

first display device **102** and the second display device **106**. The optical film **110** may be used to remove moiré interferences and more evenly distributes the incident light across its surface area to eliminate variations in intensity. Although illustrated with one optical film, any number of optical films may be used as desired. For example, an optical film may be provided behind the second display device **106**.

**[0030]** The optical films may be made from transparent plastic material that may be selected from one of the following materials: polycarbonate (PC), poly-methyl methacrylate/styrene copolymer (MS), cyclic olefins copolymer (COC), poly(ethylene terephthalate) glycol (PETG) and polymeric methyl methacrylate (PMMA), polystyrene (PS).

**[0031]** FIGS. 1B and 1C illustrate an exploded perspective view of the lighting module. Referring now to FIG. 1B, a front portion of the lighting module **112a** may have a light diffuser **114** and heat shield **116**, both of which may be supported by brackets **118** and **122**. Light diffuser **114** and heat shield **116** can generally be referred to as “light films,” with such light films being generally transparent or translucent, and also adapted to direct light from the lighting module **112a** to the optical module **100**. Although described only with a light diffuser **114** and heat shield **116**, the lighting module **112a** may have other light films as desired by the user, such as a brightness enhancement film to direct light in a specific direction, a dual brightness enhancement film to recapture any reflected light and direct it in a specific direction, or the like.

**[0032]** The lighting module **112a** may also have a plurality of light sources **120** supported by bracket **122** and plate **124**. The lighting module **112a** may also have a light reflector **126** positioned between the plurality of light sources **120** and plate **124**. In one embodiment, light reflector **126** may not be necessary as reflective material may be disposed directly on a surface of plate **124**.

**[0033]** Light diffuser **114** and reflector **126** may be designed to direct the light generated by the plurality of light sources **120** toward the optical module **100**. It will be understood that optical module **100** is shown only for reference and does not form part of the lighting module **112a**. Heat shield **116** may be designed to absorb heat generated from the plurality of light sources **120** so that heat is not directed toward the optical module. This prevents the break down and/or warping of the display devices **102**, **106** or optical film **108**. Light diffuser **114** may be made of a transparent substrate having a relative refractive index such that it can refract and diffuse the light. The transparent substrate may be made of material such as polycarbonate, acrylate, or the like. Heat shield **116** may be made a transparent material having a low thermal conductivity such as certain kinds of plastic, glass, and the like. Light reflector **126** may be fabricated from a material with a high coefficient of reflection which causes most of the light emitted from the plurality of light sources **120** in the direction away from the optical module **100** to be redirected toward the optical module **100**.

**[0034]** The heat shield **116** may be positioned near a first surface of the plurality of light sources **120**. The plurality of light sources **120** may be cold cathode fluorescent lamps (CCFLs). However, the plurality of light sources **120** may be any other type or configuration of light or illumination source able to illuminate a reflective or transmissive light, such as arrays of light emitting diodes (LEDs), incandescent lamps, and the like. The plurality of light sources **120** may be designed to emit a desired brightness, and may have a plurality of redundant light sources.

**[0035]** In one embodiment, the redundant light sources may continuously emit light such that the display may be brightly illuminated. When one of the plurality of light sources breaks down, the display may still be brightly illuminated, although a bit dimmer, due to the use of redundant light sources. For example, if ten CCFLs are needed for a given application to have enough light, then 15 CCFLs may be installed and turned on. In this manner, several of the “redundant light sources” may fail and the display will still be operational.

**[0036]** In another embodiment, the redundant light sources may be turned off. However, as further discussed below, the redundant light source may be turned on to emit light when desired by a user or when a processor detects one of the plurality of light sources no longer emits light. In yet another embodiment, some of the redundant light sources may be turned on while others are turned off.

**[0037]** Brackets **118**, **122** may surround the outer edges of the plurality of light sources **120** to provide support for the plurality of light sources **120**. Plate **124** may be disposed on a second surface of the plurality of light sources **120** to provide the necessary rigidity and support for lighting module **112a**. Plate **124** may also act as a heat transfer medium to absorb heat generated by the light sources **120** and may be made from any rigid material, such as aluminum. Plate **124** may be removably coupled to brackets **118**, **122** to form an enclosure around the plurality of light sources **120** and to seal the plurality of light sources **120** in a sealed enclosure.

**[0038]** As stated above, the light sources **120** may generate a lot of heat. Additionally, other electronic components, such as ballasts, transformers, and other devices necessary to supply the light sources with the electrical energy required to generate illumination, may generate additional heat. Therefore, heat dissipation is an important aspect of the display device. Referring now to FIG. 1C, a further portion of lighting module **112b** may have a cooling component having a plenum **128** disposed near the plate **124** and a first plurality of fans **134a**, **134b**, **134c** positioned between the plate **124** and the plenum **128**. A plurality of heat sinks or heat exchangers **130a**, **130b**, **130c** may be coupled to the plenum via heat exchange bracket **140**. A second plurality of fans **132a**, **132b**, **132c** may be coupled to each of the plurality of heat exchangers **130a-c**. In one embodiment, the “lighting module” may contain both **112a** and **112b**. However, in another embodiment, **112a** may be a separate module from **112b**.

**[0039]** Plenum **128**, heat exchangers **130a-c**, heat exchange bracket **140** and fans **132**, **134** may be made of any material able to withstand and conduct heat such as aluminum or an aluminum alloy, a polycarbonate material, or any other suitable material. The components may be coupled to each other via any known means, such as screws, bolts, snap fit, and the like.

**[0040]** The plenum **128** and the first plurality of fans **134a-c** may be designed to circulate air flow in the lighting module **112a** (FIG. 1B) to dissipate and transfer the heat generated from the plurality of light sources **120**. Heat exchangers **130a-c** and the second plurality of fans **132a-c** may be designed to circulate an air source through heat exchanger **130** to absorb and transfer heat from the heated circulated air. Referring now to FIG. 1D, a perspective view of an exemplary flow of a cooling medium through the lighting module is shown. In one embodiment, a captive or re-circulated fluid, such as air, may be used to cool the lighting module **112**. The flow of the re-circulated fluid is illustrated with reference to