



A Lighting Control Network with Endless Possibilities



User Manual

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Hardware

Introduction

The Tandem is a simple, low-cost networkable lighting control panel that provides a superior alternative to traditional panels that use time clocks, twist timers and contactors. The Tandem provides automated control of line-voltage lighting circuits and low-voltage dimming circuits based on programmed groups, panel switches, photosensors and time schedules. Multiple panels can be networked to share common attributes across a site application.

Pre-programmed control strategies allow users to quickly configure panels to control their spaces. Each panel has up to 48 switch inputs, 4 analog photosensors, 16 digital stations, up to 24 0-10V dimmers, an astronomical clock (sunrise/sunset) and a 7-day schedule clock (with 2 holiday lists). These controls are easily integrated to provide the user robust control of the entire lighting system.

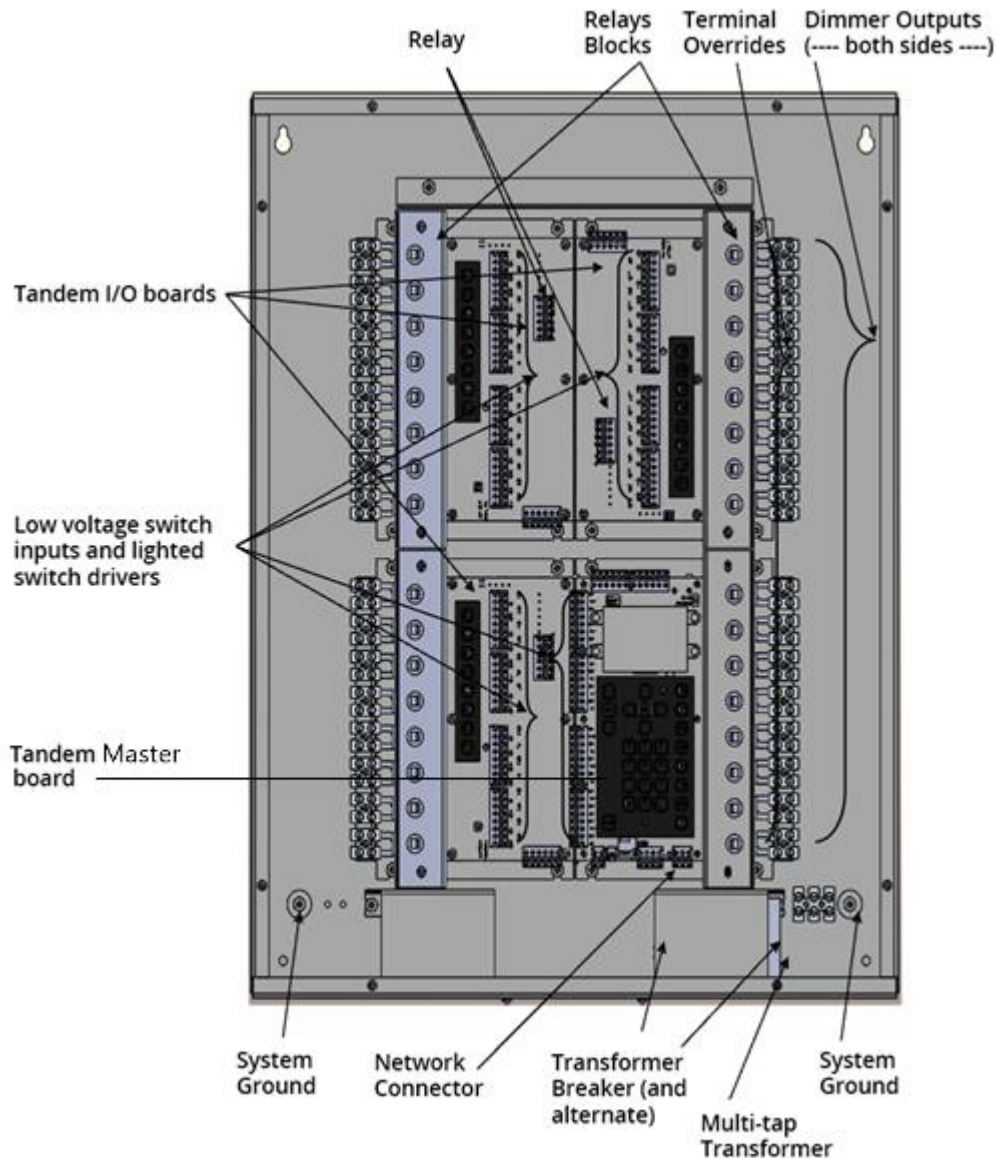
Applications

Tandem panels save energy by turning lights off or dimming them when full lighting is not needed, making them well-suited for both interior and exterior applications. The Tandem lighting controls system is widely used in many types of buildings, including offices, schools, medical facilities, and retail spaces. In addition, the Tandem system is ideal for exterior spaces such as parking lots, courtyards, and parking garages.

Interior lighting can incorporate after-hours overrides with timed sweeps, Sentry Switches™ or AS-100 line voltage switches. Exterior lighting can be controlled via a location-based astronomical clock (sunrise and sundown) photosensor or an analog photosensor, in addition to other methods.

Tandem Lighting Control System Hardware Overview

The diagram below provides a typical layout of a Tandem Panel.



Hardware components

Enclosure – The standard Tandem Panel includes a NEMA 1-rated enclosure. The panel interior is divided into line voltage section(s) and a low voltage section. The line voltage section(s) contains the primary voltage side of the transformer, the lighting relays, and the lighting load terminal blocks. The low voltage section contains the secondary voltage side of the transformer and electronic components (LCD screen, low-voltage inputs, etc.).

Transformer – A multi-tap control transformer provides 24VAC to power the Tandem motherboard. The transformer has a resettable breaker accessible both through the knockout plug in the low voltage compartment or in the high-voltage section of the enclosure.

Relay Outputs – Up to 48 relays are controlled by programs entered using the on-board keypad or through the PLC Designer software. Lighting loads are wired from the electrical service panel into the relays in the Tandem enclosure and then out to the lighting fixtures.

Relay Overrides – Each relay includes a “hardware” override on top of each relay.

WARNING – relay overrides bypass the Tandem logic board control and have no feedback to the logic board. Hardware overrides should only be used if the logic board fails to operate. The Tandem logic board has individual “software” overrides (RY1-RY8) which can be used to control the relay state during normal operation.

AUTO/MANUAL Switch

- While in **AUTO** mode, the panel will execute programs as entered by the user.
- While in **MANUAL** mode, the panel will no longer execute programs and will hold relays in their current state.

Photosensor Inputs

- The photosensor terminals supply +24VDC to photosensors and receives 0-10VDC analog signals in return. Each photosensor input includes the option to convert a 4-20mA signal to a 1-10VDC signal by setting an associated jumper (see below).
- For **ON/OFF** control, the input analog signal is compared to pre-programmed upper and lower set points. Transitions above and below the pre-programmed set points control groups of relays and dimmers.
- For dimming control, the input analog signal can be mapped to a desired dimming response.
- Refer to the Input Device Wiring section below for guidance on wiring photosensors

Switch Inputs

- The Tandem Panel supports 2-wire momentary, 3-wire momentary, 2-wire maintained, 2-wire motion sensor, and 2 and 3-wire cleaning override switches.
- The low-voltage terminal supplies +24VDC to an external device (switch, motion sensor, dry contact, etc.) and receives a switched signal(s) in return. A low-voltage switch will return +24VDC (switch is closed) or 0VDC (switch is open).
- When the switch transitions states, the Tandem Panel generates a pre-programmed output command.
- Each switch input includes a lighted switch output (LSO) for lighted switches. The tracking feature of the LSO is programmable for many options.
- Refer to the Input Device Wiring section below for guidance on wiring switches.

