NOTE:
EQUIPMENT FURNISHED AND INSTALLED BY TCM.

SEQUENCE OF OPERATION:
CHANNEL 1 = SCHEDULE ON / OFF (STAFF)
CHANNEL 2 = SCHEDULE ON / OFF (CUSTOMER)
CHANNEL 3 = SCHEDULE ON / OFF (ACCENT)
CHANNEL 4 = SCHEDULE ON / OFF (SHOW WINDOW)

TIME CLOCK PROGRAMMING NOTES:

STAFF= HALF OF THE LIGHTING FOR CLEANING AND STOCKING PURPOSES.
*SCHEDULE "ON" 1 HOUR BEFORE STORE OPENING TIME, "OFF" 1 HOUR AFTER STORE CLOSING.

CUSTOMER= HALF OF THE LIGHTING FOR STORE OPENING.
*SCHEDULE "ON" AT STORE OPENING AND "OFF" AT STORE CLOSING.

ACCENT= DIRECTIONAL DISPLAY LIGHTS AND RECEPTACLES FOR DISPLAY LIGHTS.
*SCHEDULE "ON" AT STORE OPENING AND "OFF" AT STORE CLOSING.

SHOW WINDOW= CEILING MOUNTED RECEPTACLES AND LIGHTING ABOVE SHOW WINDOWS.
*SCHEDULE "ON" AT STORE OPENING, "OFF" AT STORE CLOSING.

STORE BUSINESS HOURS:

"STAFF" IS DEFINED:
MONDAY THROUGH SATURDAY - 5:45 AM UNTIL 11:15 PM
SUNDAY - 8:45 AM UNTIL 8:15 PM

*CUSTOMER, ACCENT AND SHOW WINDOWS" ARE DEFINED:
MONDAY THROUGH SATURDAY - 9:45 AM UNTIL 9:15 PM
SUNDAY - 11:45 AM UNTIL 6:15 PM

TYPICAL
LIGHTING CONTACTORS TO BE FURNISHED AND INSTALLED BY EC ACCORDING TO MANUFACTURERS SPECIFICATIONS.

1 LIGHTING CONTACTOR WIRING DIAGRAM
NONE

2 TRACK LIGHTING WIRING DETAIL
NONE

Greengate - LiteKeeper® 4

Stand Alone Lighting Control Panel Technical Specifications

PART 1. GENERAL

1.01 - INTRODUCTION

The work covered in this section is subject to all of the requirements

in the General Conditions of the specifications.

Contractor shall coordinate all of the work in this section with all the trades covered in the other sections of the specification to provide a complete and operative system.

1.02 - DESCRIPTION OF WORK

Extent of lighting control system work is indicated by drawings, and by the requirements of this section. It is defined to include low voltage lighting control panels, switch inputs, and wiring.

Type of lighting control equipment and wiring specified in this section include the following:

Low Voltage Lighting Control Panels

Requirements are indicated elsewhere in these specifications for work including, but not limited to, raceways and electrical boxes and fittings required for installation of control equipment and wiring:

Not work of this section

1.03 - QUALITY ASSURANCE

a. UL & ULc Approvals
The control panels shall be tested and listed under the UL 916 Energy Management Equipment standard and CSA C22.2 #205 by a nationally recognized testing laboratory.

b. NEC Compliance
The control system shall comply with all applicable National Electrical Codes regarding electrical wiring standards.

c. NEMA Compliance
The control system shall comply with all applicable portions of the NEMA standards regarding the types of electrical equipment enclosures.

d. Component Pre-testing
All control equipment shall undergo strict inspection standards. The equipment shall be previously tested and burned-in at the factory prior to installation.

e. System Checkout
A factory trained technician or factory authorized personnel or contractor shall functionally test the control system and verify performance after installation.

f. Manufacturer
Manufacturer shall have a minimum of 20 years experience in control systems. Manufacturer shall provide off the shelf control products from its inventory. Control systems that require custom assembly and sizing shall not be acceptable. Manufacturer shall be PCI Lighting Control Systems, Inc., 1-802-658-6445, Fax 1-802-658-6934. Product shall be LiteKeeper®-4 control panel or approved equal.

