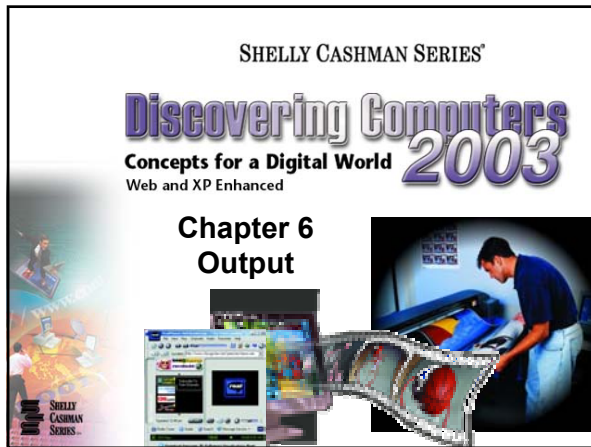




### Discovering Computers 2003 Chapter 6 Objectives

Concepts for a Digital World Web and XP Enhanced

|                                                              |                                                                                  |
|--------------------------------------------------------------|----------------------------------------------------------------------------------|
| Define the four categories of output                         | Describe the uses of speakers and headsets                                       |
| Identify the different types of display devices              | Identify the purpose of data projectors, fax machines, and multifunction devices |
| Describe factors that affect the quality of a display device | Explain how a terminal is both an input and output device                        |
| Identify monitor ergonomic issues                            | Identify output options for physically challenged users                          |
| Explain the differences among various types of printers      |                                                                                  |

Next  
p. 62

### Discovering Computers 2003 What is Output?

Concepts for a Digital World Web and XP Enhanced

#### What is output?

- Data that has been processed into a useful form, called information

Next  
p. 62 Fig. 6-1

### Discovering Computers 2003 What Are Output Devices?

Concepts for a Digital World Web and XP Enhanced

#### What is an output device?

- Any hardware component that can convey information to a user

Next  
p. 64

### Discovering Computers 2003 Display Devices

Concepts for a Digital World Web and XP Enhanced

#### What is a display device?

- Television-like
- Information on a display device sometimes is called soft copy

Next  
p. 64

### Discovering Computers 2003 Display Devices

Concepts for a Digital World Web and XP Enhanced

#### What is a CRT monitor?

- Large sealed, glass screen
- Screen coated with tiny dots of phosphor material
- Pixel, or picture element, is single point in electronic image
- Three dots (red, blue, and green) combine to make up each pixel

Next  
p. 65 Fig. 6-3

Ketabton.com

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Web and XP Enhanced

What are typical sizes for CRT monitors?

- 15, 17, 19, 21, and 22 inch screen size
- Viewable size is diagonal measurement of actual viewing area provided by the monitor



Next  
p. 6.5

**Discovering Computers 2003** Display Devices  
Concepts for a Digital World  
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What is a liquid crystal display (LCD) monitor?

- Type of flat-panel display
- Uses liquid crystals between two sheets of material to present information on screen
- Electric current passes through crystals, which creates images on the screen



Next  
p. 6.5 Fig. 6-4

**Discovering Computers 2003** Display Devices  
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Where are some features of LCD screens?

- Lightweight and compact
- Consumes less than one-third of the power than does a CRT monitor
- Ideal for notebook and handheld computers



Next  
p. 6.6 Fig. 6-5

**Discovering Computers 2003** Display Devices  
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Web and XP Enhanced

What is a Web-enabled device?

- Allows access to the Web or e-mail
  - Cellular telephones
  - Pagers
- Many use monochrome LCD displays to save battery power



Next  
p. 6.6 Fig. 6-6

**Discovering Computers 2003** Display Devices  
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Web and XP Enhanced

What is an electronic book (e-book) ?

