

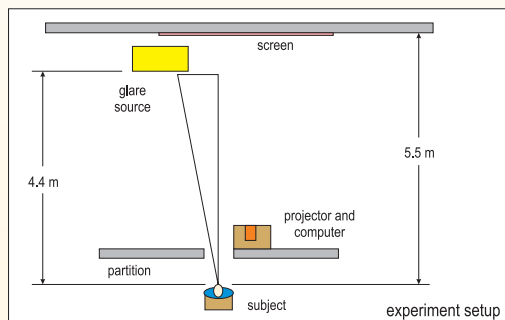
Effects of Headlamp Glare Exposure on Glare Recovery and Discomfort

The LRC is examining visual recovery to headlamp glare for the National Highway Traffic Safety Administration (NHTSA). With new headlamp technologies, drivers may be exposed to greater glare than with conventional tungsten halogen (TH) headlamps.

More than 5000 drivers have complained to NHTSA about glare discomfort and reduced visibility. Some complaints describe problems when approaching oncoming vehicles, while others describe how glare blinds the drivers for seconds even after passing the other vehicle. These drivers may be experiencing problems with visual re-adaptation—the ability of the eyes to recover their sensitivity to see objects after being exposed to glare.

Research Objective

- Determine the extent to which different headlamps' photometric performance affects the driver glare recovery time after passing an oncoming vehicle.



Methodology

- Calculated a glare profile library from headlamp photometric data as a function of headlamp type, mounting height, and misaim.
- Chose test profiles to represent a broad range of glare exposure conditions.
- Conducted a laboratory study using the selected glare profiles by exposing subjects to the test glare profiles.
- Asked subjects to respond immediately to a target (presented by a projector immediately after the glare was extinguished).
- Recorded this visual recovery time as a function of target location and contrast.
- Recorded discomfort glare ratings.

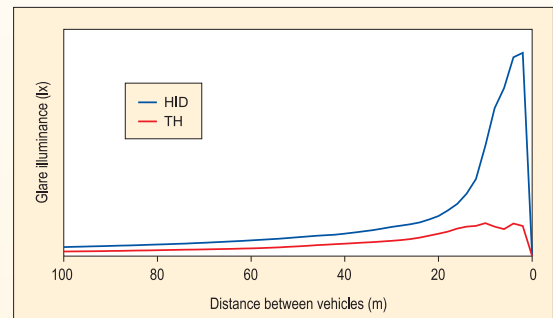
Sponsor

National Highway Traffic Safety Administration (NHTSA)

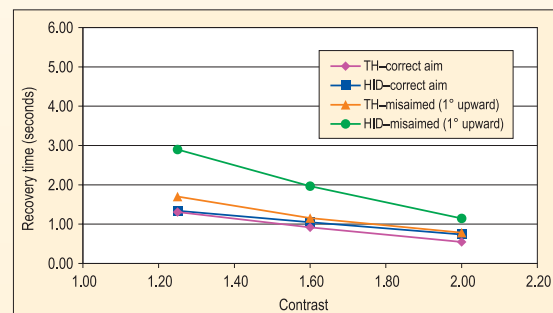


Results

- The total amount of glare exposure, or glare dosage, determines the length of recovery time. Greater glare dosage results in longer recovery time.
- The peak glare exposure determines the discomfort rating.
- The amount of discomfort felt during a glare exposure does not indicate recovery time. Greater feelings of discomfort do not necessarily mean long recovery times and lower feelings of discomfort do not mean short recovery times.
- HID and halogen systems result in similar recovery times when properly aimed.
- HID systems result in significantly longer recovery times when misaimed upwards by 1°.



Typical glare illuminances at a driver's eyes as two vehicles pass each other.



Recovery time to glare exposures simulating typical HID and TH headlamp systems, nominally aimed and misaimed 1° upward.

Lighting
Research Center