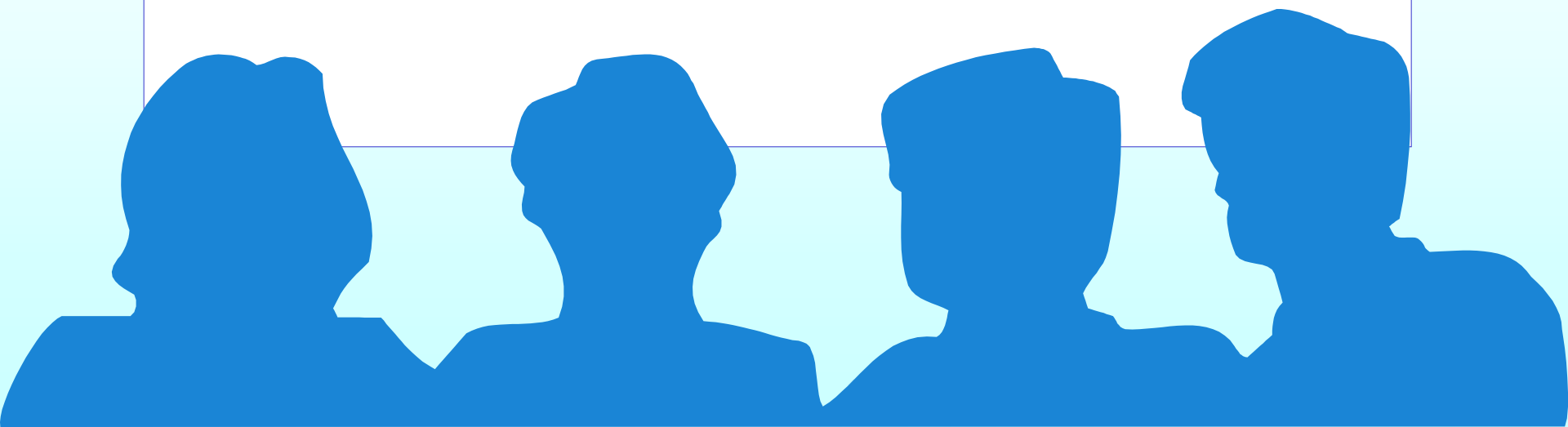
LESSON 5

Monitors and Sound Systems

This lesson includes the following sections:

- Monitors
- PC Projectors
- Sound Systems



Monitors

- Categories of Monitors
- CRT (Cathode Ray Tube) Monitors
- Flat-Panel Monitors
- Comparing Monitors
- Video Controllers

Monitors - Categories of Monitors

Monitors are categorized by the technology they use:

