

## DELTA

## Snapshots

Issue 5 Private Office Lighting Controls

The benefits that can be achieved from using lighting controls are not widely recognized. While reducing energy cost is a major reason to install lighting controls, employee satisfaction should also be considered. The following study evaluated lighting controls in private offices and found that employees use and appreciate dimming controls.

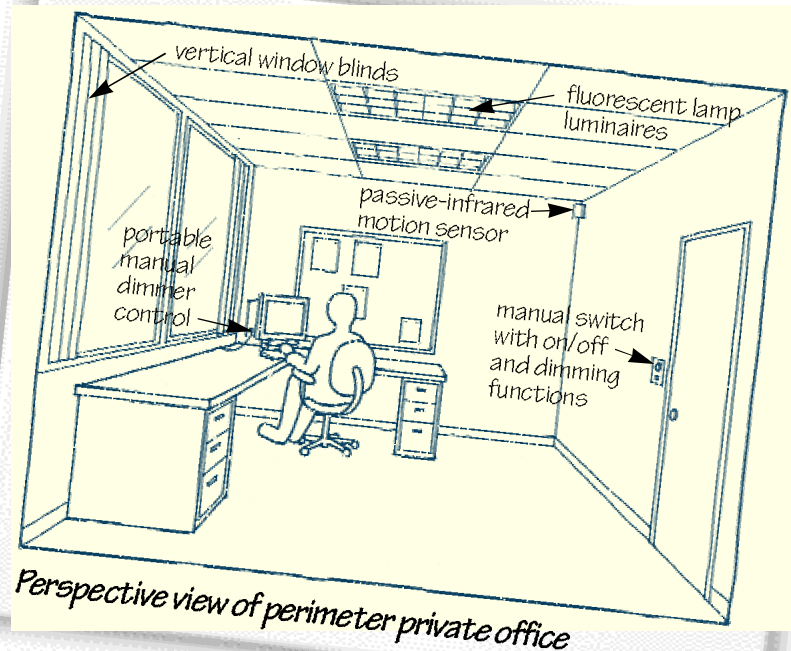
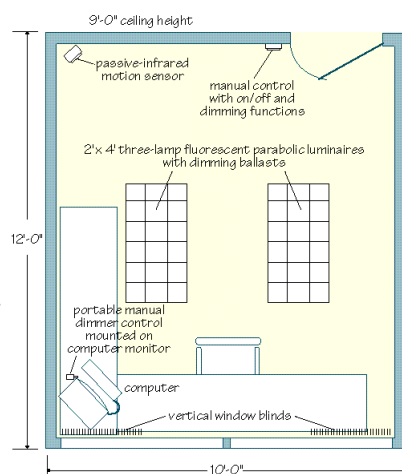
### Application Profile

The National Center for Atmospheric Research (NCAR), located in the Foothills Laboratory Campus in Boulder, Colorado, is a 250,000 ft<sup>2</sup> three building complex. The typical building consists primarily of private offices.

In 1991, in response to employee requests recognizing that quality lighting is good for business, building managers replaced the facility's entire lighting control system. The renovation added automatic controls, including motion sensors and manual switches with on/off and dimming functions.

From December 1996 to March 1997 the Lighting Research Center conducted a study of 58 private offices on a typical building floor to evaluate the effectiveness of automatic and manual lighting controls and employee acceptance of them.

Private office floor plan



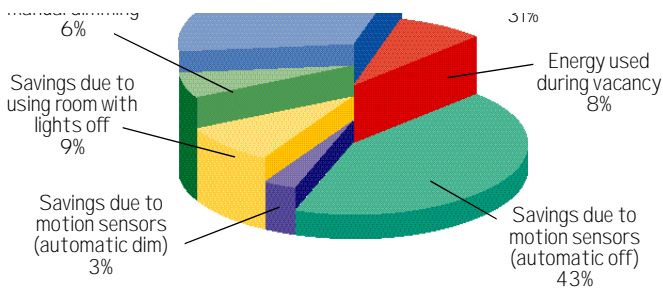
### Objectives

- Evaluate employee satisfaction regarding automatic and manual lighting controls
- Evaluate the effect of manual lighting control location (accessibility) upon users
- Evaluate the effectiveness of automatic and manual lighting controls for saving energy

