Discovering Computers 2005
A Gateway to Information

Chapter 6
Output

Chapter 6 Objectives

- Describe the four categories of output
- Describe characteristics of a CRT monitor and factors that affect its quality
- Explain the relationship between a video card and CRT monitor
- Summarize the characteristics of LCD monitors, LCD screens, gas plasma displays, and HDTVs
- Differentiate between an impact printer and a nonimpact printer
- Summarize the characteristics of ink-jet printers, photo printers, laser printers, thermal printers, mobile printers, label and postage printers, and plotter and large-format printers
- Describe the methods used for wireless printing
- Describe the uses of speakers and headsets
- Identify the output characteristics of fax machines and fax modems, multifunction peripherals, data projectors, joysticks, and wheels
- Identify output options for physically challenged users

Next

What is Output?

What is output?

- **Data that has been processed into a useful form, called information**
  - **Output device** is any hardware component that can convey information to user

p. 292 Fig. 6-1

Next

Display Devices

What is a display device?

- **Output device that visually conveys information**
  - Information on display device sometimes called **soft copy**
- **Monitor houses display device as separate peripheral**

p. 294 Fig. 6-2

Next

CRT Monitor

What is a CRT monitor?

- **Contains cathode-ray tube (CRT)**
- **Screen coated with tiny dots of phosphor material**
  - Each dot consists of a red, blue, and green phosphor
- **Common sizes are 15, 17, 19, 21, and 22 inches**
  - **Viewable size** is diagonal measurement of actual viewing area

p. 294 Fig. 6-3

Next

CRT Monitor

What is the ENERGY STAR program?

- **Encourages manufacturers to create energy-efficient devices that require little power when not in use**
- **Monitors and devices meeting guidelines display ENERGY STAR label**

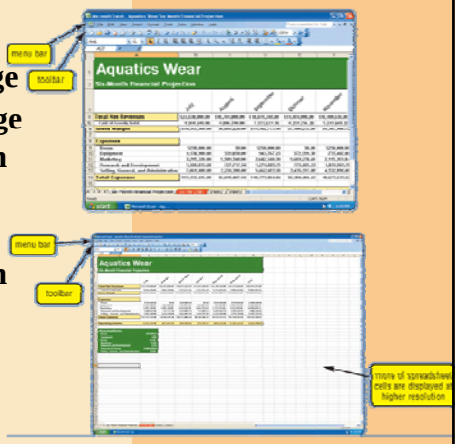
p. 295 Fig. 6-4

Next

CRT Monitor

What is resolution?

- Sharpness and clarity of image
- Higher resolution makes image sharper, displays more text on screen, makes some elements smaller
- Refresh rate is speed at which monitor redraws images on screen



p. 295 Fig. 6-5

Next

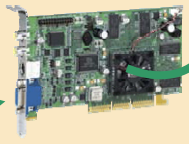
CRT Monitor

How does video travel from the processor to a CRT monitor?

- Video card (also called a graphics card) converts digital output from computer into analog video signal

Step 1. The processor sends digital video data to the video card.

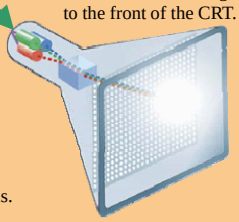
Step 2. The video card's digital-to-analog converter (DAC) converts the digital video data to an analog signal.



Step 3. The analog signal is sent through a cable to the CRT monitor.

Step 4. The CRT monitor separates the analog signal into red, green, and blue signals.

Step 5. Electron guns fire the three color signals to the front of the CRT.



Step 6. An image is displayed on the screen when the electrons hit phosphor dots on the back of the screen.

p. 297 Fig. 6-6

Next

CRT Monitor

What are video standards?

