Refresh CRT

Refresh CRT :

- As we all know, phosphor atoms have phosphorescence properties that cause them to shine. However, the strength of the luminous phosphor dots decreases with time.

- The electron beam must sweep the whole area of the screen and then repaint it numerous times per second in order to maintain a steady image. Refreshing the screen is the term for this procedure.

- If the electron beam takes too much time to refresh, it looks like the flickering of the image.

- To eliminate flickering, the screen image must be regenerated quickly enough that the eye is oblivious to the fact that it is being refreshed.

Refresh RATE :

- Refresh rate can be defined as the number of times the screen is refreshed per second.
- It's SI unit or unit of measurement is Hertz(Hz).
- A display appears stable if the refresh rate is high enough, but if the refresh rate is too low, the display will flicker, causing eye strain and headaches.

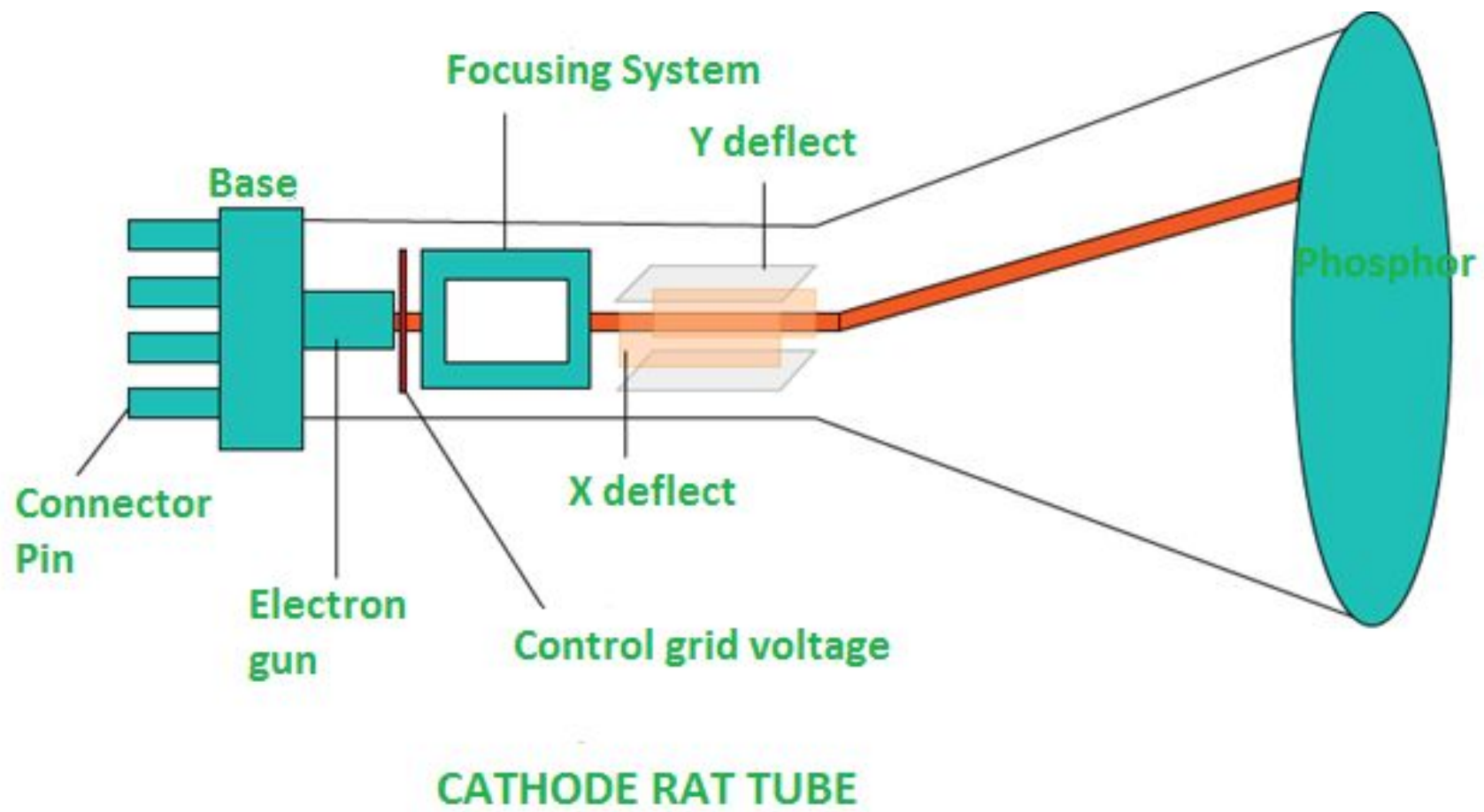**Factors in determining refresh rates :**