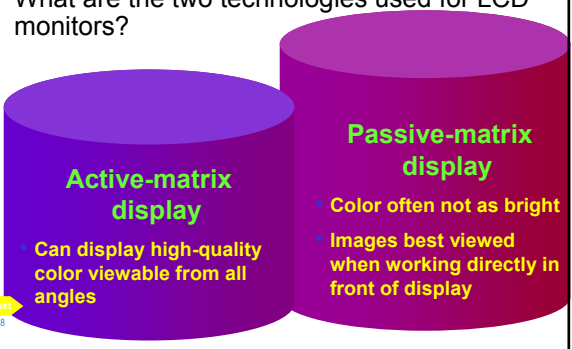
- Small, book-sized computer that uses an LCD screen
- Allows users to read, save, highlight, bookmark, and add notes to online text
- Download new book content from Web



Next  
p. 6.7 Fig. 6-7

**Discovering Computers 2003** Display Devices  
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What are the two technologies used for LCD monitors?



**Active-matrix display**

- Can display high-quality color viewable from all angles

**Passive-matrix display**

- Color often not as bright
- Images best viewed when working directly in front of display

Next  
p. 6.8

**Discovering Computers 2003**  
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## Display Devices

### What is a gas plasma monitor?

- Flat-panel display uses layer of gas plasma between two sheets of material
- Larger screen sizes and higher display quality than LCD, but much more expensive



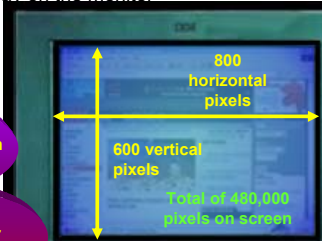
Next  
p. 6.8 Fig. 6.8

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## Display Devices

### What is display resolution?

- Describes the sharpness and clarity of image
- The higher the resolution, the sharper the image and the more that can display on the monitor



800 x 600 most common

1280 x 1024 maximum resolution of most monitors

2048 x 1536 maximum for high-end monitors

800 horizontal pixels

600 vertical pixels

Total of 480,000 pixels on screen

Next  
p. 6.8

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## Display Devices

### What is dot pitch?

- Measure of the distance between pixels
- Sometimes called pixel pitch
- Smaller the distance between the pixels, the sharper the image



Use a monitor with a dot pitch of .29 millimeters or lower to minimize eye fatigue

Next  
p. 6.9

**Discovering Computers 2003**  
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## Display Devices

### What is refresh rate?

- Speed at which monitor redraws images on the screen



Should be fast enough to maintain a constant, flicker-free image

High-quality monitor will provide refresh rate of at least 75 hertz

Image on the screen redraws itself 75 times per second

Next  
p. 6.9

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## Display Devices

### What is a video card?

- Converts digital output from computer into analog video signal
- Controls how display device produces picture
- Also called graphics card or video adapter



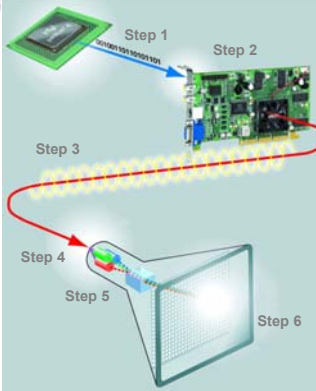
Next  
p. 6.10

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## Display Devices

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

- 1: Processor sends digital data to video card
- 2: Video card converts digital data to analog signal
- 3: Analog signal sent via cable to CRT monitor
- 4: CRT separates signal into red, green, and blue signals
- 5: Electron guns fire color signals to front of CRT
- 6: Image displays



Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

Next  
p. 6.10 Fig. 6-10

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## Display Devices

### What is bit depth?

- Number of bits a video card uses to store information about each pixel
- Also called **color depth**
- Determines number of colors a video card can display
- Greater the number of bits, better the resulting image

