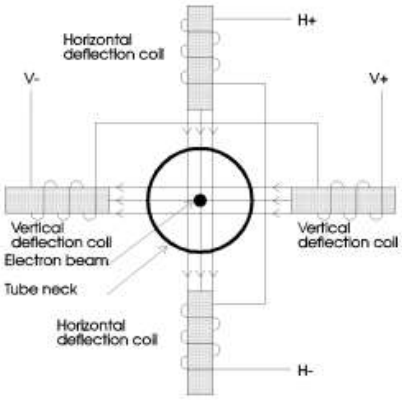
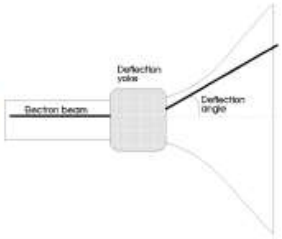
DEFLECTION



The beam is moved around the screen by magnetic fields generated by a deflection yoke. Starting in the top left corner the electron beam moves left to right across the 'raster' many times while it slowly moves top to bottom. When it strikes the front of the screen, the electrons collide with the phosphors creating light.

In magnetic deflection, two pair of deflection coils are mounted around the neck of the tube. The pair of coils above and below the electron beam cause horizontal deflection. Electrons move at a right angle to the flux lines (magnetic fields) created by the coils. The electron beam is bent at a right angle to the magnetic lines from the deflection coils.



The amount that the electron beam is bent depends on the strength of the magnetic field caused by current passing in the wires that form the deflection coils. To get a beam to sweep from left through center and to the right a current ramp must start with a large negative current. As the current decreases the beam moves back toward center. When the current reaches zero the beam is in the center of the picture. For the right hand side of the picture the current ramps up in a positive direction.

Raster Scan CRT

Television sets and most computer monitors are raster scan. The electron beam scans the screen from left to right and top to bottom to create a raster on the screen. Characters are formed by changing the brightness of dots at the required points on the raster.

Stroke monitor

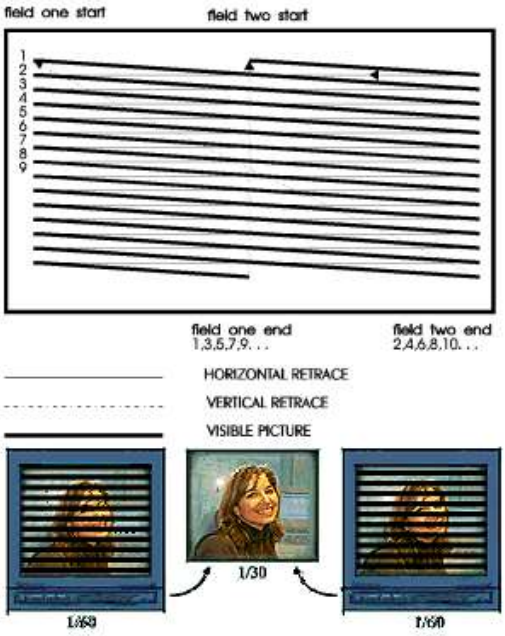
In the stroke character CRT the image is painted by the electron beam. There is no raster. This type of CRT is often used for computer aided design and other applications where line drawn images are used. The effect is much like a pen plotter.

INTERLACE

The next diagram shows an example of an interlaced picture. The odd lines are scanned first omitting the even lines. Then the even lines are scanned to complete the picture frame.

The benefit of an interlaced picture is that the horizontal and video rate can be cut in half. This makes the video card in the computer much easier to build. The video amplifier and the horizontal deflection circuits in the monitor are also simplifier. An interlaced picture as used in television, works well for pictures of flowers and trees or action shots. Generally an interlace picture is not excitable for data terminals or application where the viewer is close to the picture.

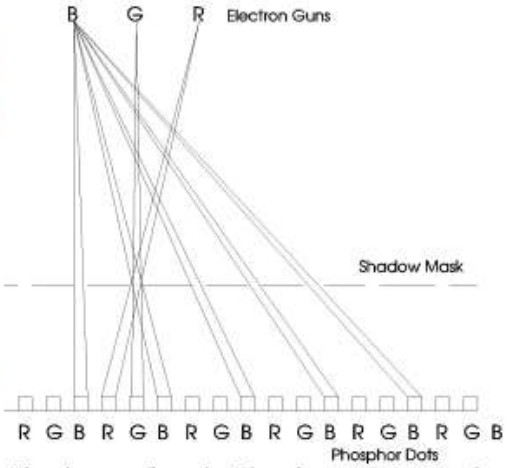
An example of where interlace does not work is the letter "E". The vertical bar in the letter is drawn both in the odd and even fields and thus gets updated 60 times a second. The three horizontal lines in the letter "E" reside in the odd field and only get drawn 30 times a second. This makes the right side of the "E" flicker.



SHADOW MASK

The electron gun resides in the back of the tube. A stream of electrons strike the phosphor coating on the inside of the tube. In color CRT's the beam passes through holes in a metal plate called a shadow mask. The purpose of the mask is to keep the electrons beams precisely aligned with the tri-color phosphor dots. The size and spacing of these holes are called the CRT's dot pitch. The smaller the holes the smaller the dot pitch and the sharper the image. The holes in most shadow masks are arranged in triangles, with the exception of Sony Trinitron CRTs that use slots.

The purpose of the shadow mask is to keep an electron beam from striking the wrong phosphor.



The electrons from the Blue electron gun can only strike Blue phosphor.

There are four different types of masks. Shadow Mask, Aperture Grill, Slot Mask and asymmetrical dot mask.

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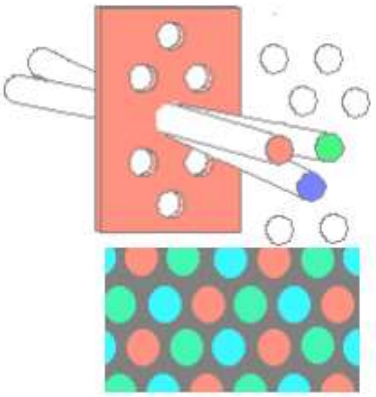
Shadow Mask



This is a very popular technology. It is made up of a screen laying just before the phosphors. A shadow mask has evenly spaced holes in the mask through which the red, green, and blue electron guns aim, helping the guns hit the right phosphor dots. The phosphor dots are also spaced evenly, so each triad of red, green, and blue dots forms an equilateral triangle. The center-to-center distance of 3 dots of the same color also form an equilateral triangle. Diagonal and vertical measurement of the pitch are equal. S shadow mask will absorb about 80% of the electrons.

Stripe Mask or Aperture Grill