1.04 - SUBMITTALS

a. Product Data
Submit manufacturer's data on lighting control system and components.

b. Shop Drawings
Submit drawings of lighting control panel and accessories including, but not necessarily limited to the low voltage relay panels, power wiring, and switch inputs.

PART 2. PRODUCTS

2.01 - MATERIALS AND COMPONENTS

A. SYSTEM DESCRIPTION

1. The lighting control system shall consist of low voltage relay control panels with 4 programmable switch inputs and shall offer up to 4 control relays.

2. Each low voltage lighting control panel shall be microprocessor controlled. Programming shall be accomplished through either the RS-232 port or through the network connection employing the Keeper Enterprise software or with an integral 2 x 16 - 32 character self-prompting LCD display and programming keypad.

3. Programmable intelligence shall include Time-Of-Day control, 32 holiday dates, warm occupants of an impending off, timed inputs, preset control, auto daylight savings, astronomical clock w/offsets, and local control.

TOD	64 Time-Of-Day/holiday schedules for 365 day programming
Holidays	32 holiday dates
Warm Off	Flash lights and provide an extra 1 second to 99 minutes of illumination
Preset	Pre-programmed switch patterns
Timed Inputs	Switch input timers 1-999 minutes
Timed Overrides	Timed override 1-999 minutes, resumes to normal schedule
Local Control	From keypad & LCD display or local switch
Astronomical Clock	Longitude and latitude input with sunset-sunrise offsets to customize outdoor lighting
Auto Daylight Savings Adjust.	Automatically adjusts the clock at the appropriate dates, selectable
Priorities	Establishes a hierarchy for inputs and network control commands
Masking	Provides permission orientation to switch inputs and network commands thereby ensuring building lighting control integrity.
Soft-Linking	Group linking for rapid programming

4. Relays may be designated as either normally open or normally closed from the software. Relay status shall not only disclose commanded relay status but next scheduled state to occur.

5. Each control panel shall provide a Warn Off (flash the lights) to inform the occupants of an impending Off command. The Warn Off command shall provide an adjustable time duration of 1 second to 99 extra minutes. The occupants may exit the premises with adequate lighting or cancel the Warn Off by overriding the lighting zone. This option occurs with all Off commands except local overrides.

6. The controller shall permit lighting to be overridden On for after hours use or cleaning. The controller shall provide optional switch timer assignments or timed overrides. The override choices for various relays shall provide special event occurrences and the controller shall return to the programmed state after the override event. Also, the controller shall provide priority and masking choices to customize the functions of switch inputs, thereby enabling switches to function differently at different times of the day to meet special facility operational requirements. These overrides shall be hard-wired inputs.

7. Programming the controller shall be through the RS-232 port or through the network connection. Communication to the panel or network can be accomplished via, RS-232, modem, or TCP/IP. Programming the controller shall also be accomplished through the integral keypad and LCD display. Descriptive information shall assist the user to employ the system with a programming manual. Lighting control systems that utilize removable programming keypads shall not be acceptable.

8. Priorities and/or Masking shall be assigned to inputs, telephone override, and global commands to insure building integrity. Priorities enable or disable the inputs based on user actuation of overrides. Masks shall permit: On only, Off only and On & Off control for intelligent after hours utilization of the controlled facility based on Time-Of-Day scheduling in the controller.

9. The lighting control system shall log all control events. The controller shall monitor all relay actuations, switch inputs and user intervention. Log reports shall be available for any duration of time the operator chooses through the Keeper Enterprise Software. Runtimes for each relay shall be available from the Keeper Enterprise Software.

B. HARDWARE FEATURES

1. Diagnostic Aids
Each control panel shall incorporate diagnostic aids for confirmation of proper operation, or in case of failure these aids shall guide the individual in rapid troubleshooting of the system.

