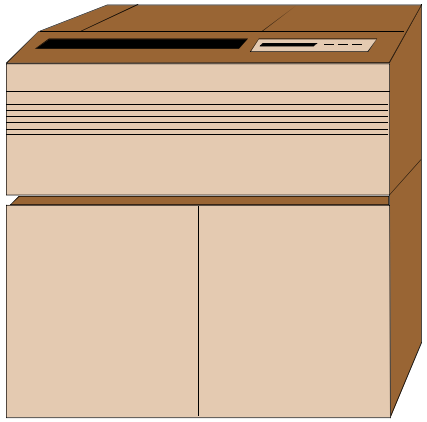
Paper Output

- Paper output is sometimes called hard copy
- Hard copy can come from one of two kinds of printers:
  - Impact printers
  - Nonimpact printers

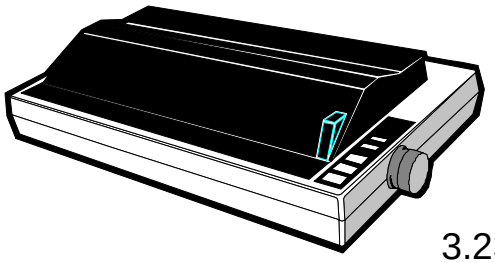


Impact Printers

- Line printers
  - Used by mainframes for massive jobs
  - Limited characters available

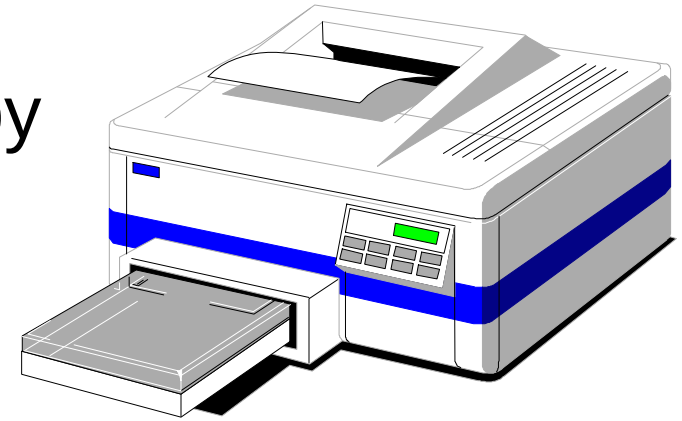


- Dot-matrix printers
  - Image formed from dots printed on paper
  - Good for text and graphics
  - Inexpensive



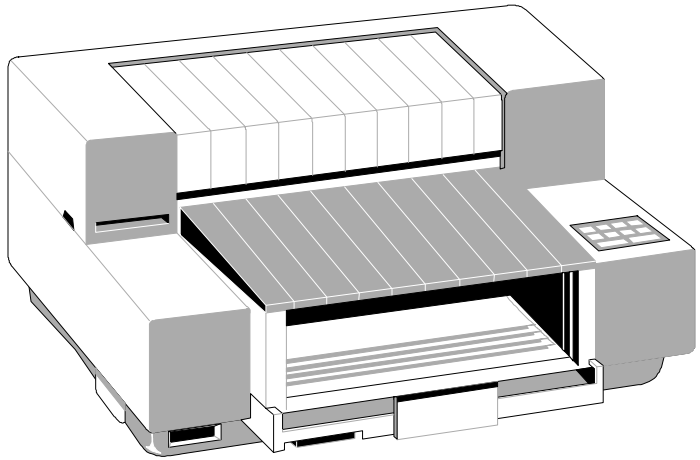
Nonimpact Printers

- Laser printers
  - Image transferred to paper with laser beam
  - Faster and more expensive than dot-matrix
  - High-resolution hard copy



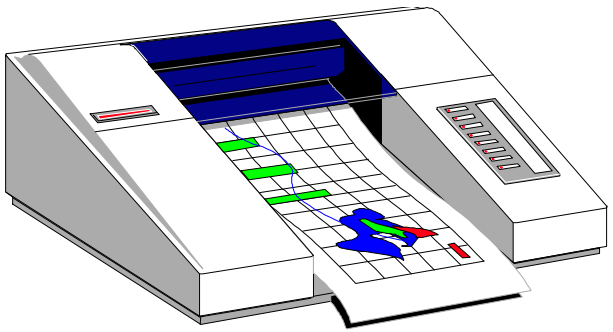
Other Nonimpact Printers

- Ink-jet
  - Dots of ink are sprayed onto the paper to form the image
  - High-resolution hard copy
  - Some models print can print color photographs



Other Nonimpact Printers

- Plotters
  - Image transferred to paper with ink pens
  - Very high resolution
  - Excellent for scientific and engineering applications