Dimmers

- The 0-10VDC dimming outputs can be controlled by schedules, switches, analog photosensors, and the local keypad.
- Up to 24 0-10VDC sink drivers can control 0-10VDC drivers.
- Unique graphing options allow the user to custom program dimmer response in a variety of ways.

USB Port

- The Tandem includes a USB 2.0 Port with a MINI B connector for use with a personal computer.
- The USB port provides a HyperTerminal interface to the keypad and display of the Tandem Panel.
- The USB port also provides an interface to PLC Designer software for panel programming.
- The USB port can be used to backup and restore user programming.
- The USB port can be used to update the Tandem Panel firmware.

MicroSD Port

- The MicroSD port can be used to backup and restore user programming.
- The MicroSD port can be used to update Tandem firmware.

CANBus Port

- The CANBus port allows the user to connect to digital switches.
- Each Digital Switch provides the user with up to 5 buttons which can activate any Tandem panel function as defined in user programming.

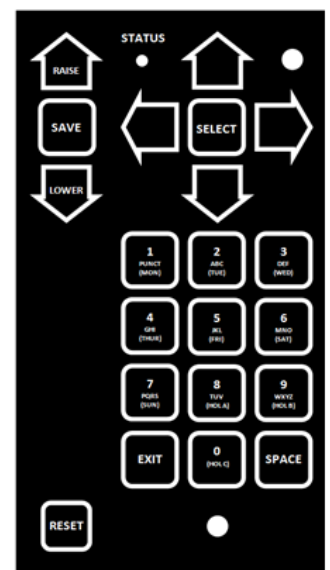
Keypad

The keypad (shown at right) is used to program and view the Tandem panel set up.

UP, DOWN, LEFT, RIGHT – used to move the active field (highlighted area) around the screen

SELECT – used to select current highlighted item

RAISE, LOWER – used to scroll through entries in a highlighted field or move to the next entry in list



SAVE – used to save the data on the current screen

0, 1-9 – used to input numeric, alphanumeric and day of week (Mon.-Sun.) entries

SPACE – used to add blank space in a name or used to scroll through entries in a toggle field

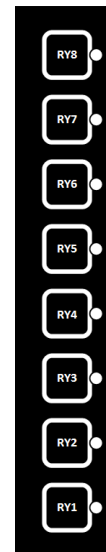
EXIT – used to leave current screen

RESET – used to reset the panel microprocessor

Relay Override

Relay override buttons (shown at right) can be used to temporarily change the relay state until the next programmed or override event.

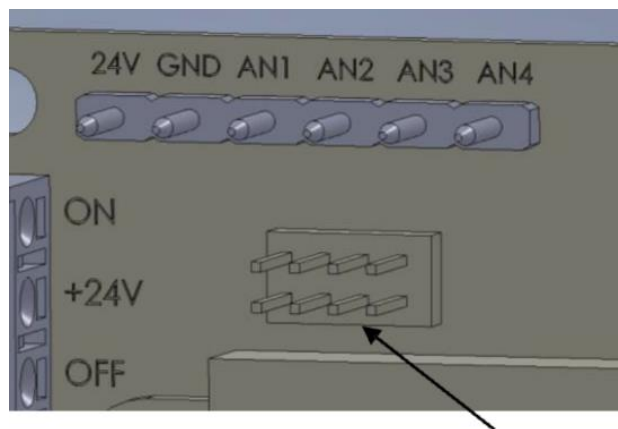
RY1 – RY8 – Used to change relay states



Photosensor Interface Terminal Block

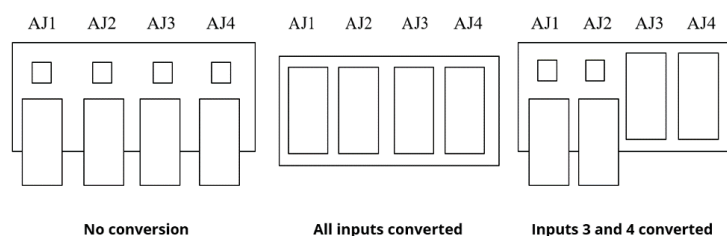
The photosensor interface terminal block is located at the top of the Tandem Master Board.

As shown in the diagram below, the interface includes six terminal pins labeled **"24V"**, **"GND"**, **"AN1"**, **"AN2"**, **"AN3"** and **"AN4"**, corresponding to the 24VDC and GND outputs provided from the panel to the photosensors and the received 0-10VDC or 4-20mA signals output from the photosensors to the panel.



Current to voltage conversion jumpers

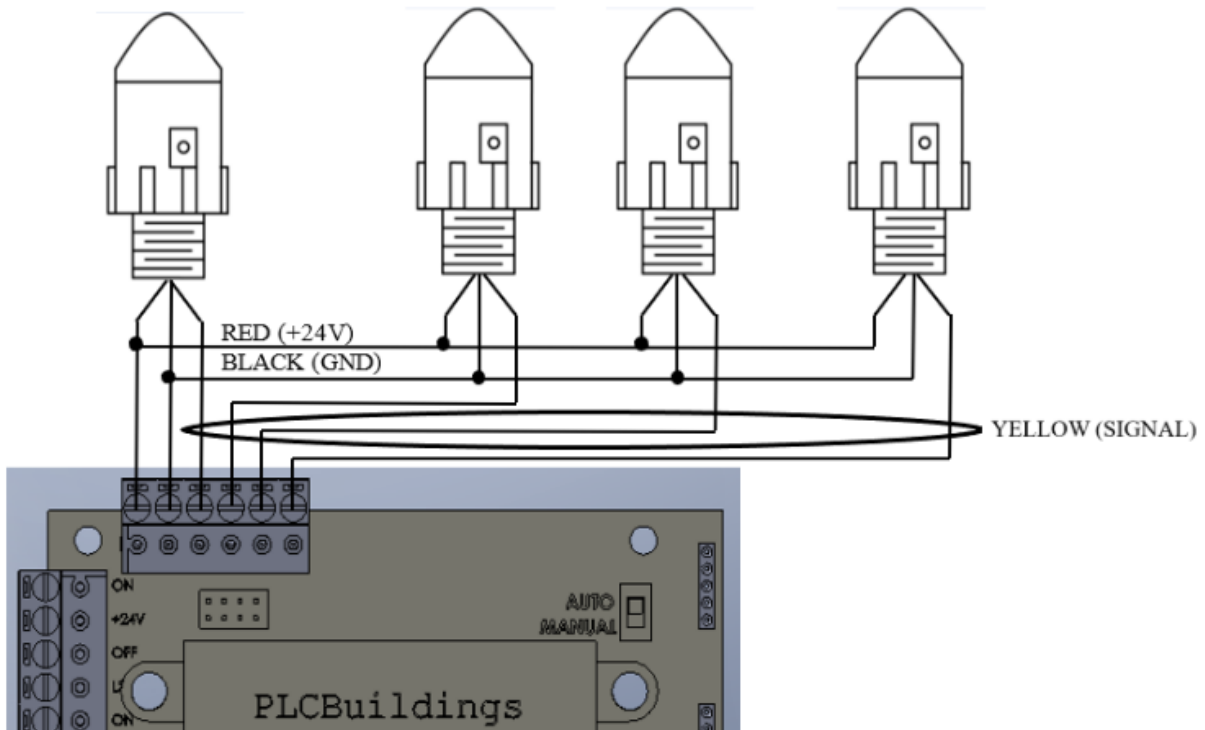
The mA conversion jumpers are located on a terminal block directly below the interface terminal block as shown above. A jumper vertically placed across a pair of pins will convert an incoming 4-20mA signal to a 1-10VDC signal as described in the examples below:



Input Device Wiring

Photosensor Wiring

Photosensors are wired to the Tandem Master Board as shown in the diagram below.