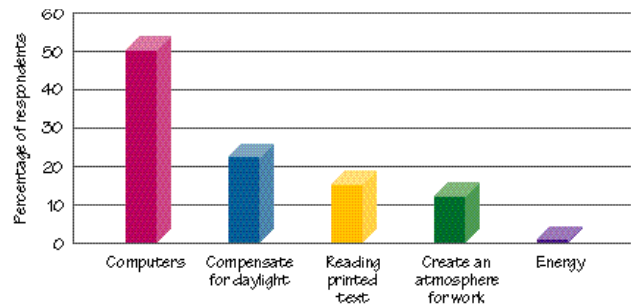
### Luminaires and Controls

Private offices include two 2' x 4' ceiling-recessed luminaires, each equipped with an 18-cell parabolic louver, three 32-W T8 fluorescent lamps with a correlated color temperature (CCT) of 4100 K, and electronic dimming ballasts. Manual window blind controls are used in perimeter offices. Private office electric lighting is controlled by:

- Manual wall switch near entry door with combination on/off and dimming function
- Portable manual dimmer control on the desktop
- Passive-infrared motion sensor mounted in room corner



Office lighting energy usage and savings compared to lights full-on (10 hour workdays for 7 weeks)



Reasons given by employees for adjusting lighting

## Findings

- Employees value having control over their work environment. They prefer manual lighting controls to automatic controls because the manual controls allow them to tailor the lighting to their needs. During the course of the study, 74% of the employees used the manual dimmers at least once.
- Employees prefer desktop over door-side lighting control by a ratio of 6:1. During the study, they adjusted the lighting two-thirds more often when desktop controls were provided.
- Manual dimming can achieve energy savings. The study showed a 6% energy savings from manual dimming, even though the employees manually dimmed to improve the work environment, rather than to save energy.
- Significant energy savings can be achieved from automatic lighting controls. The study showed a 43% energy savings resulted from using motion sensors to turn lights off in vacant offices.
- Well-designed lighting controls save energy. The combination of manual and automatic lighting controls used during the study period accounted for a 61% energy savings.
- Employees in perimeter offices often used manual controls to turn lights off and work under daylight.
- Employees in perimeter offices typically adjusted their window blinds to occlude direct sunlight while allowing diffuse daylight to enter the room.



Manual dimmer mounted on computer monitor

**DELTA Snapshots • Issue 5 • May 1999**  
**National Center for Atmospheric Research, Boulder, CO**  
**Sponsors: U.S. Environmental Protection Agency and The Watt Stopper**

### Research Project Sponsors:

Bonneville Power Administration, California Institute for Energy Efficiency, GE Lighting, Horton Controls, Motorola Lighting, Inc., National Center for Atmospheric Research, Prescolite-Moldcast Lighting, U.S. Environmental Protection Agency, The Watt Stopper

**Products:** Luminaire, Columbia Lighting; lamps, GE Lighting; ballasts, Motorola Lighting, Inc.; building automation system, Staefa; manual control, custom designed by NCAR, now available through Starfield Controls; motion sensor, The Watt Stopper

### DELTA Program:

**Directors:** Naomi Miller, Sandra Vasconez

**Principal Investigators:** Dorene Maniccia, Mark S. Rea and Burr Rutledge

**Research Specialist:** Daniel Zuczek

### DELTA Members:

Consolidated Edison Company of New York, Inc.  
 New York State Energy Research and Development Authority  
 Northeast Utilities System  
 Lighting Research Center

**Drawings:** Michiko Yoshida-Hunter

**Publication:** Judith Block

**Graphic Design:** JSC Communications, Inc.

# Rensselaer

## LRC

Lighting Research Center

For publications ordering information contact:

Lighting Research Center, Rensselaer Polytechnic Institute, Troy, New York 12180-3590 • FAX (518) 276-2999

Phone: (518) 276-8716 • e-mail: lrc@rpi.edu • World Wide Web: <http://www.lrc.rpi.edu>

Copyright © 1999, Rensselaer Polytechnic Institute. All rights reserved. Neither the entire publication nor any of the information contained herein may be duplicated or excerpted in any way in any other publication, database, or other medium and may not be reproduced without express written permission of Rensselaer Polytechnic Institute. Making copies of all or part of this publication for any purpose other than for undistributed personal use is a violation of United States copyright law.