- Video Electronics Standards Association (VESA) develops video standards

Standard	Suggested Resolution	Maximum Possible Colors
Monochrome Display Adapter (MDA)	720 x 350	1 for text
Video Graphics Array (VGA)	640 x 480	16
	320 x 200	256
Extended Graphics Array (XGA)	1024 x 768	256
	640 x 480	65,536
Super Video Graphics Array (SVGA)	800 x 600	16.7 million
Super Extended Graphics Array (SXGA)	1280 x 1024	16.7 million
Ultra Extended Graphics Array (UXGA)	1600 x 1200	16.7 million
Beyond UXGA	1920 x 1440	16.7 million
	2048 x 1536	16.7 million

Click to view Web Link, click Chapter 6, Click Web Link from left navigation, then click Video Memory below Chapter 6

p. 298 Fig. 6-7

Next

CRT Monitor

What are various video card configurations?

Video Memory	Color Depth	Number of Colors	Maximum Resolution
1 MB	8-bit	256	1024 x 768
	16-bit	65,536	800 x 600
2 MB	8-bit	256	1024 x 768
	16-bit	65,536	1280 x 1024
	24-bit	16.7 million	800 x 600
4 MB	24-bit	16.7 million	1024 x 768
6 MB	24-bit	16.7 million	1280 x 1024
8 MB	32-bit	16.7 million	1600 x 1200
16 MB	32-bit	16.7 million	1920 x 1440
32 MB	32-bit	16.7 million	2048 x 1536
64 MB	32-bit	16.7 million	2048 x 1536
128 MB	32-bit	16.7 million	2048 x 1536
256 MB	32-bit	16.7 million	2048 x 1536

p. 298 Fig. 6-8

Next

Flat-Panel Displays

What is a flat panel display?

- **Uses liquid crystal display**
  - Also called **LCD monitor**
- **Takes up less desk space than CRT monitor**
- **Consumes less than one-third the power**

p. 299 Fig. 6-9

Next

Flat-Panel Displays

What about using multiple LCD monitors?

- **Some users position two or more monitors side by side or stacked**
- **Allows users to run multiple applications simultaneously**

p. 299 Fig. 6-10

Next

Flat-Panel Displays

What are some mobile devices that have LCD screens?

- Notebooks
- Tablet PCs
- PDAs
- Smart phones

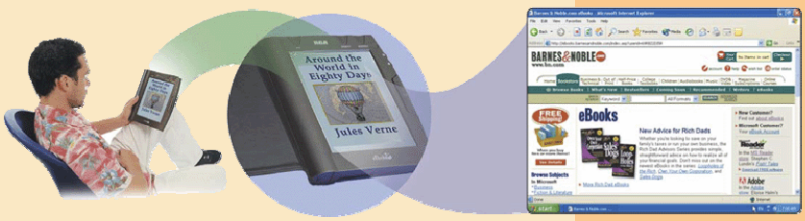
p. 300 Fig. 6-11

Next

Flat-Panel Displays

What is an electronic book (e-book)?

- Small, book-sized computer that uses LCD screen
- Allows users to read, save, highlight, bookmark, and add notes to online text
- Download new book content from Web



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Next

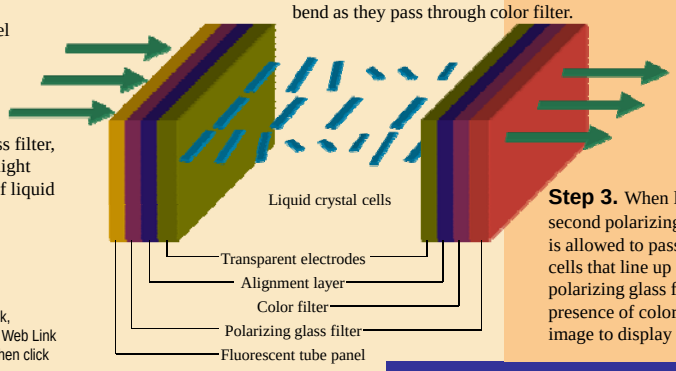
Flat-Panel Displays

How does LCD work?

- **Uses liquid compound to present information on a display**

Step 1. Panel of fluorescent tubes emits light waves through polarizing glass filter, which guides light toward layer of liquid crystal cells.

Step 2. As light passes through liquid crystal, electrical charge causes some of the cells to twist, making light waves bend as they pass through color filter.



Step 3. When light reaches second polarizing glass filter, light is allowed to pass through any cells that line up at the first polarizing glass filter. Absence and presence of colored light cause image to display on the screen.