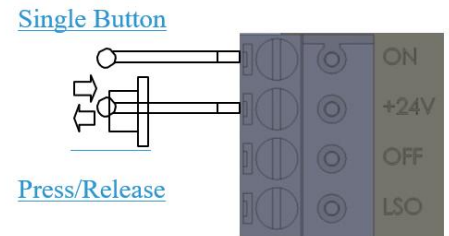
The Tandem Panel is preprogrammed to support PLC Multipoint photosensors as shown in the table below.

PLC Multipoint Photosensor	Output Signal Range		Sensor Range (FC)	
	Lower	Upper	Lower Endpoint	Upper Endpoint
CES_I_xx_1_10	1V	10V	0	100
CES_O_xx_1_10	1V	10V	0	250
CES_A_xx_1_10	1V	10V	0	1000
CES_S_xx_1_10	1V	10V	0	2000
CES_L_xx_1_10	1V	10V	0	40
MAS_I_1X	4mA	20mA	0	100
MAS_O_1X	4mA	20mA	0	250
MAS_A_1X	4mA	20mA	0	1000
MAS_S_1X	4mA	20mA	0	2000

Switch Wiring

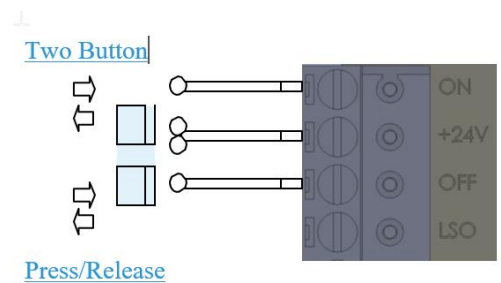
Single button, 2-wire momentary.

This switch type is usually a single push-button. The user presses and releases the button, signaling the Tandem to change the state of any groups of relays connected to the switch. This type of switch is wired between the ON input and +24VDC.



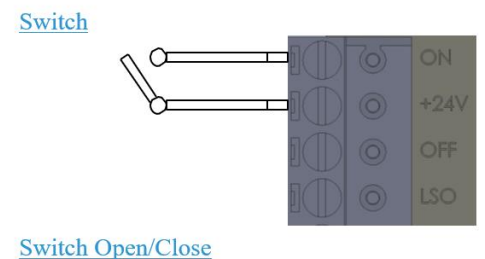
Two button, 2-wire momentary.

The switch usually includes two push-buttons or a center-return momentary switch. The user presses and releases the button connected to the ON terminal to turn a group ON and presses and releases the button connected to the OFF terminal to turn a group OFF. The ON button of this type of switch is wired between +24V and the ON terminal, and the OFF button is wired between +24V and the OFF terminal.



2-wire maintained

This switch is usually a single switch or motion sensor. When the switch closes, the switch issues an ON command. When the switch opens, the switch issues an OFF command. This type of switch is wired between the ON terminal and +24V.

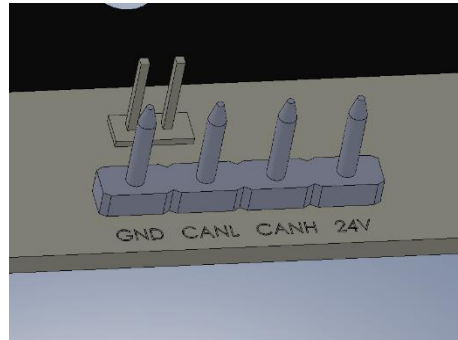


Motion sensor

A motion sensor returns +24VDC for an ON command and 0VDC for the OFF command. Motion sensors are wired between the ON terminal and +24VDC, with ground from the Photosensor port or CANBus port.

Digital Switch Wiring

Each Tandem supports a total of sixteen Leviton CN225 digital switch stations or sixteen GDS stations, each with up to five buttons, for a total of 80 buttons. The digital switch (CANBus) port, with input pins GND, CANL, CANH and 24V, is located on the bottom edge of the Tandem logic board.



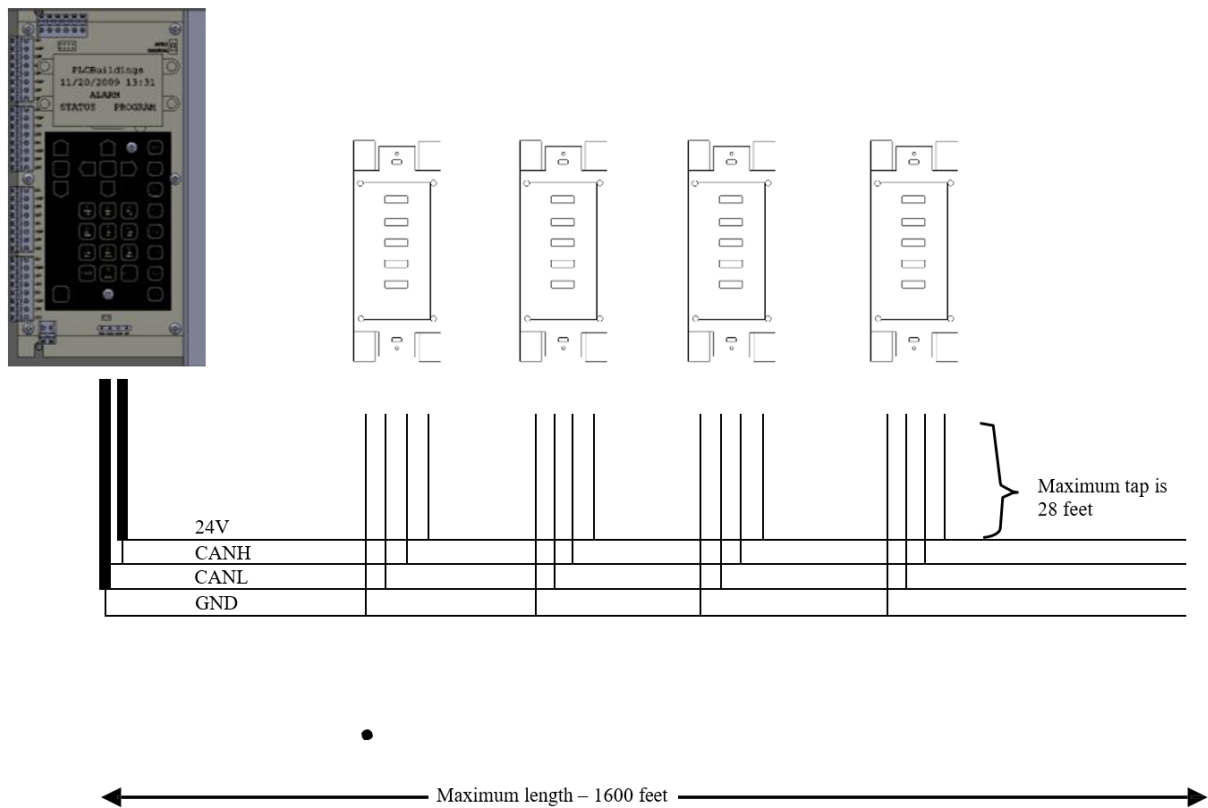
NOTE: CANBus switches are low voltage devices. Ensure that all digital switch wiring is separated from high voltage wiring.