**8-bit video card**

Uses 8 bits to store information about each pixel

Can display 256 different colors

$2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256$  colors

**24-bit video card**

Uses 24 bits to store information about each pixel

Can display 16.7 million colors

$2^{24} = 16.7$  million colors

**Next**  
p. 6.10

**Discovering Computers 2003**  
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## Display Devices

### What are video standards?

- Video Electronics Standards Association (VESA) develops video standards

| Standard                          | Suggested Resolution | Possible Simultaneous 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                 |
|                                   | 1024 x 768           | 16.7 million                 |
|                                   | 1280 x 1024          | 16.7 million                 |
|                                   | 1600 x 1200          | 16.7 million                 |
| Beyond SVGA                       | 1920 x 1440          | 16.7 million                 |
|                                   | 2048 x 1536          | 16.7 million                 |

**Next**  
p. 6.11 Fig. 6-11

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## Display Devices

### What are various video card configurations?

| Video Memory | Color Depth | Number of Colors | 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 |
| 4 MB         | 24-bit      | 16.7 million     | 800 x 600   |
|              | 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 |

**Next**  
p. 6.11 Fig. 6-12

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## Display Devices

### What is electromagnetic radiation (EMR)?

- Magnetic field that travels at speed of light
- Small amount produced by all CRT monitors

Sit at arm's length from CRT

EMR is greatest on sides and back of CRT monitor

LCD monitors do not pose this risk

**Next**  
p. 6.11

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## Display Devices

### What is the ENERGY STAR® program?

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



**EPA POLLUTION PREVENTER**

**Next**  
p. 6.12 Fig. 6-13

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## Display Devices

### What is Interactive TV?

- Two-way communications technology in which users interact with television programming
- HDTV works directly with interactive TV

Select a movie from a central library of movies

Bank

Play games

Vote or respond to network questionnaires

Shop

**Next**  
p. 6.12

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## Printers

### What is a printer?

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

portrait orientation

landscape orientation

Play Auditions...  
...for Grease!

HARBOR THEATRE COMPANY  
The Harbor Theatre Company will be holding auditions.

**Life Power Company**  
Quarterly Company Receipts and Expenditures

|                | Q1 2003      | Q2 2003      | Q3 2003      | Q4 2003      | Q1 2004      |
|----------------|--------------|--------------|--------------|--------------|--------------|
| Revenue        | \$100,000.00 | \$105,000.00 | \$110,000.00 | \$115,000.00 | \$120,000.00 |
| Expenses       |              |              |              |              |              |
| Advertising    | \$10,000.00  | \$12,000.00  | \$14,000.00  | \$16,000.00  | \$18,000.00  |
| Rent           | \$20,000.00  | \$20,000.00  | \$20,000.00  | \$20,000.00  | \$20,000.00  |
| Utilities      | \$5,000.00   | \$5,000.00   | \$5,000.00   | \$5,000.00   | \$5,000.00   |
| Salaries       | \$40,000.00  | \$42,000.00  | \$44,000.00  | \$46,000.00  | \$48,000.00  |
| Supplies       | \$3,000.00   | \$3,000.00   | \$3,000.00   | \$3,000.00   | \$3,000.00   |
| Total Expenses | \$78,000.00  | \$82,000.00  | \$86,000.00  | \$90,000.00  | \$94,000.00  |
| Net Income     | \$22,000.00  | \$23,000.00  | \$24,000.00  | \$25,000.00  | \$26,000.00  |

Next  
p. 6.12 Fig. 6-14

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## Printers

### What is an impact printer?

- Forms characters by striking a mechanism against ink ribbon that physically contacts paper
- Ideal for printing multipart forms
- Can withstand dusty environments, vibrations, and extreme temperatures

