Remote Airfield Lighting Systems

Many remote communities, such as those in Alaska, depend on air transport for business and emergency aid. Night landings at remote airfields are often impossible due to inadequate lighting. This is often caused by limited availability of electricity to power the lighting.

The LRC is helping to make night landings at remote airports safer and area communities more accessible.

This project set out to develop specifications for remote airfield lighting systems that optimize performance, minimize cost, and:

- be visually effective
- be reliable
- use minimal energy
- be easy to implement
- require low maintenance

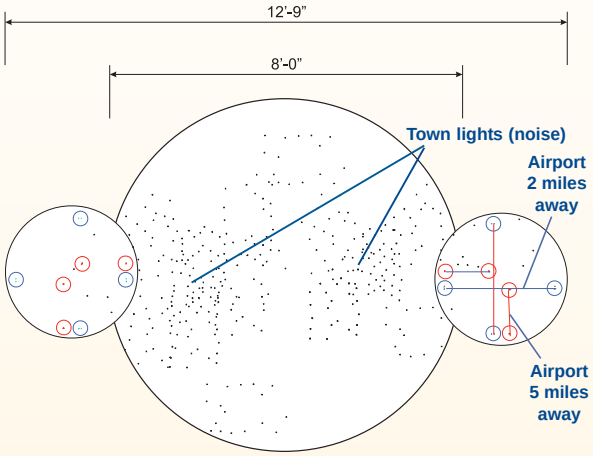
Experiment

Researchers use a scale model to simulate visual conditions of airfield lighting. The model includes a means to vary the LED intensity, color, flash pattern, viewing angle, and spatial arrangement of simulated airfield lights.

Subjects view different lighting scenarios and are asked to locate the airfield and determine the runway's orientation.

Researchers measure subjects' elapsed time, accuracy rate, and confidence in locating the appropriate airfield.

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



Preliminary 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 for optimum performance.
- 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.

Project Team

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

Sponsors

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