Output You Can Hear

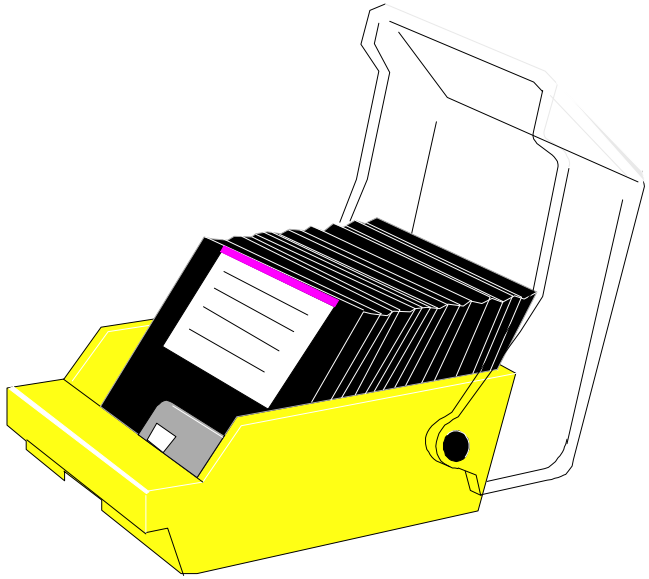
- Synthesizers can be used to generate music and sounds
- Many computers have synthesizers
- Sound cards have built-in synthesizers

Machines Controlling Other Machines

- By turning bit information into movements (robots) or measurements (sensors), machines can control other machines:
  - Automated factory equipment
  - Telephone switchboards
  - Robot arms
  - Spacecraft

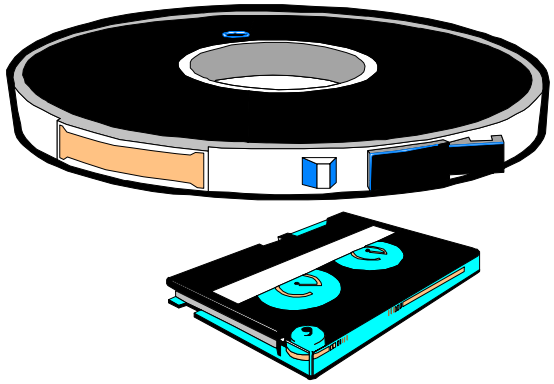
Secondary Storage: Input and Output

- Peripherals with both input and output functions. This form of storage is semi-permanent
- Examples include:
  - Magnetic tape
  - Magnetic disks
  - Optical disks



Magnetic Tape

- Magnetic tape is a common form of storage for mainframe computers.
- Information is accessed sequentially
- Massive storage for low cost but retrieval is slow



- DAT (digital audio tape) is preferred for storage on small computers

Magnetic Disks

Hard Disk

Floppy Disk

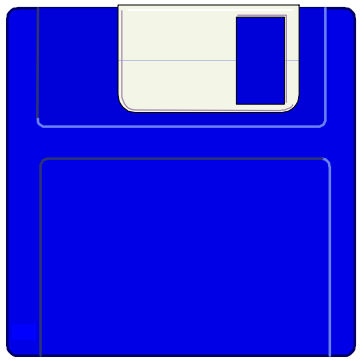
Zip Disks and Zip Drive

Hard Disks

- Hard disks are:
  - Rigid, magnetically sensitive metal disks.
  - Designed so that information can be randomly accessed
  - Designed for large storage capacity
  - Able to access data quickly
  - Not removable from the drive

Diskettes

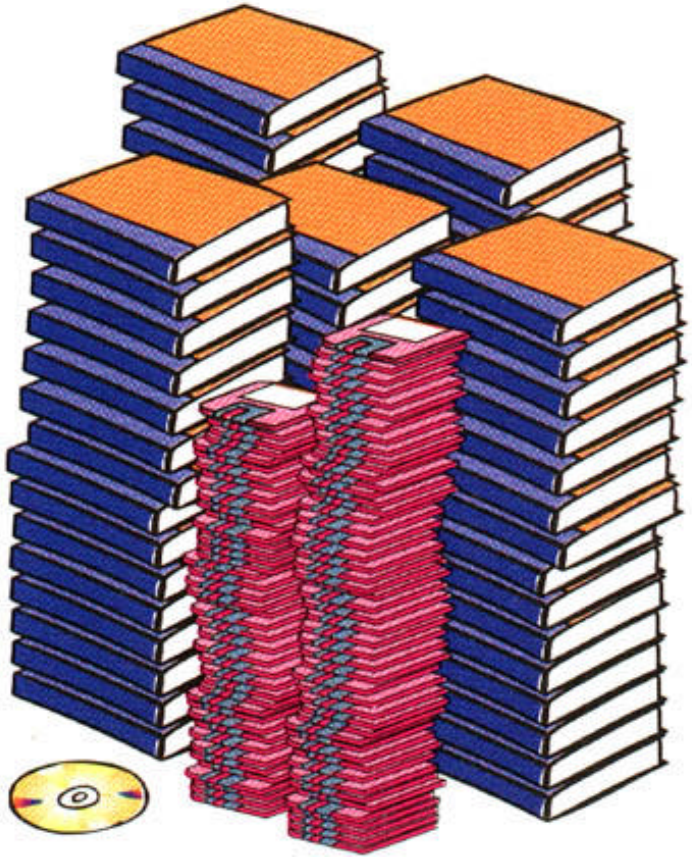
- Diskettes are:
  - Flexible, magnetically sensitive plastic disks
  - Information can be randomly accessed.
  - Has limited storage capacity
  - Access of data not as quick as hard disks
  - Removable from the drive



Optical Disks

- CD-ROM and magneto-optical disks provide:
  - Random access of information
  - A high storage capacity
- CD-ROM and magneto-optical disks:
  - Have an access time that varies but is slower than hard disks
  - Are removable from the drive

Storage Capacity



A single CD-ROM can hold as much information as

- 450 1440K diskettes
- 500 books (text only)