

# LED Beacon Lights Evaluated

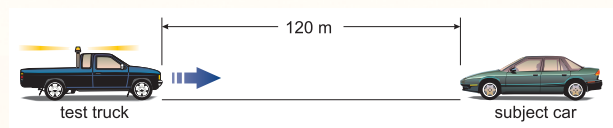
Warning beacon lights are commonly found on highway maintenance and construction trucks. Traditional rotating incandescent beacons have relatively high wattages that can drain the truck's battery power. Consequently, these trucks' engines often idle for long periods of time when they are parked at construction sites. Warning beacons using LEDs are available, and have much lower wattages, which would allow the engines of maintenance trucks to be turned off while the beacons could still operate for several hours. This could have substantial benefits in reduction of vehicle emissions, fuel costs, and wear and tear on the engines.



An LRC researcher attaches a beacon light to the test truck.

## Experiment

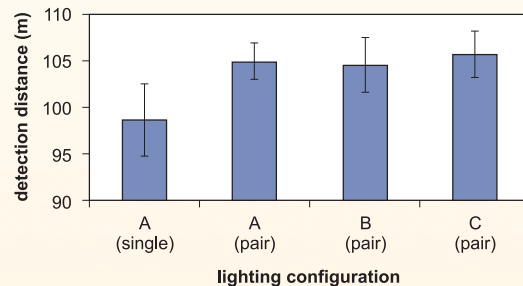
To measure closure detection, subjects sat in a parked car while facing a truck equipped with either a single incandescent rotating beacon, a pair of rotating beacons, or one of two pairs of different LED beacons. The truck moved slowly toward the car and the subject pressed a switch as soon as they could detect that the truck had moved. Distances between the truck and car were longer for the pairs of beacons than for a single beacon, but there were no differences among any of the pairs of warning beacons.



Experimental layout. The test truck began 120 m from the subject car and drove slowly toward it for each experimental trial.

## Purpose

The New York State Department of Transportation (NYSDOT) asked the LRC to evaluate several LED warning beacons to ensure that they produce the same visual effectiveness as a warning signal as the traditional incandescent beacons. LED beacons flash rather than rotate, and NYSDOT wanted to ensure that this difference did not impact the ability of drivers to see the warning beacons and to judge relative distance and speed of a vehicle equipped with them.



Mean closure detection distances for each lighting configuration; A – conventional rotating beacon, B and C – LED beacons. Error bars indicate the standard deviations for all subjects under each condition.



Warning beacon lights mounted on the test truck—single configuration, left, and pair configuration, right.

## Implications

As long as they are used in pairs, which is NYSDOT's usual practice, warning beacons using LEDs are functionally equivalent to traditional incandescent rotating beacons. Their reduced wattages can have substantial advantages at reducing NYSDOT's environmental footprint for maintenance and construction activities.

## Sponsor

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