Click to view Web Link, click Chapter 6, Click Web Link from left navigation, then click LCD Technology below Chapter 6

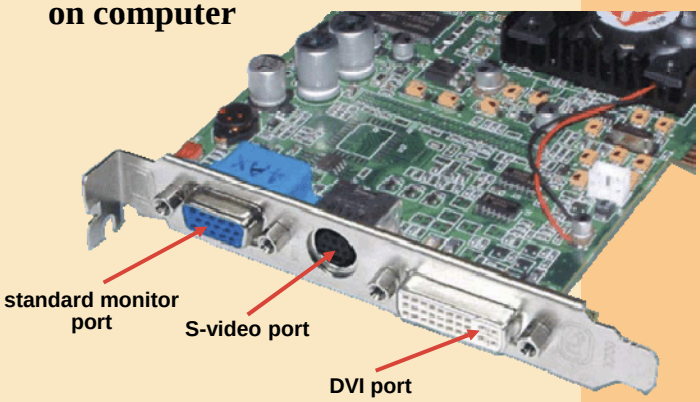
p. 300 Fig. 6-12

Next

Flat-Panel Displays

How do you use an LCD monitor with a video card?

- **Plug monitor into Digital Video Interface (DVI) port on computer**



p. 301 Fig. 6-13

Next

Flat-Panel Displays

What is a gas plasma monitor?

- **Displays image by applying voltage to layer of gas**
  - **Larger screen size and higher display quality than LCD, but much more expensive**

p. 302 Fig. 6-14

Next

Flat-Panel Displays

What is interactive TV?

Select a movie from a central library of movies	Vote or respond to network questionnaires	Bank
Two-way communications technology in which users interact with television programming		HDTV (high-definition television) works directly with interactive TV
Shop	Play games	Video conference

p. 302

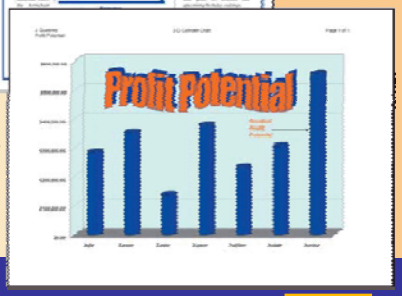
Next

Printers

What is a printer?

- Output device that produces text and graphics on paper
- Result is hard copy, or printout
- Two orientations: portrait and landscape

portrait



landscape

Click to view animation

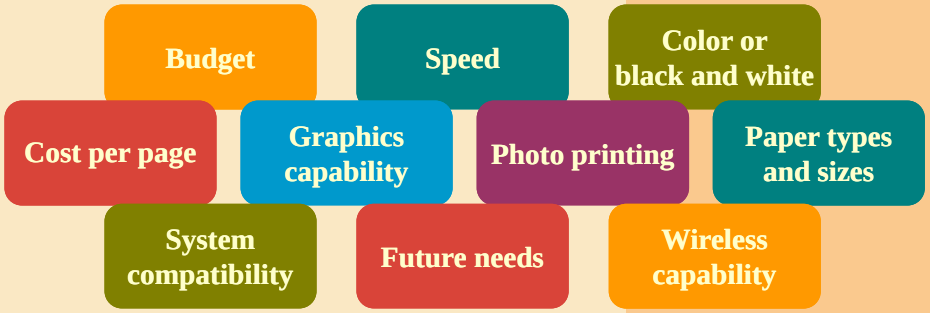
p. 303 Fig. 6-15

Next

Printers

How do you know which printer to buy?

- Depends on printing needs



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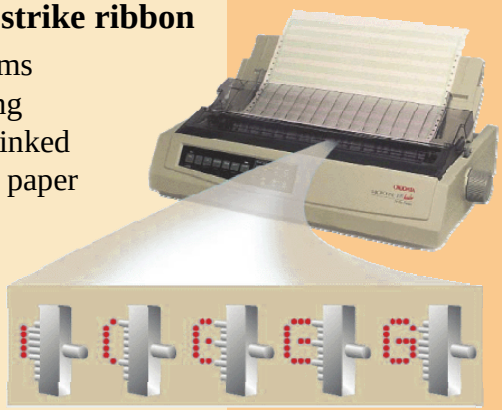
Next

Printers

What is a dot-matrix printer?

