

CRT: Crossover of Electron-beam Discussion !!

In conventional CRT's, the active coatings, from which the electrons, [and other particles], are generated, reside on the top, of the (cap), of the cathode cylinder. This cap, encased in the **G 1** structure [grid], always has a **larger** diameter than the aperture [hole], (in **G 1**), which is situated immediately above, the Cathode coating. The **G 1**, controls the amount of electrons, emanating from the coating, which must pass through it, to reach the screen.

Therefore, particles, (**electrons & ions**), generated from the periphery of the coating on the cap, (situated in a **360** degree radius), do **NOT** have un-impaired access through the aperture. They must be forced to do so. In effect, (for ease of explanation), let's just concentrate on **ELECTRONS** only.

This activity, basically results in a "**splitting**" of the electron stream, because electrons from the **right** periphery, must be bent toward the left, to go thru the **G 1** aperture, (from the impetus of the voltage on the **G 1**).

Similarly, electrons from the **left** periphery are forced to be bent to the right, to go thru the **G 1**. The same principle applies to the North side of the periphery, and ditto for the **South** side of the periphery of the Cathode cap/coating!

Then as the **split** beam is passed through the second controlling grid, (**G 2**), of the electron gun, [on its way to impinge on the phosphor screen], the electron beam attempts to **join** together, with the unimpeded part of the electron stream.

It does **join** up with the main stream, but the energy contained in those **forced** electrons, makes them to continue to go on crossing **THROUGH**, and beyond, the main stream. In effect, that results in another **splitting** of the electron stream, until something can bring it back together again. Basically, the resultant stream assumes a cone-like (ice-cream cone), appearance ... [if you could see it!]

Now the beam, diverging particles, attempting to **split** the electron

stream again, enter the anode structure (the **3rd** main structure of the Gun). They are accelerated, but then encounter a magnetic field, which is a correcting attempt, (either internal or external, depending on Gun Type), generated by, and called a “**focus**” **coil** [externally], (or part of the gun itself, called a “**focus ring**”.)

Normally, the voltages responsible for manipulating this process, **joins** the Electron Stream, together again, so that the Electron stream in unity, may do its assigned task. Ideally, the re-unification of the stream may be fixed to occur directly as it impinges on the Phosphor screen, resulting in a “needle-thin pinpoint” of light.

This action, thereby produces a clear/sharp image. **NOTE:** In the “needle-point”, [in a **525-line**}, with a **1024 X 768** dot size, there are **786,432** pinpoints of the Electron stream, **per square inch**.

Once again, **too little** focusing voltage causes the united electron stream to join together, **AFTER** it was supposed to impinge on the screen [at a point beyond the screen and glass of the face itself]. Conversely, **too much focus** voltage, would effect another “**crossover**”, **before** impinging on the Phosphor screen.

The final result, in both cases, would be a (blurry) picture, as the final dot stream, would be many times that, of what a properly-focused dot-beam should be.

NOTE: If the **G 1** aperture. was the same diameter as the cathode-coating, **NO** crossover would be created. In effect, that would be something like changing the electron stream from a **1024 X 768** dot size to a **256 X 192** dot size, or worse!. This would drastically effect/create a **blurry**) picture, because there would **NOT** be a fine pin-point created. Therefore, the dot size, would be many times larger than the crossover dot!