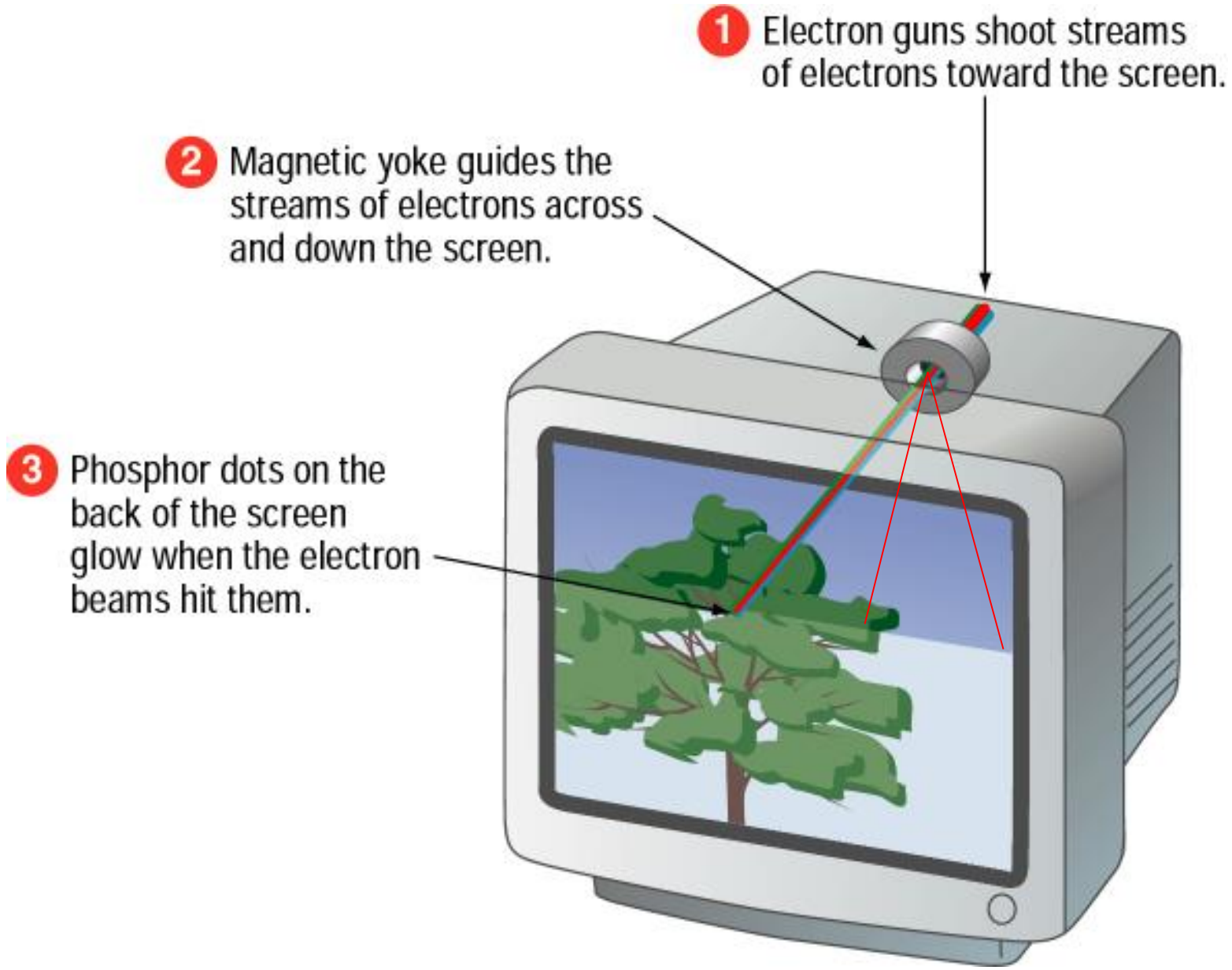
- **Cathode ray tube (CRT) monitors**
- **Flat-panel displays**

And by the way they display colors:

- **Monochrome – One color on a black background**
- **Grayscale – Shades of gray on a white or off-white background**
- **Color – From 16 to 16 million unique colors**

Monitors - CRT Monitors

- In CRT monitors, electrons are fired at phosphor dots on the screen.
- The dots are grouped into pixels, which glow when struck by electrons.
- In color CRTs, each pixel contains a red, green, and blue dot. These glow at varying intensities to produce color images.


1 Electron guns shoot streams of electrons toward the screen.
2 Magnetic yoke guides the streams of electrons across and down the screen.
3 Phosphor dots on the back of the screen glow when the electron beams hit them.

Monitors - Flat-Panel Monitors

- Most flat-panel monitors use liquid crystal display (LCD) technology.
- Passive matrix LCD uses a transistor for each row and column of pixels: less expensive, narrow viewing angle, submarining (animated graphics blurry)
- Active matrix LCD uses a transistor for each pixel on the screen: expensive, wider viewing angle, faster refresh
- Thin-film transistor (TFT) displays use multiple transistors for each pixel.

Flat-panel monitors take up less desk space; less radiation

Monitors - Comparing Monitors

When comparing monitors, consider four features:

- **Size**
- **Resolution**
- **Refresh rate**
- **Dot pitch**

Comparing Monitors - Size

- A monitor's size is the diagonal measurement of its face, in inches.
- For years, 15" monitors (13"viewing area) were standard.
- Today, 17" monitors (15" viewing area) are common.
- Larger monitors are available, but can be expensive.