The control panels shall employ both a backlit LCD and LED's to indicate:
POWER (LED)
SYSTEM OK (LED)
ON/OFF STATUS of EACH RELAY (LED & LCD)
SYSTEM CLOCK AND DATE (LCD)
PROGRAMMING CONFIRMATION (LCD)

Control systems that do not provide visual self-help diagnostics shall not be acceptable.

a. Status Indication of Relays
The system shall provide visible status indication of all relays through the window of each control panel. The visual indication shall disclose On/Off status and relay number. Systems that do not provide relay status while the enclosure door is closed shall not be acceptable.

2. Operator Interface
The control panel programming interface resides in firmware in the control panel. The programming interface shall consist of a circuit board mounted keypad and 2 line x 16 character LCD display. The integral keypad shall provide access to the main programming features. The keypad shall permit the user to manually command any or all relays individually. It shall also allow the user to link switch inputs and time schedules to relay outputs. Each panel shall control its own loads from internal memory. A control system that relies on a central control computer/processor or external time clocks shall not be permitted. Systems that utilize blocking diode technology for relay assignments shall not be acceptable.

3. Overrides
The controller shall provide timers for each override. Each override timer shall be capable of 0-999 minutes. Software shall enable or disable overrides based on Priorities, Masks or Time Of Day scheduling.

a. Dry Contact Inputs
The control system shall permit 4 dry contacts inputs for override purposes. Momentary 3 wire or 2 wire (toggle) inputs shall be supported. Maintained contacts shall be supported as 2 wire (SPST) inputs. Inputs shall be dry contacts (24 VDC @ 12 ma. internally supplied to the inputs). The 24 VDC power supply is provided with an auto-resettable fuse. Should an inappropriate electrical connection be made the design will protect the board and switches until the fault is removed. Any switch input shall be software linked to any number of relays for override control. The control panel shall have dry contact inputs on the logic board. Control systems that utilize separate accessories to allow for dry contact switches shall not be acceptable.

b. Photocell Control
The controller shall accept dry contact ambient light sensors. The controller shall provide power for the sensor thereby eliminating any external power supply. Sensors shall provide for outdoor and indoor applications and issue a command to the controller once the threshold is reached. The sensor shall provide user adjustable dead band control.

c. Remote Overrides
The controller shall accept remote commands issued from other inputs. The controller shall provide this feature without the need to add extra equipment to the controller. Remote overrides can be issued from the Telephone Interface Module (TIM), Photocells, Motion Sensors, or Dry Contact Switches. Lighting systems that need to add extra equipment to receive remote overrides are not acceptable.

4. Service Override & Priority Override
The control panel shall provide a three position master-service override for the control unit. The service override shall not be accessible from the exterior. Systems that provide a service override on the exterior of the controller shall not be acceptable.

The master service override provides a single three-position switch with the option of All Off, Auto, and All On, respectively. This master switch shall operate all of the relays in the controller. This switch shall override and supersede all commands from the logic board when the switch is in the All On or All Off position. The master switch shall function to override all the relays should the logic board programming differ from the space function.

The system shall remember the last command to the individual relays. Upon returning the master override switch to the Auto position, the relays shall return to the most recent command state. This will occur even if the last command happened during the master override condition.

5. Relays
The LiteKeeper®-4 comes standard with electrically held 20amp 120/277VAC relays. Relays must be specified Normally Open or Normally Closed. The wire terminations shall be able to accept 10 AWG. Relays that are latched or mechanically held are not acceptable. The relays shall be rated for 10 million mechanical operations.

6. RS-232 port
The controller shall provide an RJ-12 connection for RS-232 communications. Programming shall be permitted through either a local connection or remotely through a modem. The Keeper Enterprise software accessory includes a six wire communication cable to connect to the controller. Systems that do not include an on-board RS-232 port for communications are not acceptable.

7. Integrated Design
The controller CPU board and relays shall be mounted on the same board. The controller board shall be modular and designed for rapid field replacement or upgrading.

8. Memory Back-up
The system shall utilize a memory back-up device that is system integrated and shall be non-serviceable. The data in RAM shall be protected against power interruptions lasting as long as 7 days. The power interrupt protection circuit shall be entirely maintenance-free.