A properly wired CAN bus network requires “terminating” resistors at the beginning and end of the network. Termination puts a known resistance between the CANL and CANH lines to dampen noise and communications reflections. Proper termination will prevent disruption and interference of communications signals. The Tandem has a network terminator onboard, available via the CANBus Terminator. Placing the supplied jumper across the two pins of the Terminator will place a terminating resistor on the network.

NOTE: The Tandem CANBus Terminator should only be used if the panel is at the beginning or end of the network.

Wiring a Leviton CN225 Station

Digital switch wiring should be run using a single Cat 5 twisted pair cable with the digital stations connected directly to this cable or with short “tap” connections. The entire digital switch network should not exceed 1,600 feet. The longest individual “tap” off the main Cat 5 cable should not exceed 28 feet.



Firmly insert switch leads into the appropriate terminal location and tighten the clamping screw. If using stranded wire, twist strands of each lead tightly, making sure that there are no stray strands protruding from the terminal block.

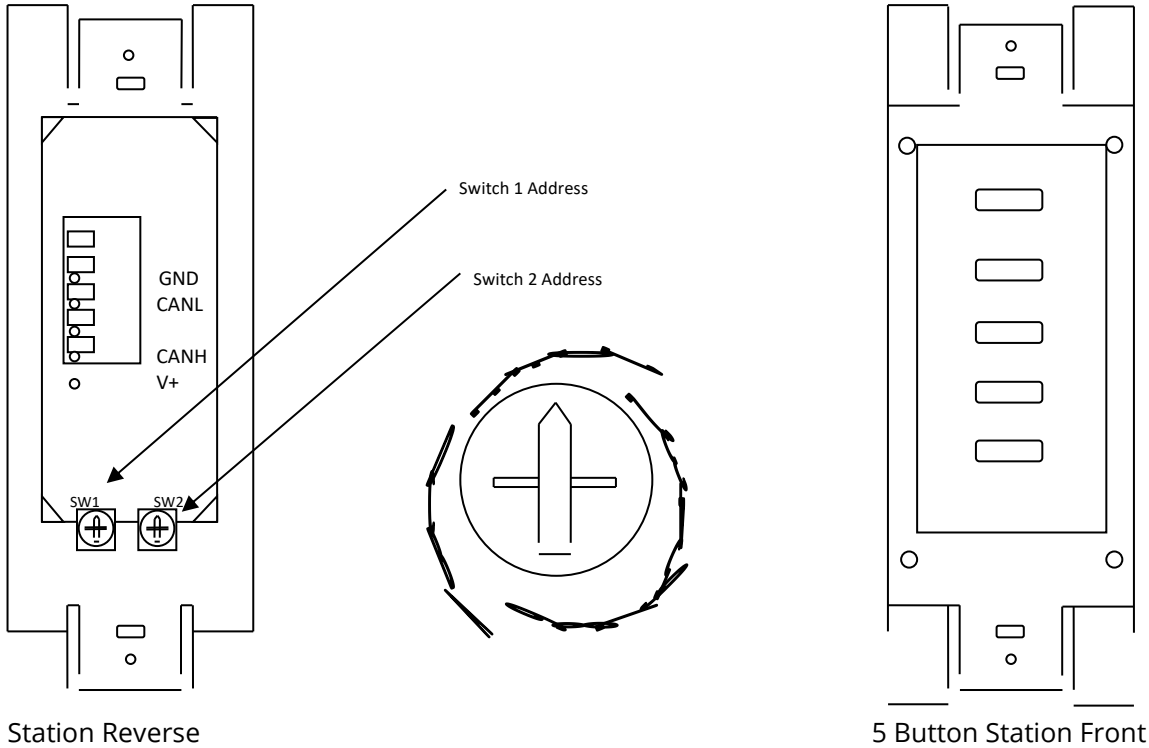
It is Reinforcement of the +24V and GND wires using extra wires in the Cat5 bundle is recommended. Insert the extra conductors into the switch terminal block, ensuring that wire colors are matched at each switch. Recommend switch wiring is shown in the table below.

Signal	Cat 5 wire	Extra Cat 5
GROUND	Green	Orange & Orange/White
CANH	Blue/White	
CANL	Blue	
+24V	Green/White	Brown & Brown/White

Addressing a Leviton CN225 Station

The Leviton CN225 has two rotary address switches on the back of the switch for setting the station's

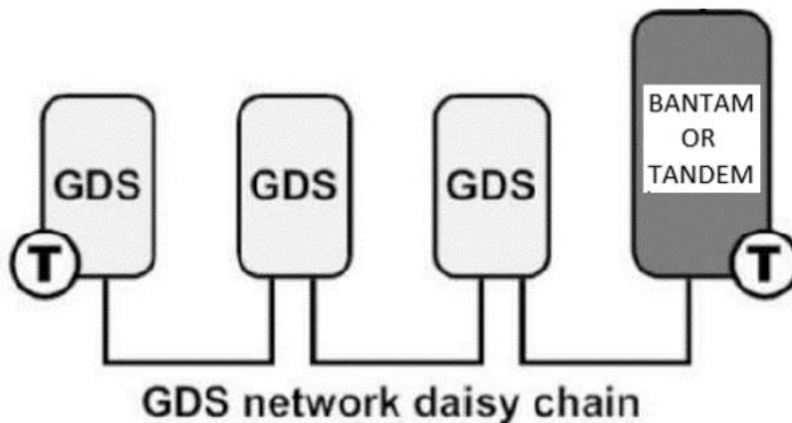
CANBus hardware address. The rotary settings are 1-9, A-F. When entering the address in the Tandem Panel, use the following for letters A thru F: A=10, B=11, C=12, D=13, E=14, F=15. Refer to the Digital Switch Programming section for further information.



Wiring a GDS TLB-W Station

GDS TLB-W switches are networkable, intelligent, low-voltage switches. The GDS network uses a daisy chain configuration with two distinct ends. The two end devices should be terminated using onboard termination jumpers. The GDS network should not exceed 1000 feet (300 meters). Refer to the diagram below.

NOTE: Use of a unique color code for each signal (GND, CANL, CANH and 24V) is suggested to prevent miswiring.





GND CANL DRAIN CANH +24V

Information regarding GDS addressing and commission is located in the Digital Switches section.

Display

The display in each panel allows the user to quickly determine the system status or to make simple programming adjustments. For extensive programming, use of PLC Designer (Tandem Panel user interface software) is recommended. More information about PLC Designer can be found in the PLC Designer User Manual.