Next  
p. 6.14

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## Printers

### What is a dot-matrix printer?

- Impact printer that produces printed images when tiny wire pins on print head mechanism strike inked ribbon
- Most use continuous-form paper

continuous-form paper

Next  
p. 6.14 Fig. 6-17

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## Printers

### How does a dot-matrix printer work?

- When ribbon presses against paper, it creates dots that form characters and graphics
- A higher number of pins (9 to 24) means printer prints more dots per character, which results in higher print quality

dots form characters

Next  
p. 6.14 Fig. 6-17

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## Printers

### What is a line printer?

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

Next  
p. 6.14 Fig. 6-18

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## Printers

### What is a non-impact printer?

- Forms characters and graphics on piece of paper without actually striking paper

ink-jet printer

thermal printer

laser printer

Next  
p. 6.15

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Web and XP Enhanced

### What is an ink-jet printer?

- Nonimpact printer forms characters and graphics by spraying tiny drops of liquid ink onto piece of paper
- Most popular type of color printer for home use

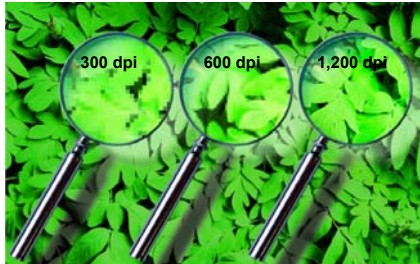


Next  
p. 6.15 Fig. 6-19

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### What is the resolution of a printer?

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

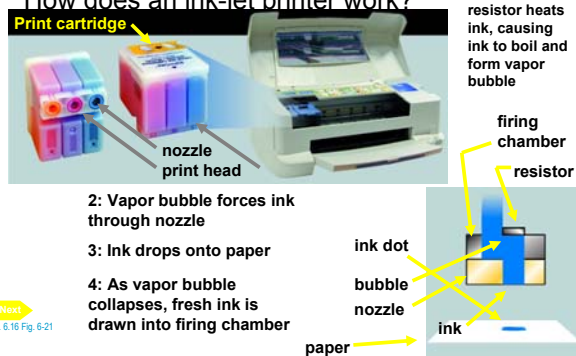


Next  
p. 6.15 Fig. 6-20

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### How does an ink-jet printer work?

**Print cartridge**



1: Small resistor heats ink, causing ink to boil and form vapor bubble

2: Vapor bubble forces ink through nozzle

3: Ink drops onto paper

4: As vapor bubble collapses, fresh ink is drawn into firing chamber

Labels: nozzle print head, firing chamber, resistor, ink dot, bubble, nozzle, ink, paper

Next  
p. 6.16 Fig. 6-21

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### What is a laser printer?

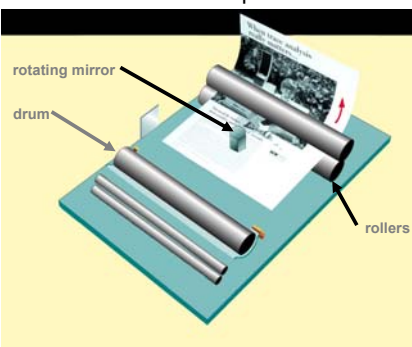
- High-speed, high-quality nonimpact printer
- Prints text and graphics in very high-quality resolution, ranging from 600 to 1,200 dpi
- Typically costs more than ink-jet printer, but is much faster



Next  
p. 6.16 Fig. 6-17

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### How does a laser printer work?



1: Drum rotates as paper is fed through

2: Mirror deflects laser beam across surface of drum

3: Laser beam creates charge that causes toner to stick to drum

4: As drum rotates, toner transfers from drum to paper

5: Rollers use heat and pressure to fuse toner to paper

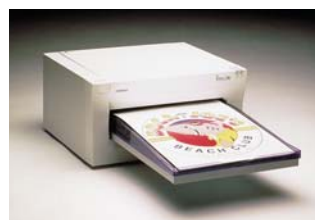
Labels: rotating mirror, drum, rollers

Next  
p. 6.17 Fig. 6-23

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### What is a thermal printer?