The diagonal size (often 15”)

Comparing Monitors - Resolution

- **Resolution is the number of pixels on the screen, expressed as a matrix (such as 600x800).**
- **A 17" monitor offers resolutions from 640x480 up to 1280x1024.**
- **The Video Graphics Array (VGA) standard is 640x480. Super VGA (SVGA) monitors provide resolutions of 800x600, 1024x768 or higher.**

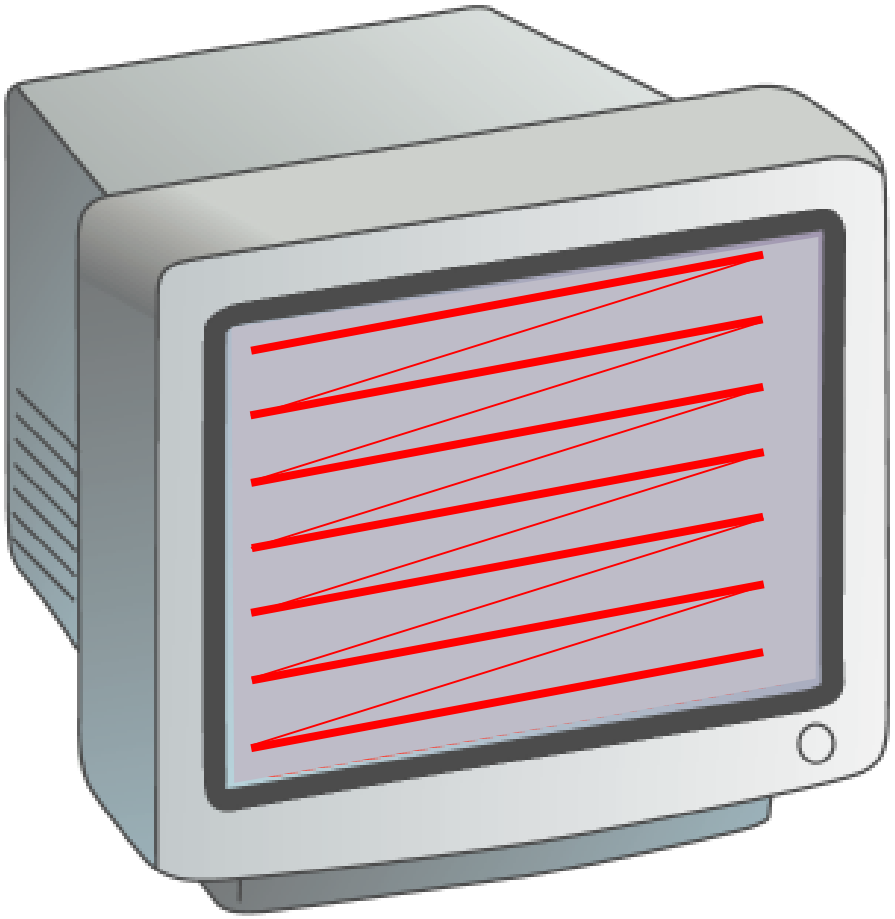
Resolution (image sharpness) is important.

(Especially for graphics, page layout, and CAD (Computer Aided Design))

Comparing Monitors - Refresh Rate

- **Refresh rate is the number of times each second that the electron guns scan the screen's pixels.**
- **Refresh rate is measured in Hertz (Hz), or cycles per second.**
- **Look for a refresh rate of 72 Hz or higher. A slower rate may cause eyestrain.**