- **Impact printer that produces printed images when tiny wire pins strike ribbon**
  - **Impact printer** forms characters by striking mechanism against inked ribbon that contacts paper



p. 304 Fig. 6-17

Next

Printers

What is a line printer?

- **High-speed impact printer that prints entire line at a time**
- **Speed measured in lines per minute (lpm)**
  - Band printer prints fully formed characters using a hammer mechanism
  - Shuttle-matrix printer is high-speed printer that works like dot-matrix printer

p. 304 Fig. 6-18

Next

Printers

What is an ink-jet printer?

- **A type of nonimpact printer that sprays tiny drops of liquid ink onto paper**
  - **Nonimpact printer** forms characters and graphics without striking paper
- **Prints in black-and-white or color on a variety of paper types**

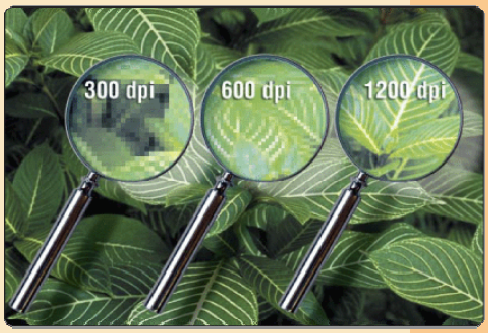
p. 305 Fig. 6-19

Next

Printers

What is the resolution of a printer?

- **Sharpness and clarity**
- **Measured by number of dots per inch (dpi) printer can output**

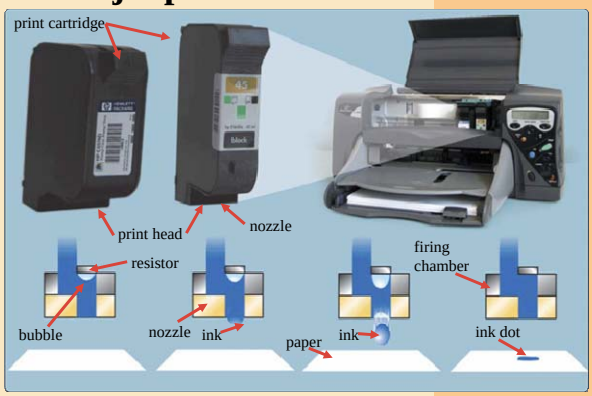


p. 306 Fig. 6-20

Next

Printers

How does an ink-jet printer work?



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p. 307 Fig. 6-21

Step 1. A small resistor heats the ink, causing the ink to boil and form a vapor bubble.

Step 2. The vapor bubble forces the ink through the nozzle.

Step 3. Ink drops onto the paper.

Step 4. As the vapor bubble collapses, fresh ink is drawn into the firing chamber.

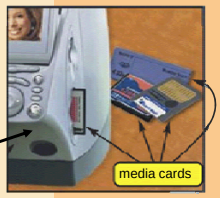
Next

Printers

What is a photo printer?

- Color printer that produces photo-lab-quality pictures

Step 1. Take photograph with digital camera and store it on media card in the camera.



Step 2. Insert media card into card reader on photo printer.

Step 3. Use menu to select desired image to print, view it on LCD screen, edit if necessary, select size of the print, and then print image.

Step 4. Remove printed photo from the printer.

Click to view video

Click to view Web Link, click Chapter 6, Click Web Link from left navigation, then click Photo Printers below Chapter 6

p. 307 Fig. 6-22

Next

Printers

What is a laser printer?

- High-speed, high-quality nonimpact printer
- Prints text and graphics in very high-quality resolution, ranging from 600 to 2,400 dpi
- Typically costs more than ink-jet printer, but is much faster

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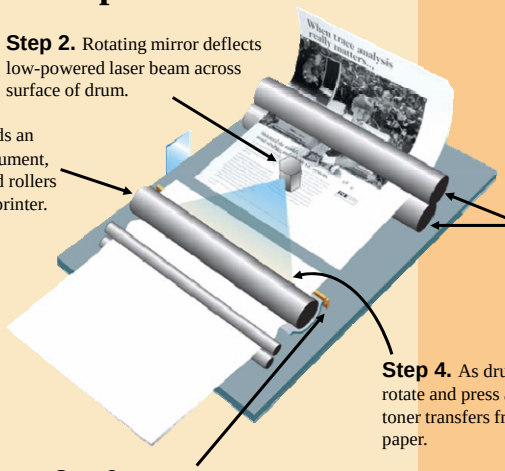
p. 309 Fig. 6-23

Next

Printers

How does a laser printer work?



