

Enhancing the Visibility of the NUMITRON Display in Sunlight

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NUMITRON digital display devices when used with filters are readily visible in high ambient light including bright sunlight. A few basic design practices, however, can enhance the overall presentation and assure maximum visibility.

Sharp characters together with a good contrast ratio provide the best possible visible display. Because the NUMITRON devices by design provide a sharp character, improved visibility is obtained by providing the greatest possible contrast ratio. This contrast ratio is a measure of the relative luminance of portions of the display and takes into account both the figure and its background. The following specific design practices are recommended to maximize the overall display contrast ratio.

1. Use the NUMITRON light shields to eliminate the side-to-side reflections from adjacent devices. (DS3000 for the DR2100 series and DS3001 for the DR2000 series NUMITRON Devices).
2. Provide a dark, preferably black, matte finish on the outside or facing surface of the panel containing the cutout for the NUMITRON devices and filter. A paint recommended for this finish is 3M Company's "NEXTEL" brand (velvet coating) No. 101-C10 black paint or equivalent. The matte finish on the panel eliminates reflections (mirror effect) of objects or light immediately in front of the viewing area. The mirror effect would reduce display contrast and add confusing bright areas around the numerals.
3. Use an anti-reflection-type filter in front of the NUMITRON display to eliminate reflections from the filter itself. A recommended filter is the Panelgraphic Corporation

Chromafilter CF-133 or equivalent. These filters, colored red, amber, green, blue, neutral-gray, and blue-green, are recommended for the NUMITRON devices. The colors amber and gray give the best visibility. Red and green also work very well.

4. Select a filter having a low light transmission (about 8 to 14%). Such a filter is desirable because it attenuates the light, such as sunlight, coming from an outside source. Because the NUMITRON devices provide high-brightness displays, the numerals are highly visible even behind low-transmission filters.
5. Mount the filters and the front panel with a downward slant of about 10° . This slant will reduce reflections from objects in front of the display.
6. Mount the display assembly (NUMITRON device plus filter) in a light-tight enclosure. Block out all external light from the back and sides. In addition, paint the inside of the enclosure with the 3M NEXTEL paint, or equivalent, to give it a black matte finish.
7. Provide an overhang or awning for the overall enclosure of the display and, if possible, recess or tunnel all four sides. This type of structure reduces the effect of sunlight shining into the display area.

Each of the above recommendations contributes to the overall visibility of a NUMITRON display used in high ambient light. If all the techniques are applied, the NUMITRON display should be easily readable even in direct sunlight.