1 The electron gun scans from left to right,



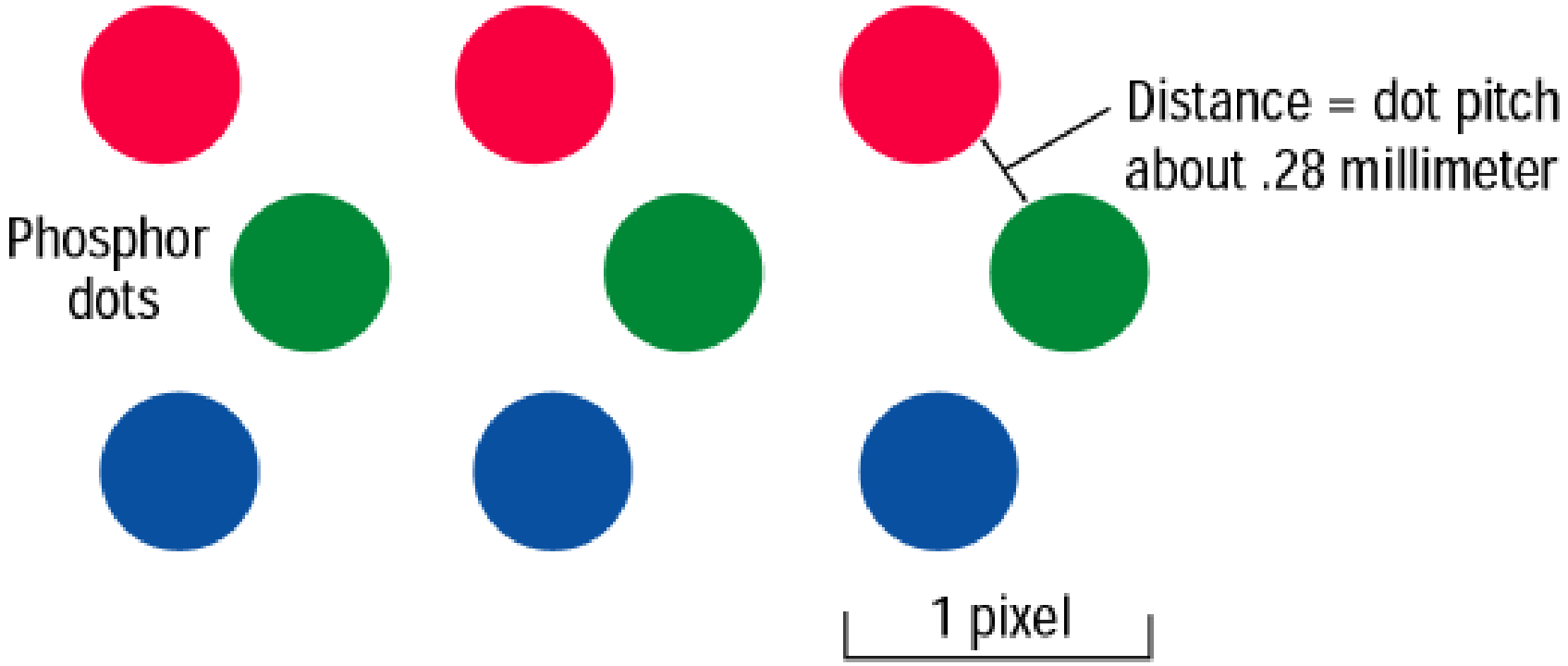
2 and from top to bottom,