9. Voltage Specific Transformer
The controller shall incorporate a voltage specific transformer. The controller shall require specification of voltage for each control location. The voltages of 120 or 277 VAC shall be available for specification.

10. Lockable Enclosure
Each control panel shall be enclosed in a lockable NEMA class 1 enclosure. The enclosure shall be manufactured out of 1/16" steel and shall provide pre-punched knockouts for efficient installation. The controller enclosure shall provide four relays per unit.

11. Keeper Enterprise Software
The PC based interface software accessory provides access to lighting control system files within a Microsoft® Windows® environment. The Keeper Enterprise software shall support Windows® 2000, Windows® XP and above. The optional software package shall allow individual panel programming to be executed locally, via direct connection or remotely through a TCP/IP connection or modem. The central programming software shall permit the user to modify the control panel programming or configuration in an "OFF-LINE" mode. This software package shall store all programmed data and archive for future use. Systems using third party software are not acceptable. Systems that are not capable of creating program backups are not acceptable.

The following features shall be standard in the PC based software:

a. Standard Software Features:
Real Time Relay Status Monitoring
Alpha-Numeric Descriptors
Communications: Direct, TCP/IP and Modem
Status Indication
Global Software Modifications
Manual Relay Commands
Relay Pattern Commands
Preset Options
User Management - Password protection, and privilege modification for multi-user security.
Logging of Controller Actions (switch inputs, TIM commands, & relay actuations)

b. File Maintenance
Archive Programs
Data Base Restoration
Uploading and Downloading of Programs
Snap Shots -- Indication of changes and flawless panel restoration.

Software package shall permit the PC to be utilized for other functions (i.e. word processing, database, & etc..) besides lighting control. Systems that require an "on-line" dedicated computer for control system operation shall not be acceptable.

12. Stand Alone Hardware Accessories
The LiteKeeper® 4 has several hardware accessories that may be utilized to enhance your lighting control application. Select from the stand alone hardware accessories which accessories will be utilized for your application.

☐Use this hardware accessory
a. Ethernet Interface Module (EIM)
Internet Connection Specifications: The control system accessory provides easy access to control panels over a TCP/IP connection by converting sent information into RS-232 communication capable information. This unit operates on standard 110VAC. Manufacturer shall provide proper cabling from controller to Ethernet Interface Modules. RJ-45 connections are the responsibilities of others.

This specification will outline the respective responsibilities of PCI and of the customer when a TCP/IP connection is used for communication to the PCI Lighting Control Systems network.

PCI's Responsibility to the Customer
PCI will supply one Ethernet Interface Module per network when a TCP/IP connection is used.

Instructions on how to install and configure the Ethernet Interface Module shall be supplied by PCI.

Customer's Responsibility
The customer will provide an IP address, Subnet Mask, Default Gateway, and a TCP Port Number for each Ethernet Interface Module required. The customer shall provide a qualified Network Administrator to properly configure the device(s). Any future changes to the customers TCP/IP network that affect the operation of the device(s) will be the customer's responsibility.

The customer will be responsible for any Internet and Virus Protection Security measures. This includes, but is not limited to, Firewall, Proxy Servers, and Virus Protection Software.

The customer will provide a qualified Technician to install and connect the Ethernet Interface Module to the building's LAN and to the PCI Lighting Control Systems lighting panel. The Ethernet wire should be Category 5 wire and installed per Category 5 wiring specifications.

☐Use this hardware accessory
a.1. VPN hardware device accessory: An optional VPN hardware device may be added to your lighting control network and building LAN to ensure security of your building LAN and lighting control network.

☐Use this hardware accessory
b. Telephone Interface Module (TIM)
The control system shall provide intelligent software for the Telephone Interface Module (TIM) option. The optional TIM unit shall allow modem communications and touch-tone overrides from any touch-tone phone. The control system shall be multi-tasking and permit up to one TIM for each control panel.