- Generates images by pushing electrically heated pins against heat-sensitive paper
- Ideal for small devices, such as adding machines



Next  
p. 6.19 Fig. 6-24

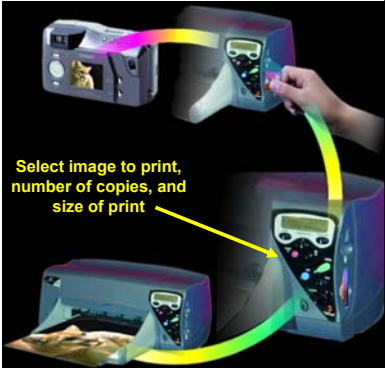
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## Printers

### What is a photo printer?

- Color printer that produces photo lab quality pictures and prints everyday documents

**Select image to print, number of copies, and size of print**



Next  
p. 6.20 Fig. 6-25

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## Printers

### What is a label printer?

- Small printer that prints on adhesive type material that can be placed on a variety of items
- Most also print bar codes and e-stamps



Next  
p. 6.21 Fig. 6-26

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## Printers

### What is a portable printer?

- Small, lightweight ink-jet or thermal printer that allows mobile user to print from notebook or handheld computer while traveling

**portable printer**



Next  
p. 6.22 Fig. 6-27

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## Printers

### What is a plotter?

- Sophisticated printer used to produce high-quality drawings
- **Large-format printer** similar to plotter and is used to print quality color prints

**plotter**



**large-format printer**



Next  
p. 6.22

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## Speakers and Headsets

### What is an audio output device?

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

**speakers**



**woofer**

Next  
p. 6.23 Fig. 6-29

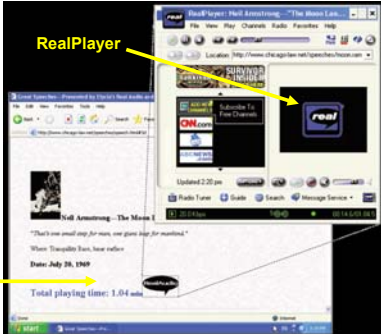
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## Speakers and Headsets

### What is voice output?

- Computer talks to you through speakers on computer

**RealPlayer**



**link to audio broadcast**

Next  
p. 6.24 Fig. 6-31

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## Speakers and Headsets

What is **Internet telephony**?

- Allows you to have a conversation over the Web, just as if you were talking on the telephone



Next  
p. 6.24

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## Other Output Devices

What is a **data projector**?

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



Next  
p. 6.25 Fig. 6-32

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## Other Output Devices

What is a **facsimile (fax) machine**?

- Device that transmits and receives documents over telephone lines



Next  
p. 6.25 Fig. 6-33

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## Other Output Devices

What is a **fax modem**?

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



Next  
p. 6.26 Fig. 6-34

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## Other Output Devices

What is a **multifunction device (MFD)**?

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



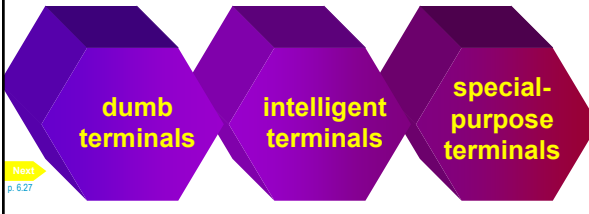
Next  
p. 6.26 Fig. 6-35

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## Terminals

What is a **terminal**?

- Device that performs both input and output



Next  
p. 6.27

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## Terminals

### What is a **dumb terminal**?

- Has a keyboard and monitor, but no processor or memory
- Connects to host computer that performs processing and then sends output back

keyboard and monitor



Next  
p. 6.27 Fig. 6-36

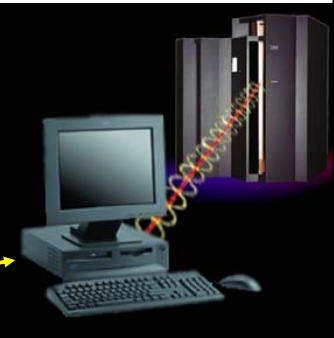
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## Terminals