3 refreshing every phosphor dot in a zig-zag pattern.

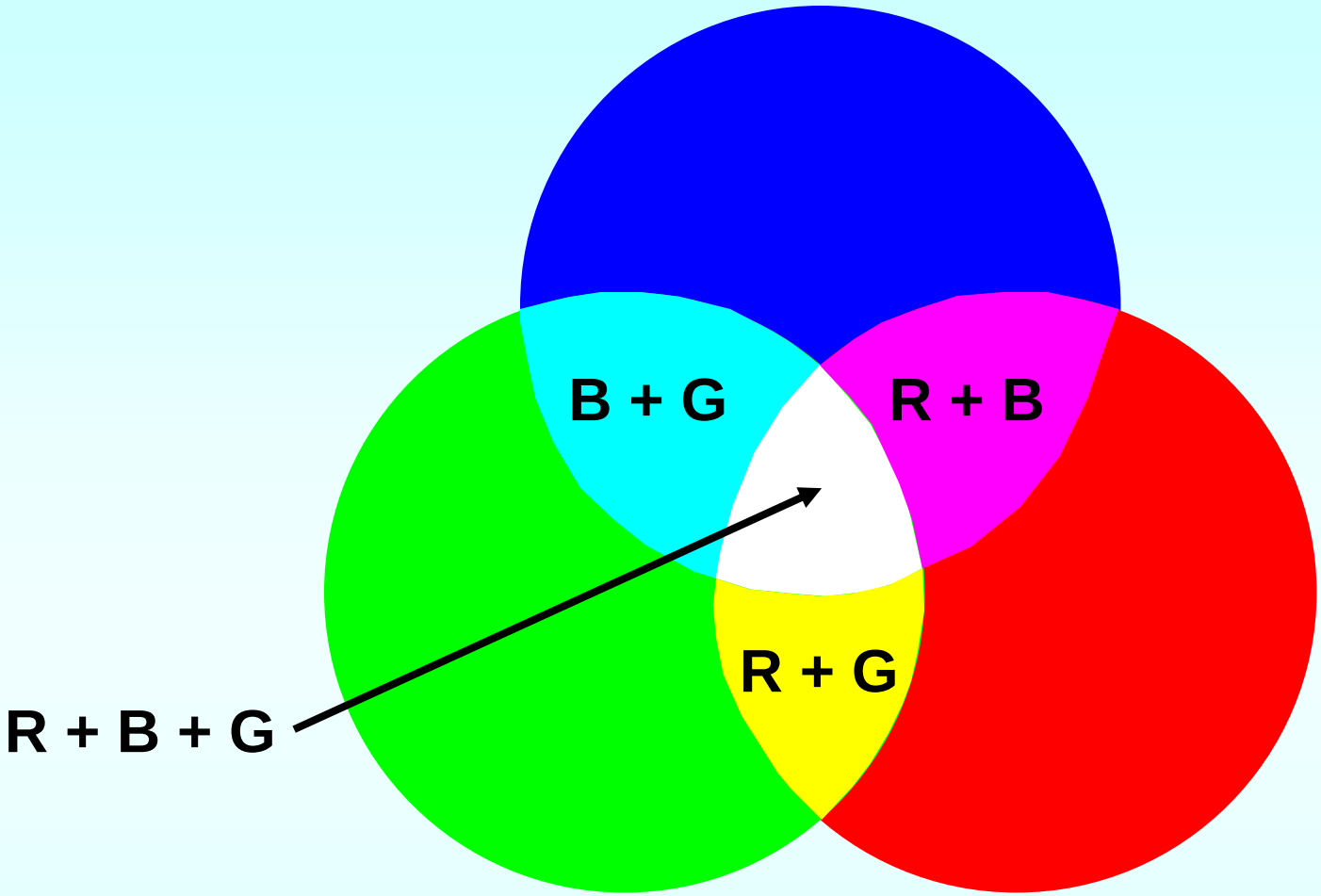
Fast scanning = Quick refresh (less flicker)