Override Operation: Touch-tone interface shall permit the control panel to command pre-assigned control points On\.Off. All user interfaces shall be through the twelve Touch-tone keys on the telephone. All entries into the override system shall be prompted by a digitized voice. Systems not employing voice guided override instruction are not acceptable.

The TIM shall provide individual control passwords. Each password shall allow a preset group designation (number of relays) and the duration of the telephone override. TIM shall also provide a password to prevent entry into the override control system.

☐Use this hardware accessory
c. Modem
The control system shall be capable of modem communications. Each control panel shall provide a serial communications port for external telecommunications. The modem shall utilize the Hayes compatibility standard and enable modem access as defined by the Bell 212A and CCITT V.22 protocol standards.

The system shall be a multi-tasking system and permit more than one modem in operation at a time communicating on the network. Communication speed shall be a minimum of 14,400 baud.

☐Use this hardware accessory
d. N2 Gateway
The LiteKeeper® network shall permit data protocol translation through a building automation interface Gateway. The N2 Gateway shall permit Johnson N2 communication protocol to operate individual relays, relay groups and read the status of those relays. The LiteKeeper® network shall respond efficiently to the requested information from the Johnson N2 network.

☐Use this hardware accessory
e. BACnet Gateway
The LiteKeeper® network shall permit data protocol translation through a building automation interface Gateway. The BACnet Gateway shall permit BACnet communication protocol to operate individual relays, relay groups and read the status of those relays. The LiteKeeper® network shall respond efficiently to the requested information from the BACnet network.

☐Use this hardware accessory.
f. LON Gateway
The LiteKeeper® network shall permit data protocol translation through a building automation interface Gateway. The LON Gateway shall permit LonWorks communication protocol to operate individual relays, relay groups and read the status of those relays. The LiteKeeper® network shall respond efficiently to the requested information from the LonWorks network.

C. ACCEPTABLE PRODUCTS

1. Product
LiteKeeper® 4 lighting control unit manufactured by PCI Lighting Control Systems, Inc., 6 Green Tree Drive, So. Burlington, VT 05403-6025

PART 3 EXECUTION

3.01 Equipment Installation and Documentation

a. Installation
The control system shall be installed and fully wired as shown on the plans by the installing contractor. The contractor shall complete all electrical connections to all control circuits, and override wiring.

b. Documentation
The contractor shall provide accurate "as-built" drawings to the owner for correct programming and proper maintenance of the control system. The "as-builts" shall indicate the load controlled by each relay and the relay panel number.

c. Operation and Service Manuals
The factory shall supply all operation and service manuals.

3.02 PRODUCT SUPPORT AND SERVICE

a. Factory Support
Factory telephone support shall be available at no cost to the owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment.

3.03 SYSTEM DELIVERY AND ACCEPTANCE

a. Delivery
The contractor is responsible for complete installation of the entire system according to strict factory standards and requirements. The following items shall constitute factory standards and requirements:

1. All system equipment shall operate in accordance with specification and industrial standard procedures.
2. An operational user program shall exist in the control system. The program shall execute and perform all functions required to effectively operate the site according to the requirements.
3. Demonstration of program integrity during normal operation and pursuant to a power outage.
4. Contractor shall provide a minimum of two training hours on the operation and use of the control system. Additional support services shall be negotiated between the contractor and the building owner or manager.

3.04 WARRANTY

a. Warranty
Manufacturer shall supply a 3-year warranty on all hardware and software. These warranties will be in affect for all installations. Systems that provided special warranties based on installation shall not be acceptable.

Cooper Controls
203 Cooper Circle Peachtree City, GA 30269
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F: 800-954-7016
www.coopercontrol.com

Date: 09/22/14

NewStudio Architecture
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ANTHROPOLOGIE

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HALLBERG ENGINEERING
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1750 Commerce Court, White Bear Lake, MN 55110
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STATE OF MAINE
PAUL
D11553
LICENSED
PROFESSIONAL ENGINEER

DRAWN BY: DJQ	CHECKED BY: KLS/PJF
NSA PROJECT NUMBER: 2013-99	
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REVISION :

SHEET TITLE :
LIGHTING CONTROL DIAGRAM

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