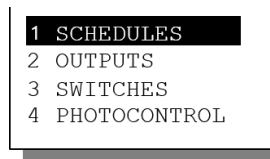
The display shows 4 lines of text with up to 16 characters per line. Some menus/screens may contain more lines/characters or may display graphical information.

The highlighted area of the screen indicates the current active menu/screen item. The desired option can be accessed by either pressing the **SELECT** key when that option is highlighted or by pressing the number appearing to the left of each option on the numeric keypad.

For example, if the user presses the **SELECT** key when **SCHEDULES** is highlighted on a menu screen, the scheduling options will appear on the display. The user can also access scheduling options by pressing **1** on the alphanumeric keypad.

The user can navigate between display fields using the **UP/DOWN** and **LEFT/RIGHT** arrow keys. The highlighted area will transition between lines and fields as the user presses these keys.

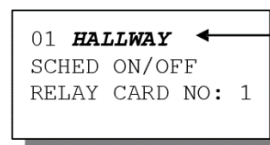
In some instances, there will be a flashing cursor on the display. This represents an alphanumeric entry field on the screen.



1	SCHEDULES
2	OUTPUTS
3	SWITCHES
4	PHOTOCONTROL

Modifying Entries

When the value on a screen has been modified but not saved, the field will display in *italics*. The name will appear italicized until the **SAVE** button is pressed. In the example shown on the right, the **GROUP** name has been changed to "**HALLWAY**", but not yet saved.



01	<i>HALLWAY</i>
SCHED ON/OFF	
RELAY CARD NO: 1	

Italicized name
(indicating change
from original value)

Display Screen Layout

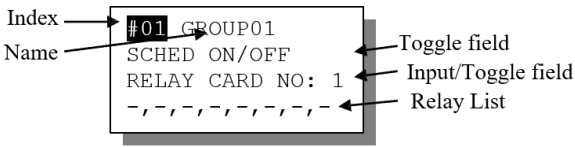
Index Field – Many screens include an Index Field, usually located in the top left corner of the display. The Index Field provides for access to the multiple selections for each panel function using the

RAISE/LOWER arrow keys located on the left-hand side of the keypad. The desired function can also be accessed by pressing the corresponding Index Field number on the keypad, followed by the **SELECT** key. Pressing **EXIT** will restore the previous selection. In the example shown on the right, the Index Field is displayed as **#01**.

Name Field – A custom name can be created by navigating to the desired field name and pressing **SELECT** and using the alphanumeric keypad to enter the new name. Once the new name has been entered, press **SAVE**. Pressing **EXIT** will restore the previous selection. In the example shown on the right, the Name Field is displayed as **GROUP01**.

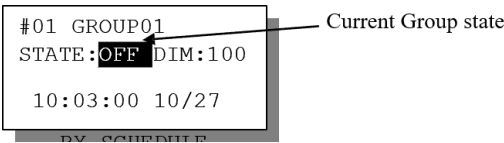
Relay List Field – Entries can be changed by pressing the number keys 1-8, which will toggle the corresponding relay to confirm the relay assignment.

Toggle Field – Pre-defined features can be selected by navigating to the desired field name and pressing the **RAISE/LOWER** arrow keys. Pressing **EXIT** will restore the previous selection.



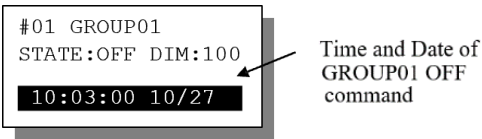
ON/OFF Toggle Entry Field

On the **GROUP STATUS** screen, the Group state can be toggled by first pressing **RAISE/LOWER** arrow keys while the Group state is highlighted on the display screen and then pressing **SAVE**. In the example shown on the right, the highlighted field shows an **OFF** command issued to the displayed Group.



Log Entry Field

On the **GROUP STATUS** screen, the log entries of previous Group events can be viewed by pressing the **RAISE/LOWER** arrow keys to scroll through up to 1000 previous events. To return to current Group status display, press **EXIT**. In the example shown on the right, the highlighted log entry shows the last time and date the group was modified.



More Options – Press **SELECT** to navigate to other options/sub-options for this screen.

Time Field

The Time Field for any event can be displayed in three ways:

- 1) Hours and minutes in military time;

2) **OPEN/CLOSE** (of the facility as programmed elsewhere)

3) **SUNUP/SUNDN** (based on the internal astronomical clock)

To change the Time Field Type, press the **RAISE/LOWER** arrow keys and then **SAVE**. To return to the current type without saving, press **EXIT**.

START/STOP – Normal Schedule

```
#01  START/STOP
START: 06:00
STOP: 18:00
DAYS: MTWTFSS---
```

START/STOP – Start schedule on **OPEN**, Stop schedule at set time

```
#01  START/STOP
START: OPEN+000
STOP: 18:00
DAYS: MTWTFSS---
```

START/STOP – Start schedule on **CLOSE**, Stop schedule at set time

```
#01  START/STOP
START: CLOSE+000
STOP: 18:00
DAYS: MTWTFSS---
```

START/STOP – Start schedule on **SUNUP**, Stop schedule at set time

```
#01  START/STOP
START: SUNUP+000
STOP: 18:00
DAYS: MTWTFSS---
```

START/STOP – Start schedule on **SUNDN**, Stop schedule at set time

```
#01  START/STOP
START: SUNDN+000
STOP: 18:00
DAYS: MTWTFSS---
```

Days of Week Field

This field displays the days of the week for which the selected schedule is active. Entries in this list can be changed by pressing numbers 1-7 on the alphanumeric keypad. Pressing a given number will toggle the corresponding day of the week assignment. The numbers 8 and 9 will toggle Holiday List A (Perpetual) and Holiday List B (Single Day), respectively (programmed elsewhere). To save changes, press **SAVE**. To return to the previous screen without saving, press **EXIT**.

In the examples shown above, the schedule has been set to active for Monday – Sunday.

Status

Tandem Lighting Control System Status

The current status of schedules, outputs, switches, photosensors, and system setup can be accessed by selecting **STATUS** from the main screen.

Use the **LEFT/RIGHT** arrow keys to highlight **STATUS**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to scroll through the status selections.

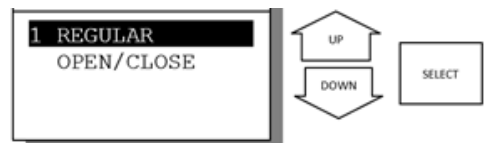


Schedules Status

Status of **REGULAR** and **OPEN/CLOSE** schedules can be accessed from the **SCHEDULES** selection as shown below.

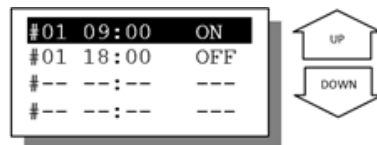
REGULAR Schedule Status

Use the **UP/DOWN** arrow keys to highlight **REGULAR**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to scroll through the list of active schedules.

In the example shown on the right, Schedule #01 is programmed to turn lights **ON** at 9:00 a.m. and **OFF** at 6:00 p.m.



OPEN/CLOSE Schedule Status

Use the **UP/DOWN** arrow keys to highlight **OPEN/CLOSE**. Press **SELECT**.



The **OPEN** and **CLOSE** times will be displayed.