Comparing Monitors - Dot Pitch

- **Dot pitch is the distance between the phosphor dots that make up a single pixel.**
- **In color monitors, three dots (red, green, and blue) comprise each pixel.**
- **Look for a dot pitch no greater than .28 millimeter.**



Fine dot pitch = Crisp displays

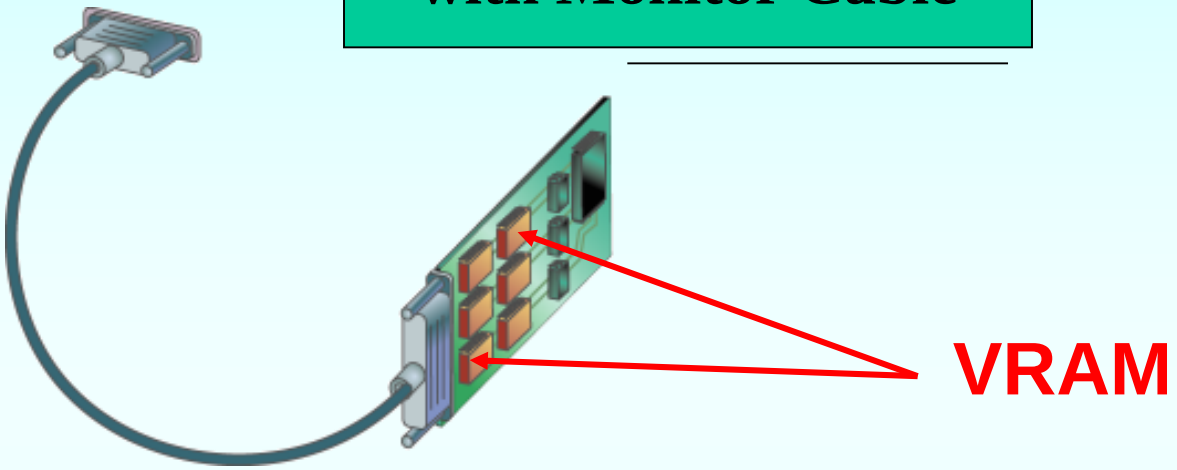


Phosphor Dot Color Mixing
R: Red, G: Green, B: Blue

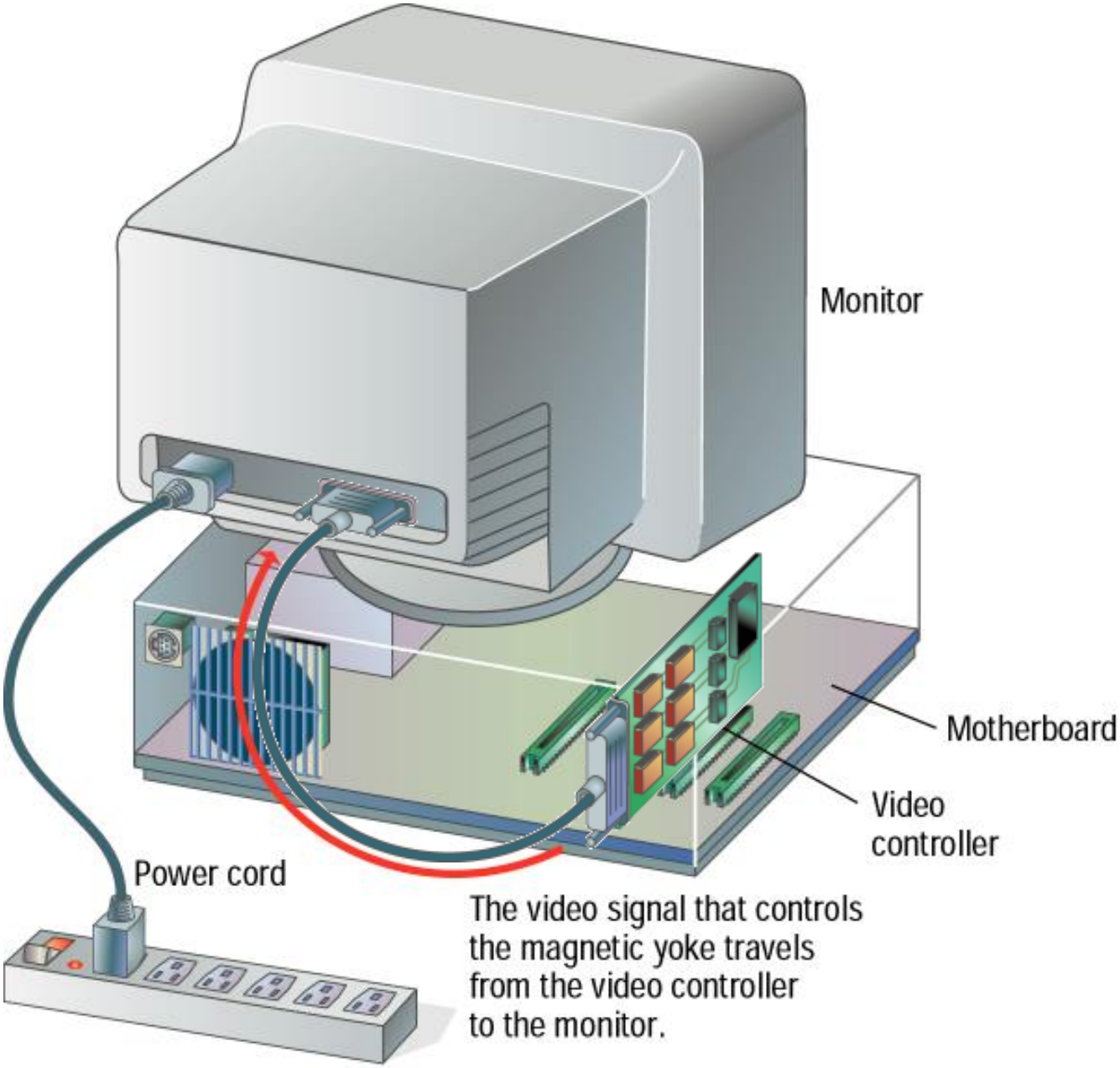
Monitors - Video Controllers

- **The video controller is an interface between the monitor and the CPU (Central Processing Unit).**
- **The video controller determines many aspects of a monitor's performance, such as resolution or the number of colors displayed.**
- **The video controller contains its own on-board processor and memory, called video RAM (VRAM).**

Video Control Board with Monitor Cable



Graphic intensive applications such as games require plenty of VRAM.


Monitor
Motherboard
Video
controller
Power cord
The video signal that controls
the magnetic yoke travels
from the video controller
to the monitor.

