backlight controller that controls operation of the backlit LCD monitor, monitors faults and performs replace before fail analysis. **FIG. 1** is a perspective view of an exemplary embodiment of the backlight assembly **100** of a backlit LCD monitor. Shown in **FIG. 1** is a backlight assembly **100** that includes a series of fluorescent bulbs **102** having parallel longitudinal axes. The bulbs **102** provide the backlight source used in the backlit LCD monitor. In as exemplary embodiment of the present invention, the bulbs **102** are driven by two inverters to generate a backlight luminance of 1000 nits and the backlights have a maximum capability of providing over 1400 nits of luminance. In an exemplary embodiment, 31 cold cathode flourescent tubes (CCFT) are aligned horizontally in parallel, running from the left to the right of the LCD. The CCFTs are housed in a rugged aluminum enclosure that is lined with a highly reflective, flame retardant material that is designed to harness all of the light that is generated by the CCFTs and focus it towards the LCD.

[0024] **FIG. 2** illustrates an exemplary embodiment of how the bulbs **102** are driven electrically. The backlit LCD monitor includes two inverters **202/204** for driving the bulbs **102**. In a preferred embodiment, thirty-one bulbs **102** are used and the bulbs are interlaced between the two inverters **202/204**. Every other bulb **102** is connected to the same inverter **202/204** so that, in the example shown in **FIG. 2**, odd numbered bulbs **102** are coupled to inverter **202** and even numbered bulbs **102** are coupled to inverter **204**. If one inverter **202/204** fails, sufficient backlight is generated across the entire display area by the bulbs **102** coupled to the working inverter **202/204**.

[0025] **FIG. 3** is an exploded, perspective view of the cooling assembly **300** coupled to the backlight assembly **100** and an LCD screen **10**. Shown in **FIG. 3** is a cooling assembly **300** which is mounted on the backside of the backlight assembly **100** and comprises a combination of passive and active cooling techniques. Light from the backlight assembly **100** is emitted to an LCD screen **10** opposite the cooling assembly **300**. The cooling assembly **300** includes a heat sink **302**, which in an exemplary embodiment comprises a finned aluminum plate, for conducting heat away from bulbs **102**. The heat sink **302** lies on the side of the cooling assembly **300** that faces away from the backlight assembly **100**. In an exemplary embodiment, the heat sink is constructed from a milled block of aluminum or aluminum extrusion to optimize the thermal coefficient. Heat that is generated by the backlights is dissipated through the heat sink fins that provide optimized surface area.

[0026] In an exemplary embodiment, the cooling assembly **300** also includes an air inlet **304** and two air outlets **306**. Bulbs **102** are positioned in a closed air space, also referred to as the backlight chamber, provided between backlight assembly **100** and cooling assembly **300**. A gasket could be used to connect the backlight assembly **100** and the cooling assembly **300** in order to create the closed air space. The air inlet **304** and air outlets **306** are in fluid communication with this internal closed air space. Also shown in **FIG. 3** is a sensor assembly **308** which includes a number of light sensors to monitor the light output across bulbs **102** and a temperature sensor to measure the temperature of the air in the closed air space or backlight chamber. The sensor assembly **308** is positioned perpendicular to the axes of the bulbs **102**. Signals from the light sensors are provided to a controller for monitoring as described in further detail herein. Also shown in **FIG. 3** is a sensor assembly **310** on the back of the cooling assembly **300** that faces away from the backlight assembly **100**. This sensor assembly measures the temperature of the air near the heat sink **302**.

[0027] **FIG. 4A** is an exploded, perspective view of an exemplary embodiment of the rear cover portion of the backlit LCD monitor. Shown in **FIG. 4A** is a rear cover assembly **400** which is placed over the cooling assembly **300**. The rear cover assembly **400** includes exhaust fans **402** in fluid communication with the air outlets **306**. Exhaust fans **402** direct air away from the rear cover assembly **400** as indicated by the arrows in **FIG. 4A**. A filter (e.g. a HEPA filter) **404** is placed over a cover inlet **406**. In another embodiment, some other dust reducing device such as a gas purging system or another form of dust free air supply may be used in place of the filter. The cover inlet **406** is in fluid communication with the air inlet **304** on the cooling assembly **300**. During operation, the exhaust fans **402** draw air through the filter **404**, through the air inlet **304**, over the bulbs **102** and out through the air outlets **306**. This reduces the interior temperature of the backlit LCD monitor and allows the bulbs **102** to operate at a higher current and/or in higher ambient temperature conditions. Another fan **408** in the rear cover assembly **400** directs air into the space between the rear cover assembly **400** and the cooling assembly **300**, hereafter referred to as the "electronics chamber", as indicated by the arrow in **FIG. 4A**. This air is directed through an opening in the rear cover assembly **400** and onto the heat sink **302**. This further reduces the interior temperature of the electronics chamber of the backlit LCD monitor.

[0028] **FIG. 4B** is a cross-sectional view depicting the backlight assembly **100**, the cooling assembly **300** and the rear cover assembly **400**. The front of the backlight assembly **100** may include a diffuser **101** so that light emitted to the LCD screen **10** is uniform. As noted above, a gasket **90** may be used to form an airtight chamber encompassing bulbs **102** between the backlight assembly **100** and the cooling assembly **300**. Fan **402** draws air over bulbs **102** through filter **404**. In addition, fan **408** directs air at the heat sink **302**. As described in further detail herein, the fans are controlled by a controller in response to sensed temperature.

[0029] **FIG. 5** is a high level block diagram of an exemplary backlit LCD monitor control system. In an exemplary embodiment, the system includes a microprocessor based controller **500** or application specific integrated circuit (ASIC) that is designed to optimize the performance of an LCD monitor by monitoring, controlling and recording the performance of each of the monitor subsystems. One function of the controller **500** is to control the brightness of the bulbs **102** through the inverters **202/204**. Light sensors **506**, part of the sensor assembly **308** mounted on the side of the cooling assembly **300** facing the backlight assembly **100**, monitor the brightness of the bulbs **102** and provide brightness signals to the controller **500**. Multiple light sensors **506** may be used, and the signals may be averaged to provide an average brightness. Based on the sensed brightness, the controller **500** can increase or decrease the current to the inverters **202/204** in order to increase or decrease the output of the bulbs **102**.

[0030] In an exemplary embodiment, the bulbs **102** are driven to produce 1000 nits of luminance but have a capa-