
THOMAS ELECTRONICS

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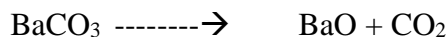
RE: REACTIVATION RECOMMENDATIONS FOR THOMAS ELECTRONICS
CATHODE RAY TUBES (CRT) AFTER EXTENDED STORAGE.

Thomas Electronics Inc recommends the following cathode reactivation for CRTs after extended storage. For the purpose of this review, extended storage is taken to be a CRT stored for a period of one year or more without operation in an ambient temperature below 100 ° C.

The cathode used in most CRT designs is commonly called an oxide cathode or barium oxide cathode. It contains a coated surface consisting of a solid solution of barium, strontium and calcium oxides supported on a nickel base. The coating is sprayed on the surface of the cathode.

A filament indirectly heats the coating.

Thomas receives the cathode from the manufacturer in the carbonate state, with binders to hold the coating in place. Thomas places the cathode into the electron gun and then flame seals the gun into a glass envelope. The bulb / gun assembly is placed in an exhaust oven and vacuum is drawn to 10^{-7} torr. During this exhaust cycle, voltage is applied to the filament and the cathode coating is heated. During this heating cycle, several chemical reactions occur that result in the formation of a barium oxide coating. A typical reaction is:



The carbon dioxide is pumped out during the exhaust process and is not present in the CRT during normal operation.

The CRT is removed from the exhaust pump and a second stage to cathode activation occurs in which current is drawn from the cathode with the cathode operated at elevated temperatures. This current draw and elevated temperature is needed to enable chemical reduction of the cathode coating. This stage of breakdown consists of both electrolysis of the oxide by passage of current and chemical reduction by reducing agents.

The CRT is then ready for normal operation. The above operations have resulted in a surface whose work function has been established at 0.5 electron volts by formation of a dipole layer. Surface temperature is typically 750 ° C.

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The surface established above can support electron loading up to 1 A/cm² and can last for several thousand hours of operation, depending on loading and duty cycles etc.

If the CRT is not operated for an extended storage period, it is possible that some residual gas may be absorbed on the cathode surface. In the unlikely event that optimum performance is not immediately achieved upon initial turn on, Thomas recommends the CRT be run for 24 hours, with the filament set at its rated voltage. This action will re-establish the emission layer while evaporating any surface contaminants that may be present.

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