The electron gun assembly consists of an [illegible] control grind (G) an accelerated

Experiment No:- 3 Roll No:- 1698009
Date

Aim:- Understanding the working principle of black and white and coloured monitor.

Theory:-

Cathode Ray Tube (CRT)

- A CRT is an electronic tube designed to display electrical data.

The basic CRT consists of four major components:-

1. Electron Gun.
2. Focusing & Accelerating Anodes.
3. Horizontal & Vertical Deflection Plates.
4. Evacuated Glass Envelope.

1. Electron Gun:-

It is used for producing a strain of electrons.

2. Focussing & Accelerating Anodes:-

These are used for producing a narrow and sharply focus beam of electrons.

3. Horizontal and Vertical Deflection Plates:-

These are used for controlling the path of the beam

4. Evacuated Glass Envelope:-

It has a phosphorecent screen which produces bright spot when struct by a high velocity electron beam.

The electron gun assembly consists of an indirectly heated cathode (k), a control grind (G), an accelerated anode A1, focussing anode A2 and accelerating anode A3.

→ Working Of CRT

Heater element is energized by alternating current to obtain high emission of electrons from cathode. Control grid is biased negative with respective to cathode it controls the density of electron beam to focus the electron beam on the screen focusing anode is used. The ~~screen focusing anode is used~~. focusing anode operate at a potenial of 1200V and accelerating anode at 2000V to accelerate the electron beam.

Two pairs of deflection plates provided in the CRT these deflection plates are mounted at a right angle to each other to provide electron beam deflection along vertical and horizontal axis of the screen. The screen consists of a glass which is coated by some florescent material like zinc silicate. which is semitransparant phosphor substance. When high velocity electron beam structs the phosphorescent screen the light ~~emits~~ emitts from it. The property of phosphor to emitt light when its atom are excited is called fluorescence

→ Applications of CRT

1. In cathode ray oscilloscope
2. As a display device in radar

3. In television.
4. In computer Monitors

* Monitor Specifications

1] Resolution: A monitor's resolution describes the no. of potential pixels the monitor is capable of displaying. The value is given as resolution: the total horizontal pixels x the total vertical pixels

2] Interlaced or non interlaced mode:
Interlacing: Information on a monitor is displayed by an electron gun scanning the phosphor inside of the display. The gun scans from top to bottom, left to right with each complete scan displaying a "frame". In interlaced mode, the image is to be scanned in two passes known as even pass and odd pass. In first pass the electron gun scanning will skip every next line on the second pass, it will scan the lines it missed during the first times, thus creating the full image in two scans instead of one.

Non Interlacing: It is the opposite of interlaced display i.e. all lines are scanned or displayed in one pass instead of the two passes required in the interlaced display.

3] frame rate: This is used to show the number of items a screenful of information is produced per second on the monitor. Higher the frame rate, less flicker problem you get.

4] Video bandwidth:- It is the highest input frequency a monitor can handle and helps in determining the resolution capabilities of the monitor and unit in Megahertz (MHz). The bandwith is calculated as Bandwith = horizontal pixel x vertical pixel x frame rate.

5] The dot pitch or slot pitch:- It is simply a measurement of the distance between dots or slots on the CRT. This measurement is independent of the size of the tube or the size of the displayed image.

6] Screen size:- Most computer displays are rated by their screen size. Different size of monitors are available as 15 inch, 17 inch, 14 inch, etc.

* Monochrome Graphics Adapter (MGA)
Characteristics of MGA:
→ It supports two modes of display: (a) Text mode (80x25)
(b) Graphics mode
→ The video buffer is 64 kb and is divided ~~(720x348)~~ into two graphics pages of 32kb each.
→ The MGA supports a parallel interface for the printer.
→ It provides limited pen logic.

MGA Monitor:-
1] Video amplifier:- It consists of four stage cascaded amplifiers video signal amplified is given to video drive stage and finally to CRT k cathode through the CRT.

2) Vertical oscillator: Vertical synchronous pluse is applied to the oscillator. This removes ony random noise that may be present on the input line and conditions the vertical pulses for processing.

3) Horizontal oscillator: Horizontal synchronous pulse is applied to the oscillator and oscillator output is applied to CRT, to tell about the scan line to begin.

4) Flyback transformer: It is used to produce different G1, G2, G3 voltages to control raster brightness. EHT is helpful for H. synchronization.

Working

→ The interface provides the video, intensity, Hsync and Vsync. signals.
→ The video and intensity signals are very low powered at this point. So to be able to display a pixel on the Monitor, these signals must be amplified. So, they are given to a video amplifier circuit. It's output is given to video driver so that the desired signals are given to the CRT.
→ One horizontal oscillation refers to the motion of the electrons bean from the left end of the screen to the right end and back to the left eng (retracing).
→ One vertical oscillation refers to the motion of the electron beam from the top left end ~~of the screen to the right end and back to the~~

agin to the top.

→ The Hsync signal synchronizes the start of the next row of the electron beam with video. So, when the electron beam reaches the end of the present row an Hsync applied to the Horizontal oscillator which in turn outputs a horizontal deflection which retraces the electron beam to the start of next row. This is required, as the video input is a stream of signals continosly passed to the CRT.

→ The same is the function of Vsync except that it deals with frames instead of individual rows that make the frame.

* Video Graphics Array (VGA)

→ VGA is the display hardware first introduced with the IBM PS/2 line of computers in the 1987. Because of its widespace adoption, it has become the computer display standard.

→ It is supreseded by numerous slightly different extensions to VGA.

→ Today, VGA analog interface is used for high definition video, including resolutions of 1080p and higher

VGA / SVGA Monitor:-

1. Power Circuits: The power supply circuit is a synchronous type switching power circuit and it consists of Line filter IC, Rectifier, Pulse width Modulator,

Regulator IC and SMPS converting transformer.

2] Mode Detecting circuit :- It has 3 different resolution modes depending on the polarity of synchronous signals.

3] Vertical Deflection circuit :- This consists of mux, vertical oscillator, etc. The Vsync is applied to the vertical oscillator IC.

4] Horizontal drive circuit :- The Hsync signal is applied to Horizontal Drive IC. The output from Flyback Transformer is connected to Horizontal Driver IC.

5] Horizontal Output Circuit :- This generates the horizontal scan of high voltage to be applied to the CRT. The function of H-output stage is to serve as a switch for H-output circuit.

6] Video circuit :- The RGB analog signals are applied to transistor away via video amplifier IC. These signals are provided to cathode of CRT. The RGB output guns are controlled by variable resister inside the circuit.

Colour Palette.

→ 18 bit value for the colours to be displayed are stored in 256 colour registers.
→ 256 maximum colours can be displayed.
→ for each pixel of 8 bit value is used to select