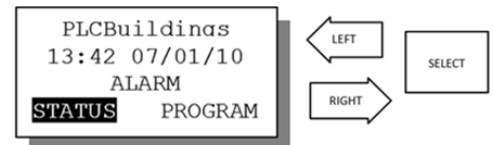
In the example shown on the right, the **OPEN** time has been set to 6:00 a.m. and the **CLOSE** time has been set to 6:00 p.m.



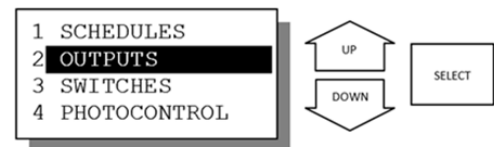
Outputs Status

The status of Tandem Panel **OUTPUTS** can be accessed by highlighting the **OUTPUTS** selection on the **STATUS** screen

Use **LEFT/RIGHT** arrow keys to highlight **STATUS**. Press **SELECT**.



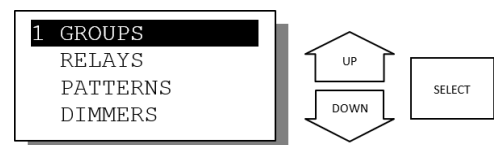
Use the **UP/DOWN** arrow keys to highlight **OUTPUTS**. Press **SELECT**.



Groups Status

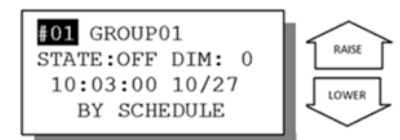
Status of **GROUPS** can be accessed from the **OUTPUTS** selection as shown below.

Use the **UP/DOWN** arrow keys to highlight **GROUPS**. Press **SELECT**.



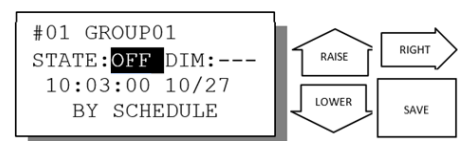
Use the **RAISE/LOWER** arrow keys to scroll to the desired **GROUP** entry.

In the example shown on the right, **GROUP 01 STATE** is **OFF** and the dimming level is set to **0**.

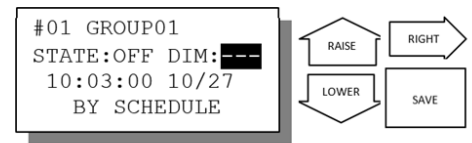


The **GROUP STATE** and dimming level settings can be overridden directly from this screen.

Use the **RIGHT** arrow key to highlight the **GROUP STATE** field setting. Use the **RAISE/LOWER** arrow keys to change the setting. Press **SAVE**.

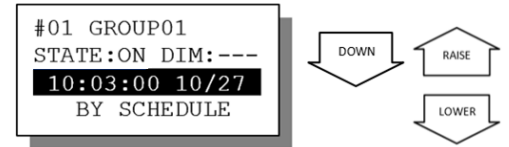


Use the **RIGHT** arrow key to highlight the **GROUP DIM** field setting. Use the numeric keypad numbers 0-9 to change the setting. Press **SAVE**.



GROUPS Logs can be accessed directly from this screen.

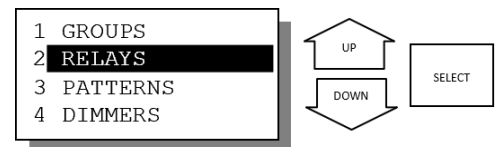
Use the **DOWN** arrow key to highlight the Log field. Use the **RAISE/LOWER** arrow keys to scroll through the **GROUPS** Logs. Press **EXIT** to end.



Relay Status

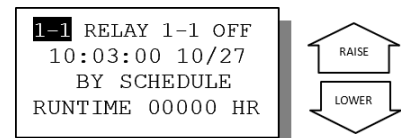
Status of **RELAYS** can be accessed from the **OUTPUTS** selection as shown below.

Use the **UP/DOWN** arrow keys to highlight **RELAYS**. Press **SELECT**.



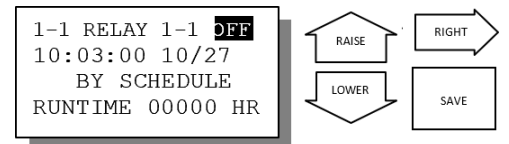
Use the **RAISE/LOWER** arrow keys to scroll to the desired **RELAY** entry.

In the example shown on the right, **RELAY 1-1** is **OFF**.



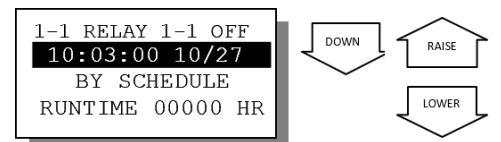
The **RELAY** setting can be overridden directly from this screen.

Use the **RIGHT** arrow key to highlight the **RELAY** status field setting. Use the **RAISE/LOWER** arrow keys to change the setting. Press **SAVE**.



RELAYS Logs can be accessed directly from this screen.

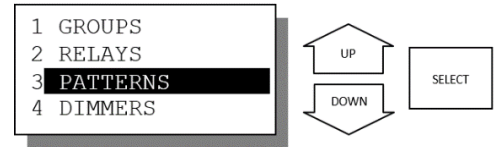
Use the **DOWN** arrow key to highlight the Log field. Use the **RAISE/LOWER** arrow keys to scroll through the **RELAYS** Logs. Press **EXIT** to end.



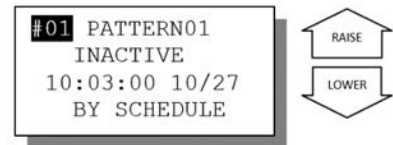
Pattern Status

Status of **PATTERNS** can be accessed from the **OUTPUTS** selection as shown below.

Use **UP/DOWN** arrow keys to highlight **PATTERNS**. Press **SELECT**.

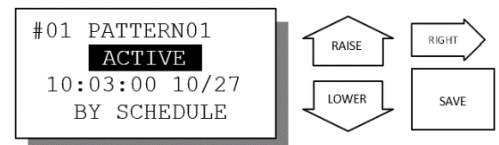


Use **RAISE/LOWER** arrow keys to scroll to the desired **PATTERN** entry. In the example shown above, **PATTERN 01** is **INACTIVE**.



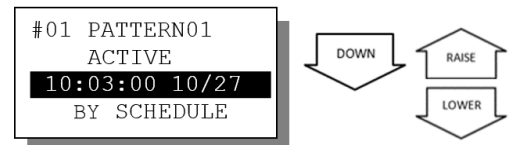
The **PATTERNS** setting can be overridden directly from this screen.

Use the **RIGHT** arrow key to highlight the **ACTIVE/INACTIVE** field setting. Use the **RAISE/LOWER** arrow keys to change the setting. Press **SAVE**.



PATTERNS Logs can be accessed directly from this screen.

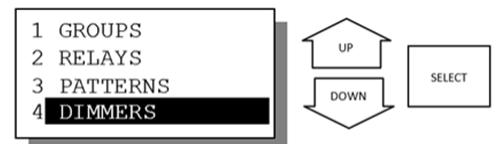
Use the **DOWN** arrow key to highlight the Log field. Use the **RAISE/LOWER** arrow keys to scroll through the **PATTERNS** Logs. Press **EXIT** to end.



Dimmer Status

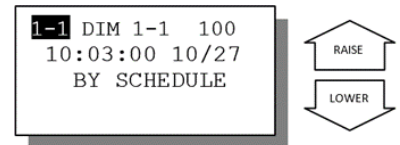
Status of **DIMMERS** can be accessed from the **OUTPUTS** selection as shown below.