### What is an **intelligent terminal**?

- Has monitor, keyboard, memory and processor
- Similar to a PC in that it can perform tasks independent of host computer
- Programmable

host computer



intelligent terminal

Next  
p. 6.28

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## Terminals

### What is a **point-of-sale (POS) terminal**?

- Records purchases at point where purchase is made
- Output from POS terminals serves as input to host computer

POS terminal in a grocery store



scanner and keyboard are input

Next  
p. 6.28 Fig. 6-37

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## Terminals

### What is an **automated teller machine (ATM)**?

- Self-service banking machine that connects to host computer through telephone network



Next  
p. 6.29 Fig. 6-37

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## Output Devices for Physically Challenged Users

### What is the **Magnifier** command?

- Windows Magnifier command enlarges text and other items in window on screen

Magnifier command



Location of mouse pointer magnified at top of screen

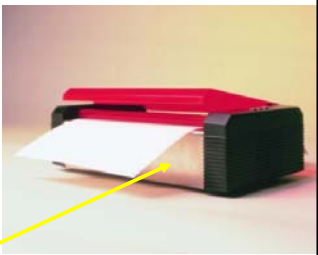
Next  
p. 6.29 Fig. 6-38

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## Output Devices for Physically Challenged Users

### What other output options are available for visually impaired users?

- Change Window's 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



Braille printer

Next  
p. 6.30 Fig. 6-39

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## Summary

### What are suggested output devices for the Home user?

**Home**



- ☐ 17- or 19-inch color CRT monitor
- ☐ High-definition television
- ☐ Ink-jet color printer; or photo printer; or label printer
- ☐ Speakers and headset

**Next**  
p. 6.30 Fig. 6-40

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## Putting It All Together

### What are suggested output devices for the SOHO user?

**Small Office/Home Office**



- ☐ 19- or 21-inch color CRT monitor
- ☐ Color LCD display for handheld computer
- ☐ Multifunction device; or ink-jet color printer; or laser printer, black and white
- ☐ Label printer
- ☐ Fax machine
- ☐ Speakers and headset

**Next**  
p. 6.30 Fig. 6-40

**Discovering Computers 2003**  
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## Putting It All Together

### What are suggested output devices for the Mobile user?

**Mobile**



- ☐ 15.4-inch color LCD display with notebook computer
- ☐ 19-inch color CRT monitor for notebook computer docking station
- ☐ Color LCD display for handheld computer
- ☐ Portable printer
- ☐ Ink-jet color printer; or laser printer, black and white, for in-office use; or photo printer
- ☐ Fax modem
- ☐ Headset
- ☐ DLP data projector

**Next**  
p. 6.30 Fig. 6-40

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## Putting It All Together

### What are suggested output devices for the Large Business user?

**Large Business**



- ☐ 19- or 21-inch color CRT or LCD monitor
- ☐ 15.4-inch color LCD display for notebook computer
- ☐ Color LCD display for handheld computer
- ☐ Laser printer, black and white
- ☐ Line printer (for large reports from mainframe)
- ☐ Label printer
- ☐ Fax machine or fax modem
- ☐ Speakers and headset
- ☐ DLP data projector
- ☐ Dumb terminal

**Next**  
p. 6.30 Fig. 6-40

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## Putting It All Together

### What are suggested output devices for the Power user?

**Power**



- ☐ 21-inch color LCD monitor
- ☐ Laser printer
- ☐ Plotter
- ☐ Photo printer; or dye sublimation printer
- ☐ Fax machine or fax modem
- ☐ Speakers and headset

**Next**  
p. 6.30 Fig. 6-40

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## Summary of Output

- What is output?
- What are output devices?
- Display devices
- Printers
- Speakers and headsets
- Other output devices
- Terminals
- Output devices for physically challenged users

## Chapter 6 Complete

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