- The horizontal scanning frequency and the number of horizontal lines displayed on the monitor are directly proportional to the refresh rate. The horizontal scanning frequency is the number of times in one second that the electron beam sweeps one line before returning to the start of the next. Kilohertz is the unit of measurement for horizontal scanning frequency (kHz).
- 100,000 lines are scanned per second on a monitor with a horizontal scanning frequency of 100kHz. The number of horizontal lines on the screen is determined by the resolution of the monitor.

Importance of refresh rates :

- While buying a monitor, one of the features that customers look into is the display refresh rate, which provides users a good experience . A high refresh rate is important in providing a clear picture and avoiding eye fatigue.

- When electron beams impact the screen in a zig-zag pattern, a picture appears on the screen. The number of times a screen is repainted in one second is called a refresh rate, and it is measured in Hertz (Hz). A display with a refresh rate of 95 Hz, for example, is repainted 95 times per second.

- A monitor has to be "flicker-free", meaning that the image is redrawn quickly enough so that the user cannot detect flicker. Today, a refresh rate of 75 Hz or above is considered to be flicker-free.

WORKING OF REFRESH CRT :

- Cathode is heated to produce electrons as a cloud .

- When the electron is injected through the electron gun , it passes through the control grid .

- A control grid controls the intensity of electrons in the vacuum tube . If the control grid has a high negative potential , then it allows only a few electrons to pass through it.

- The brightness of a display is adjusted by altering the voltage on the control grid because the amount of light emitted by the phosphor coating is dependent on the number of electrons impacting the screen. On video displays, a control knob can be used to adjust the brightness of the entire screen.

- Deflection systems An electromagnetic field or an electrostatic field can be used to deflect a stream of electrons in some linear manner .When the deflecting plate is at zero potential , the beam produces a spot at the centre.

- Fluorescence light is emitted while the phosphor is being struck by electrons .

- Phosphorescence light is emitted once the electron beam is removed .

Connector Pin

Base

Focusing System

Y deflect

Phosphor

Electron gun

Control grid voltage

X deflect

CATHODE RAT TUBE

Line - a line can be described as **a single point that continues for a distance, or as the connection between two points**.

A line is a collection of infinite points that extends on both sides infinitely on a plane.

Line segments - A line segment is a collection of finite points which has a definite length.

Introduction to random scan concepts

Attributes of line color, width, style, caps and joins.
Character generation Primitive operations

LINE ATTRIBUTES

Basic attributes of a straight line segment are its type, its width, and its color. In some graphics packages, lines can also be displayed using selected pen or brush options.

Line Type

line-type attribute - solid lines, dashed lines, and dotted lines.

We modify a line drawing algorithm to generate such lines by setting the length and spacing of displayed solid sections along the line path.

A dashed line could be displayed by generating an interdash spacing that is equalto the length of the solid sections. Both the length of the dashes and the interdashspacing are often specified as user options. A dotted line can be displayed bygenerating very short dashes with the spacing equal to or greater than the dash size. Similar methods are used to produce other line-type variations.

To set line type attributes in a PHICS application program, a user invokes the function

setLinetype (It)

where parameter I t is assigned a positive integer value of 1,2,3, or 4 to generate lines that are, respectively, solid, dashed, dotted, or dash-dotted.