Use the **UP/DOWN** arrow keys to highlight **DIMMERS**. Press **SELECT**.



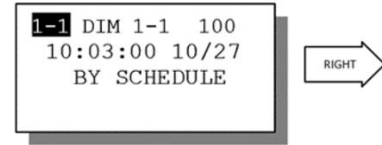
Use the **RAISE/LOWER** arrow keys to scroll to the desired **DIMMER** entry.

In the example on the right, **DIMMER 1-1** has been set to **100%**.

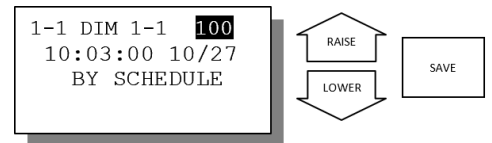


The **DIMMER** setting can be overridden directly from this screen.

Use the **RIGHT** arrow key to highlight the **DIMMER** setting field.

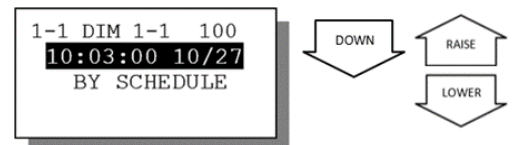


Use the numeric keypad numbers **0-9** to change the **DIMMER** setting. Press **SAVE**.



DIMMER Logs can be accessed directly from this screen.

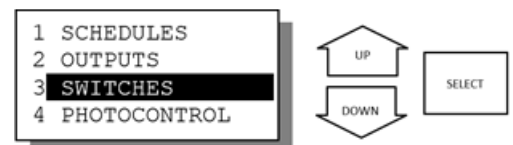
Press the **DOWN** arrow key to highlight the Log field. Use the **RAISE/LOWER** arrow keys to scroll through the **DIMMER** Logs. Press **EXIT** to end.



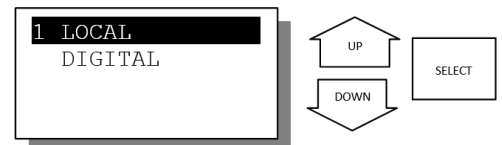
Switch Status

Status of **LOCAL SWITCHES** can be accessed from the **OUTPUTS** selection as shown below.

Use the **UP/DOWN** arrow keys to highlight **SWITCHES**. Press **SELECT**.

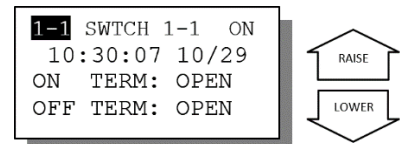


Use the **UP/DOWN** arrow keys to highlights **LOCAL**. Press **SELECT**.



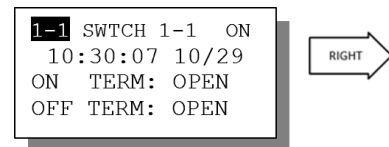
Use the **RAISE/LOWER** arrow keys to scroll to the desired **SWITCH** entry.

In the example shown on the right, **SWITCH 1-1** is **ON**.

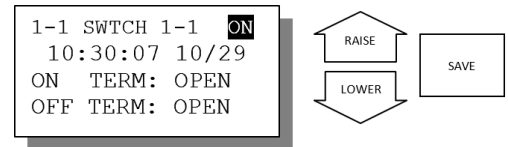


The **SWITCH** setting can be overridden directly from this screen.

Use the **RIGHT** arrow key to highlight the **SWITCH** setting field.

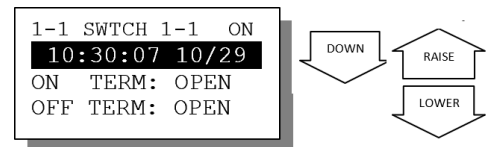


Use the **RAISE/LOWER** arrow keys to change the **SWITCH** setting. Press **SAVE**.



SWITCH Logs can be accessed directly from this screen.

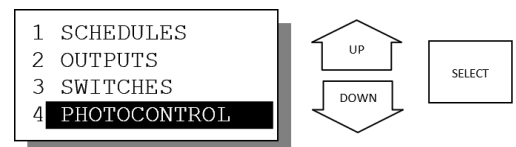
Press the **DOWN** arrow key to highlight the Log field. Use the **RAISE/LOWER** arrow keys to scroll through the **SWITCH** Logs. Press **EXIT** to end.



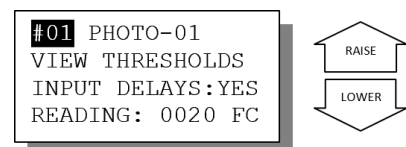
Photosensor Status

Status of Photosensors can be accessed from the **OUTPUTS** selection as shown below.

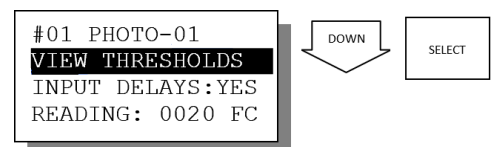
Use the **UP/DOWN** arrow keys to highlight **PHOTOSENSOR**. Press **SELECT**.



Use the **RAISE/LOWER** arrow keys to scroll to the desired **PHOTOSENSOR** entry (1 through 4).



Press the **DOWN** arrow key to highlight **VIEW THRESHOLDS** settings. Press **SELECT** to view **THRESHOLDS** and current **ON/OFF** states.

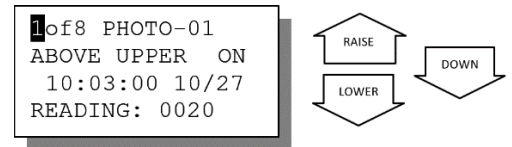


Photosensor Threshold Status Review

Status of **PHOTOSENSORS THRESHOLDS** can be accessed from the **VIEW THRESHOLDS** selection as shown below.

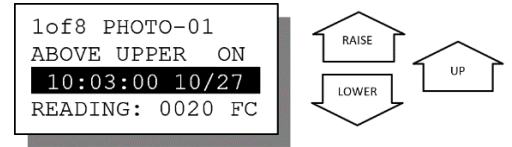
Use the **RAISE/LOWER** arrow keys to scroll to the desired Photosensor **THRESHOLD** entry (1 through 8).

In the example shown on the right, **PHOTOSENSOR 1** has been set to **ABOVE UPPER ON**.



PHOTOSENSOR Logs can be accessed directly from this screen.

Press the **DOWN** arrow key to highlight the Log field. Use the **RAISE/LOWER** arrow keys to scroll through the **PHOTOSENSORS** Logs. Press the **UP** arrow key to highlight the **THRESHOLD** number. Press **EXIT** to end.

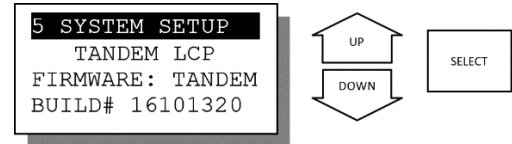


System Setup

From the main **STATUS** screen, use the **UP/DOWN** arrow keys to navigate to **SYSTEM SETUP**. Do not Press **SELECT**.

The **SYSTEM SETUP** screen displays the Tandem Panel firmware version.