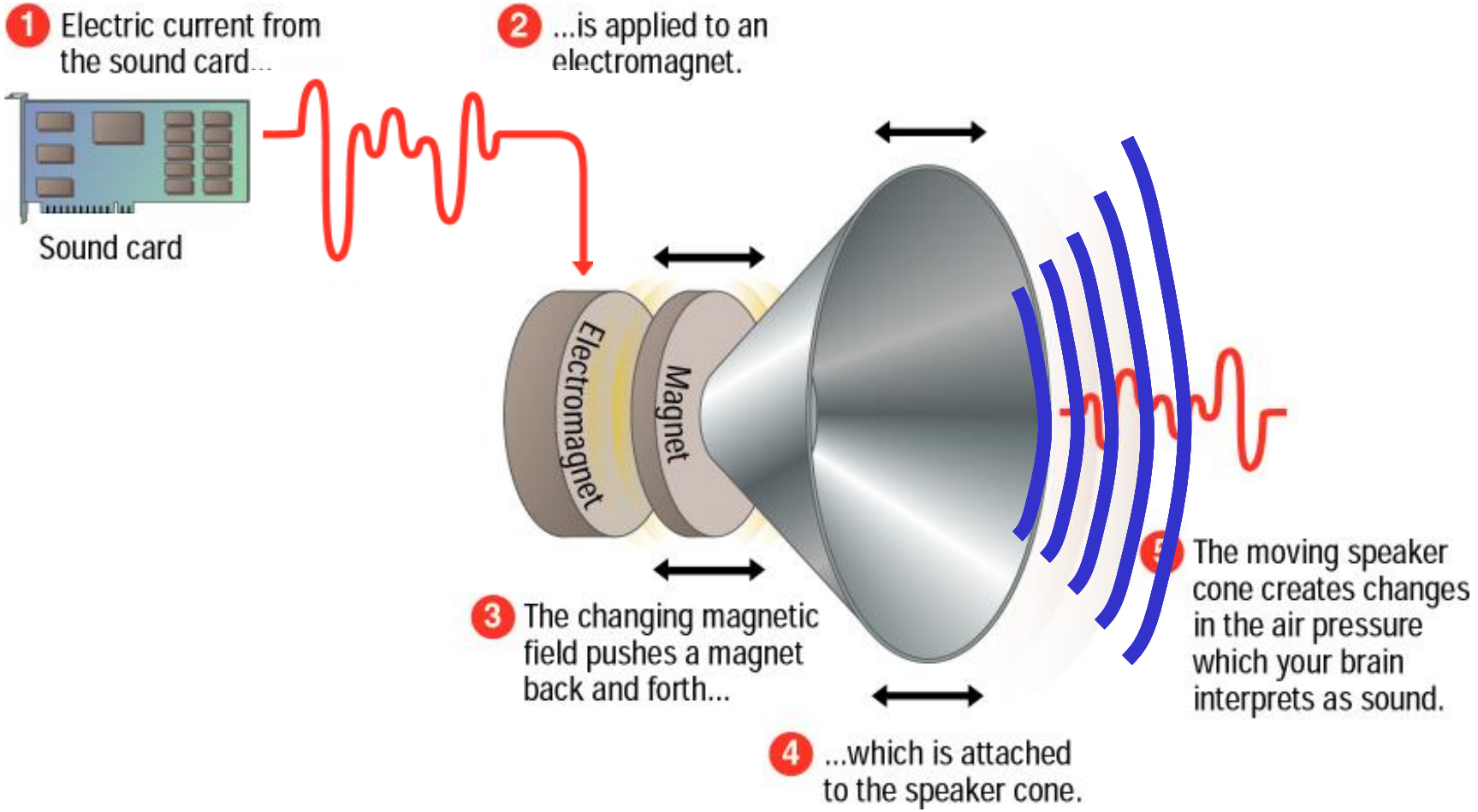
PC Projectors

- **A PC projector connects to a PC and is used to project images on a large screen.**
- **Many PC projectors provide the same resolutions and color levels as high-quality monitors.**
- **Digital light processing (DLP) projectors use a microchip containing tiny mirrors to produce very sharp, bright images.**

Projected Screen

Sound Systems

- **Multimedia PCs come with a sound card, speakers, and a CD-ROM (Compact Disk-Read-Only Memory) or DVD (Digital Versatile Disk) drive.**
- **A sound card translates digital signals into analog ones that drive the speakers.**
- **With the right software, you can use your PC to edit sounds and create special sound effects.**


1 Electric current from the sound card...
Sound card
2 ...is applied to an electromagnet.
Electromagnet
Magnet
3 The changing magnetic field pushes a magnet back and forth...
4 ...which is attached to the speaker cone.
5 The moving speaker cone creates changes in the air pressure which your brain interprets as sound.