Remote Airfield Lighting Systems

2007 Project Update

Many remote communities, such as those in Alaska, depend on air transport for business and emergency aid. Night landings at remote airfields are often dangerous. The LRC explored ways to help make night landings at remote airports safer and area communities more accessible.

This project developed specifications for remote airfield lighting systems that optimize performance, minimize cost, are visually effective and reliable, use minimal energy, are easy to implement, and require low maintenance.

Above: Study subject viewing scale model simulation of remote airport and surrounding community at night

Right: Prototype airport fixtures developed by the LRC were used in flight tests in Alaska and North Dakota to validate laboratory results. Placed at the corners of a runway, these fixtures helped to confirm the optimum spectrum, intensity, flash rate, and distribution for airport lighting.

Experiment

Researchers simulated visual conditions of airfield lighting by using a scale model capable of varying the LED intensity, color, flash pattern, viewing angle, and spatial arrangement of simulated airfield lights. Subjects viewed different lighting scenarios and were asked to locate the airfield and determine the runway's orientation. Researchers measured subjects' elapsed time, accuracy rate, and confidence level in locating the appropriate airfield.

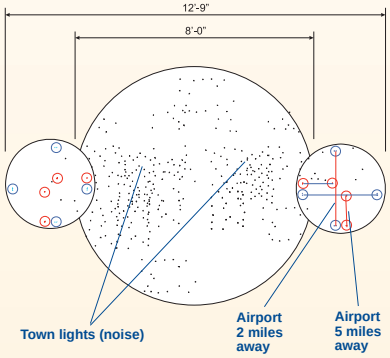

Diagram of scale model used to simulate remote airport lighting at night

Results

- Airfield lighting should be visible to both peripheral and foveal (central) vision:
  - "Locate and identify" task involves both peripheral detection and foveal examination
  - Airfield lights should not disappear when looked at directly
- A system for mesopic photometry, developed earlier by the LRC, works well for specifying the spectrum of airfield lighting.
- Detection of airfield lighting is best described by a purely scotopic spectral sensitivity.
- When airfield orientation and visual confirmation are required, the fitted spectral response requires some photopic contribution.
- A pilot's confidence rating for identifying the airport follows a similar trend, but with slightly more photopic contribution.
- Additional edge lights, located between the four corner lights, contribute little to identifying and orienting to the runway. If used, edge lights should be as bright as corner lights.

Project Team

Federal Aviation Administration (FAA)
Center for General Aviation Research (CGAR)
Lighting Research Center (LRC)
Embry-Riddle Aeronautical University
University of North Dakota - Aerospace
University of Alaska

Sponsors

Federal Aviation Administration (FAA)
Center for General Aviation Research (CGAR)

Rensselaer

View LRC Project Sheets at
www.lrc.rpi.edu/resources/newsroom/projectsheets.asp

Lighting Research Center

Lighting Research Center, Rensselaer Polytechnic Institute • 21 Union Street • Troy, NY 12180 • (518) 687-7100 • www.lrc.rpi.edu