Step 1. After user sends an instruction to print a document, drum rotates as gears and rollers feed sheet of paper into printer.

Step 2. Rotating mirror deflects low-powered laser beam across surface of drum.

Step 3. Laser beam creates a charge that causes toner to stick to drum.

Step 4. As drum continues to rotate and press against paper, toner transfers from drum to paper.

Step 5. Set of rollers uses heat and pressure to permanently fuse toner to paper.

p. 310 Fig. 6-24

Next

Printers

What is a thermal printer?

- Generates images by pushing electrically heated pins against heat-sensitive paper
  - Dye-sublimation printer, (also called a digital photo printer) uses heat to transfer dye to specially coated paper

professional

home use

p. 310 Fig. 6-25

Next

Printers

What is a mobile printer?

- **Small, lightweight, battery-powered printer that allows mobile user to print from notebook computer, Tablet PC, or PDA while traveling**

p. 311 Fig. 6-26

Next

Printers

What is a label printer?

- **Small printer that prints on adhesive-type material**
- **Most also print bar codes**
  - Postage printer has built-in digital scale and prints postage stamps

p. 311 Fig. 6-27

Next

Printers

What is a plotter?

- **Sophisticated printer used to produce high-quality drawings**
- **Large-format printer creates photo-realistic-quality color prints**

p. 312 Fig. 6-28

Next

Printers

What is wireless printing?

- **Output transmitted to printer wirelessly via infrared light waves or radio waves**
  - Bluetooth printing uses radio waves
  - Devices need to be within 30-foot range

Click to view Web Link, click Chapter 6, Click Web Link from left navigation, then click Wireless Printing below Chapter 6

p. 312 Fig. 6-29

Next

Speakers and Headsets

What is an audio output device?

- **Computer component that produces music, speech, or other sounds**
- **Speakers and headsets are common devices**

Click to view Web Link, click Chapter 6, Click Web Link from left navigation, then click Speakers and Headsets below Chapter 6

p. 313 Figs. 6-30–6-31

Next

Speakers and Headsets

What is voice output?

- **Computer talks to you through speakers on computer**
- Internet telephony **allows you to have conversation over Web**

p. 314 Fig. 6-32

Next

Other Output Devices

What is a facsimile (fax) machine?

- **Device that transmits and receives documents over telephone lines**

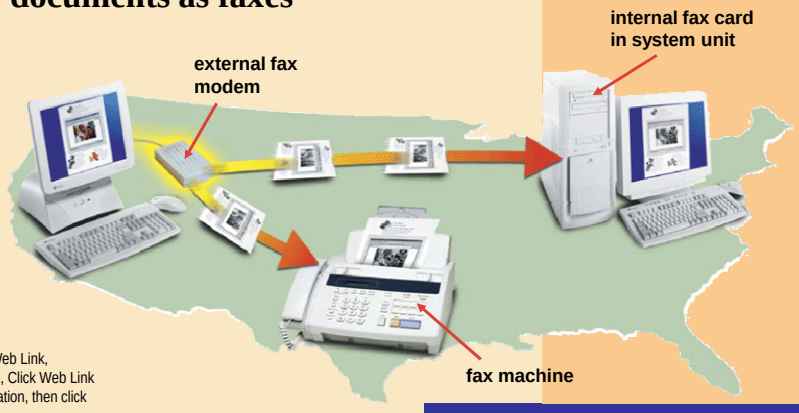
p. 315 Fig. 6-33

Next

Other Output Devices

What is a fax modem?

- Modem that allows you to send and receive electronic documents as faxes



Click to view Web Link, click Chapter 6, Click Web Link from left navigation, then click Fax Modems below Chapter 6

p. 315 Fig. 6-34

Next

Other Output Devices

What is a multifunction peripheral?

