Carmine Cifaldi
7435 Fairlinks Court
Sarasota, Florida 34243
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Corey S. Powell, Editor-in-Chief:
Discover Magazine
90 5th Ave. 11th fl.
New York, N.Y. 10011

Re: June 2010 Issue, Page 12, *"After the Late Show"*

Dear Mr. Powell:

Did you ever try to change a 75-Watt light bulb, in order to substitute a different wattage type? If you were in a hurry, you would get an unwelcome *"hot potato"* in your hand, if you didn't wait about 10 seconds, till the bulb cooled off somewhat.

The picture shown represents electrons still being emitted, immediately after the power is turned off the T.V. The reason being, the filament of the T.V. Tube, (@ 6.3 Volts draws 600 milliamps of current); which creates heat of 1,472 Degrees F, [800 degrees C]. Even though the power has been cut off, the cathode can not be cooled immediately. Therefore the high temperature needs several seconds to be dissipated

That high temperature created by the filament, causes electrons to be emitted from cathode coating, in a process called *"thermionic emission".* The coating, I worked with was called *"Cathode Coating 100".* It was composed of a *triple carbonate*, as follows:

a) 56 % Barium could generate many electrons very quickly, for approximately 3-5 years.
b) 31 % *Strontium,* took longer to release electrons, but could do so, from 5-10 years.
c) 13 % *Calcium*; which took longer yet to release electrons, but could last 10-20 years!

NOTE: That is why, as T.V. sets aged, it took longer and longer, to show an acceptable picture. Technically, there was enough cathode coating, to produce electrons for100 years, (depending on conversion & activation activity).

The cathode coating was situated on the top outer portion of the cathode cylinder, called the *"Cathode Cap".* The Filament, resides inside the cathode cylinder, directly adjacent to the underside, of the Cathode Cap. When the Television set is turned off, the following activities take place:

a) The *sweep-circuit voltages* are immediately terminated;
These are the circuits responsible for the deflection of the electron beam, (from the vertical to the horizontal), from left to right and from the top of the picture to the bottom of the picture, according to the signal sent to it.

B) Voltage to Grid 1 (G1), is immediately terminated. This G1controls the amount of electrons which can be used in creating the picture, (including lightening & darkening).

C) Voltage to Grid 2 (G2), is immediately terminated. This voltage, greatly accelerates the electron stream, on its way to the phosphor screen.

D) The *focusing arrangement* is immediately turned off. This is the voltage necessary, [whether internally or externally controlled], to focus, (fine tune), the pinpoint dot of the electron beam

E) The *high-voltage* is likewise terminated. This is the voltage necessary to impel the focused electron beam (stream), to impinge on and light up, the phosphor particles *EXCEPT*, that the tube itself has a *"capacitive action".* The capacitive action, *SLOWS* the voltage from being terminated immediately, but rather allows it to get *less and less!*

***F) Eventually*, [in several seconds], the High-Voltage goes to *ZERO volts*. However, all the way down to *Zero, that decreasing voltage* was still accelerating those freed electrons, from the rapidly-cooling cathode-coating. This allowed those electrons to impinge briefly/momentarily, on the phosphor screen.**

G) This is aided /abetted by the fact that there is a *momentary retention* of light-output from the phosphor particles struck. The lighted phosphor particles themselves, which were struck by the electrons, *fade away slowly,* normally associated with the function of the phosphor, but generally described as "*decay-time"),of* the phosphor being used.

H) Finally, all the preceding events, allowed the phosphor to be excited momentarily, which produced the picture, as seen on *Page 12, of the June 2010 Issue, of DISCOVER MAGAZINE!*

Having said all the foregoing … to see that fleeting glimpse of the picture, as shown in …. Discover, page 12, all the time,* (as long as/whenever the T.V. set is on*), simply interrupt (stop) … the voltage going to the cathode of the Picture tube! You will see an un-accelerated, un-focused, un-swept picture of the Electron spot/beam, EXACTLY as shown on page 12!

That is because; there would be NO "difference of potential", between the Cathode and G1, to start the electron beam, on its way to the phosphor screen. Therefore the high voltage would NOT have the power to really light up the picture!

Yours truly,

Carmine cifaldi
www.cifaldi.org
ccifaldi@tampabay.rr.com