Line Width

We set the line-width attribute with the command: Line-width parameter Lr. is assigned a positive number to indicate the relative width of the line to be displayed. A value of 1 specifies a standard-width line. On.

For lines with slope magnitude greater than 1, we can plot thick lines with horizontal spans, alternately picking up pixels to the right and left of the line-path.

Problem with implementing width options using horizontal or vertical pixel spans is that the method produces lines whose ends are horizontal or vertical regardless of the slope of the line. This effect is more noticeable with very thick lines. We can adjust the shape of the line ends to give them a better appearance by adding line caps

One kind of line cap is the **butt cap** obtained by adjusting the end positions of the component parallel lines so that the thick line is displayed with square ends that are perpendicular to the line path. If the specified line has slope m, the square end of the thick line has slope - 1 / m .

Another line cap is the **round cap** obtained by adding a filled semicircle to each butt cap. The circular arcs are centered on the line endpoints and have a diameter equal to the line thickness.

A third type of line cap is the **projecting square cap**. Here, we simply extend the line and add butt caps that are positioned one-half of the line width beyond the specified endpoints.
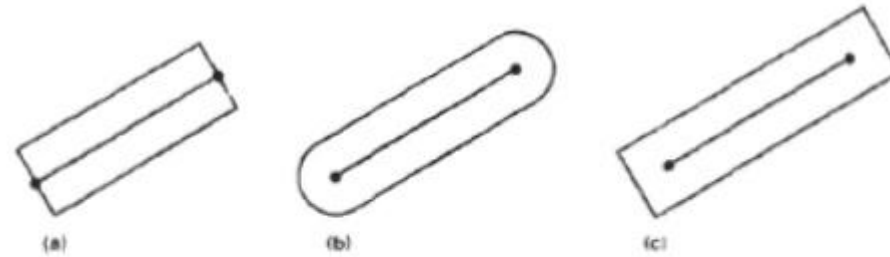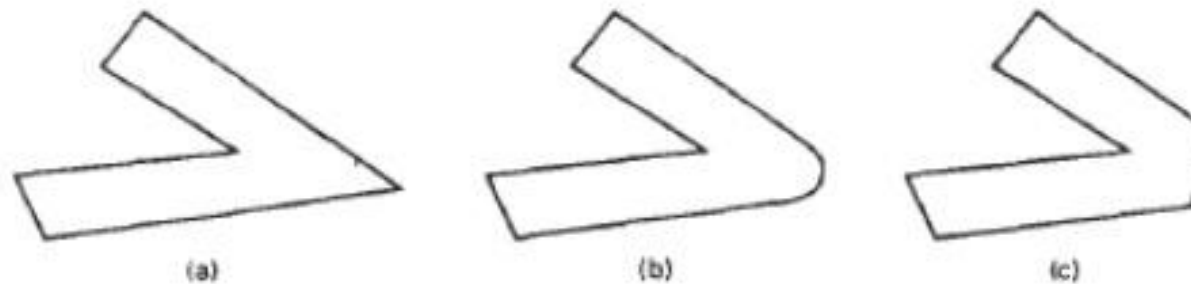

Figure 4-5
Thick lines drawn with (a) butt caps, (b) round caps, and (c) projecting square caps.

A **miter join** is accomplished by extending the outer boundaries of each of the two lines until they meet.

A **round join** is produced by capping the connection between the two segments with a circular boundary whose diameter is equal to the linewidth.

And a **bevel join** is generated by displaying the line segments with butt caps and filling in the triangular gap where the segments meet.

Figure 4-6
Thick line segments connected with (a) miter join, (b) round join, and (c) bevel join.

Line Color

When a system provides color (or intensity) options, a parameter giving the current

color index is included in the list of system-attribute values. A polyline routine displays a line in the current color by setting this color value in the framebuffer at pixel locations along the line path using the set pixel procedure.

The number of color choices depends on the number of bits available per pixel in the frame buffer. We set the line color value in PHlCS with the function

Set PolylineColourIndex (le)