- Provides functionality of printer, scanner, copy machine, and fax machine

Click to view Web Link, click Chapter 6, Click Web Link from left navigation, then click Multifunction Peripherals below Chapter 6

p. 316 Fig. 6-35

Next

Other Output Devices

What is a data projector?

- Device that takes image from computer screen and projects it onto larger screen

p. 316 Fig. 6-36

Next

Other Output Devices

What is force feedback?

- Sends resistance to joystick or wheel in response to actions of user

Click to view Web Link, click Chapter 6, Click Web Link from left navigation, then click Force Feedback Devices below Chapter 6

p. 317 Fig. 6-37

Next

Putting It All Together

What are suggested output devices for the home user?

User	Monitor	Printer	Other
 Home	▪ 17- or 19-inch color CRT monitor or LCD monitor	▪ Ink-jet color printer ▪ Photo printer	▪ Speakers ▪ Headset ▪ Force-feedback joystick and wheel

p. 318 Fig. 6-38

Next

Putting It All Together

What are suggested output devices for the small office/home office user?

User	Monitor	Printer	Other
 Small Office/ Home Office (SOHO)	▪ 19- or 21-inch color CRT monitor or LCD monitor ▪ Color LCD screen on Tablet PC or PDA	▪ Multifunction peripheral ▪ Ink-jet color printer ▪ Laser printer, black and white ▪ Label printer ▪ Postage printer	▪ Fax machine ▪ Speakers

p. 318 Fig. 6-38

Next

Putting It All Together

What are suggested output devices for the mobile user?

User	Monitor	Printer	Other
 Mobile	▪ 15.7-inch color LCD screen on notebook computer ▪ Color LCD screen on PDA	▪ Mobile color printer ▪ Ink-jet color printer ▪ Laser printer, black and white ▪ Photo printer	▪ Fax modem ▪ Headset ▪ DLP data projector

p. 318 Fig. 6-38

Next

Putting It All Together

What are suggested output devices for the large business user?

User	Monitor	Printer	Other
 Large Business	▪ 19- or 21-inch color CRT monitor or LCD monitor ▪ Color LCD screen on Tablet PC or PDA	▪ High-speed laser printer ▪ Laser printer, color ▪ Line printer (for large reports from a mainframe) ▪ Label printer	▪ Fax machine or fax modem ▪ Speakers ▪ Headset ▪ DLP data projector

p. 318 Fig. 6-38

Next

Putting It All Together

What are suggested output devices for the power user?

User	Monitor	Printer	Other
 Power	▪ 23-inch color LCD monitor	▪ Laser printer, black and white ▪ Plotter or large-format printer ▪ Photo printer; or ▪ Dye-sublimation printer	▪ Fax machine or fax modem ▪ Speakers ▪ Headset

p. 318 Fig. 6-38

Next

Output Devices for Physically Challenged Users

What is the Magnifier command?

- **Windows Magnifier command enlarges text and other items on screen**

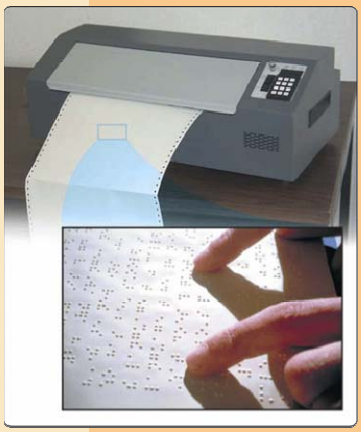
p. 319 Fig. 6-39

Next

Output Devices for Physically Challenged Users

What other output options are available for visually impaired users?

- **Change Window settings, such as increasing size or changing color of text to make words easier to read**
- **Blind users can work with voice output**
- **Braille printer outputs information in Braille onto paper**



Click to view video

p. 320 Fig. 6-40

Next

Summary of Output

- CRT monitors
- Flat-panel displays
- Printers
- Speakers and headsets
- Fax machines and fax modems
- Multifunction peripherals
- Data projectors
- Force feedback joysticks and wheels

Chapter 6 Complete