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The Use of Parking and Auxiliary Lamps for Traffic Sign Illumination  

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16. Abstract  
In 1997, the U.S. government introduced an option of having headlamps labeled as visually/optically aimable (VOA). To be so labeled, the vertical gradient of the light output needs to meet certain minimum requirements. A concern with VOA lamps is that they might provide less light above the horizontal than conventional U.S. lamps, thus reducing the effectiveness of retroreflective signs. This study examined 36 first-generation VOA lamps, to assess the reduction of light above the horizontal. Furthermore, this study addressed the possibility of maintaining the status quo of light for sign visibility, by supplementing light from VOA lamps with light from either parking lamps or an auxiliary lamp mounted just above the driver.  

A comparison of the first-generation VOA lamps in our sample with market-weighted U.S. low beams from 1997 indicates that, on the right side of the beam pattern, just above the horizontal, the mean deficit from VOA lamps can reach 1,400 cd per lamp. Two considerations lead to the conclusion that parking lamps will not be able to make up for this deficit. First, current U.S. requirements limit the output of parking lamps above the horizontal to no more than 125 cd. Second, the retroreflective geometry for parking lamps (i.e., the resultant observation angle) provides either no advantage or only a marginal advantage over headlamps. A lamp mounted on the roof just above the driver would provide a substantial advantage over headlamps in terms of retroreflective geometry, because the observation angles for such a lamp are smaller than for either headlamp. Taking into account this advantage, a single such lamp would need to have a peak intensity between 1,500 and 2,000 cd to make up for the deficit created by both VOA headlamps.  

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