In the example shown on the right, the firmware version is displayed at **BUILD# 16101320**.



Press **SELECT** to access the System Setup parameters.

Time & Date

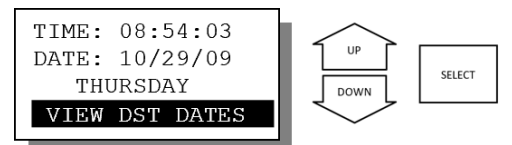
Status of **TIME & DATE** settings can be accessed as shown below.

Use the **UP/DOWN** arrow keys to highlight **TIME & DATE**. Press **SELECT**.



Daylight Savings

Use the **UP/DOWN** arrow keys to highlight **VIEW DST DATES**. Press **SELECT**.



The current **DAYLIGHT SAVINGS** settings will be displayed.

In the example shown on the right, the Daylight Savings Dates for 2009 are March 8, 2009 through November 1, 2009.

To return to the main **TIME & DATE** screen, press **EXIT**.

DAYLIGHT SAVINGS

2009

BEGIN: 03/08/09

END: 11/01/09

Astronomical Time

Use the **UP/DOWN** arrow keys to highlight **SUNRISE/SET**. Press **SELECT**.

1 TIME & DATE

2 **SUNRISE/SET**

3 HOLIDAYS

UP

DOWN

SELECT

The current Astronomical Time settings will be displayed.

In the example shown above, for the date of September 3, the sunrise and sunset times are 6:28 a.m., and 7:47 p.m., respectively.

Everett WA

47N 122W 09/03

SUNRISE: 06:28

SUNSET: 19:47

To return to the main **TIME & DATE** screen, press **EXIT**.

Holidays

Use the **UP/DOWN** arrow keys to highlight **HOLIDAYS**. Press **SELECT**.

1 TIME & DATE

2 SUNRISE/SET

3 **HOLIDAYS**

UP

DOWN

SELECT

Use the **UP/DOWN** arrow keys to scroll through the pre-programmed holiday list.

To return to the main **TIME & DATE** screen, press **EXIT**.

New Year 01/01

ML King 01/18

HOLIDAY 1 01/21

Presidents 02/15

UP

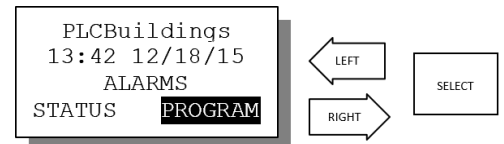
DOWN

Schedules

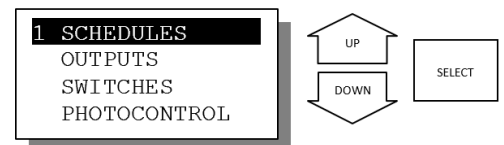
Tandem Panel scheduling features are described below.

Schedule Setup

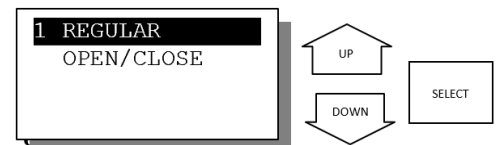
From the main PLC Buildings screen, use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.



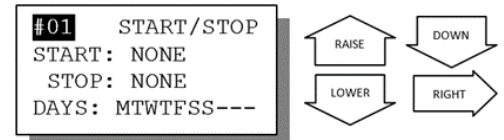
Use the **UP/DOWN** arrow keys to highlight **SCHEDULES**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to highlight **REGULAR**. Press **SELECT**.



When creating a new schedule, the schedule type will default to **START/STOP**, with the **START** and **STOP** times displaying as **NONE** and all days of the week **ACTIVE** as shown in the example below.



Press the **RIGHT** arrow key to highlight the schedule type field.

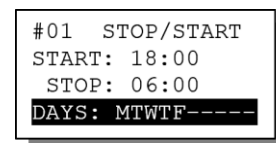


Setting Schedule DAYS

Press the **DOWN** arrow key to highlight the **DAYS** field.

Use the numeric keypad numbers **1-7** to activate the schedule days (Monday – Sunday). Use numeric keys **8, 9**, and **0** to activate Holiday lists. Press **SAVE**.

In the example shown on the right, Schedule #01 is programmed for weekdays (Monday – Friday) only.



START/STOP – Normal Schedule

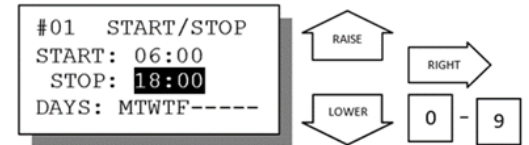
Press the **DOWN** arrow key to highlight the **START** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**. Use the **RAISE/LOWER** keys to display **00:00**.

Use the numeric keypad to enter the desired **START** time (00:00–23:59).

Press the **DOWN** arrow key to highlight the **STOP** time field and repeat the step above.

Press **SAVE** to complete the time input

In the example shown on the right, Schedule #01 is programmed to turn lights **ON** at 6:00 a.m. and **OFF** at 6:00 p.m. for weekdays only.



START/STOP – OPEN/CLOSE

NOTE: **OPEN** and **CLOSE** times must be defined (via SCHEDULE SETUP) in order to use this feature.

Press the **DOWN** arrow key to highlight the **START** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**. Use the **RAISE/LOWER** keys to display **OPEN/CLOSE**.

Press the **RIGHT** arrow key to highlight the offset for **OPEN**.

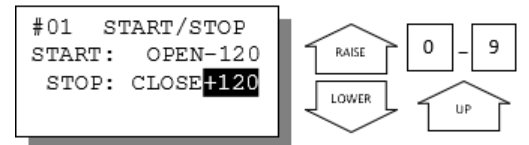
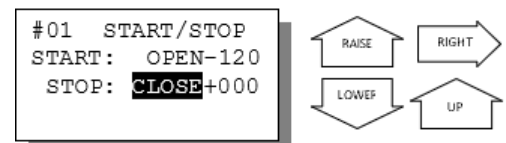
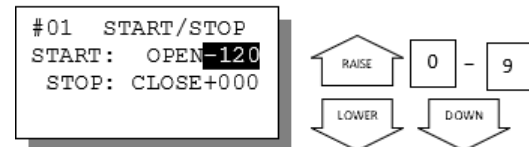
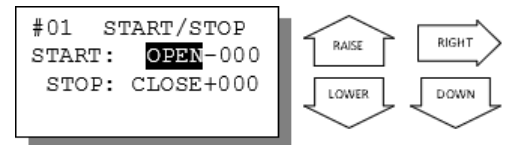
Use the numeric keypad to alter the **OPEN** offset time (in minutes).

Press the **RAISE** arrow key for a positive (+) offset and the **LOWER** arrow key for a negative (-) offset.

Press the **DOWN** arrow key to highlight the **CLOSE** offset and repeat the step above to alter the offset time.

Press **SAVE** to complete the time input.

In the example shown on the right, the **OPEN** offset has been set to 120 minutes prior to **OPEN** and the **CLOSE** offset has been set to 120 minutes after **CLOSE**.



START/STOP – SUNUP/SUNDN

Press the **DOWN** arrow key to highlight the **START** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**. Use the **RAISE/LOWER** keys to display **SUNUP/SUNDN**.

Press the **RIGHT** arrow key to highlight the offset for **SUNUP**.

Use the numeric keypad to enter the offset time (00:00–23:59).

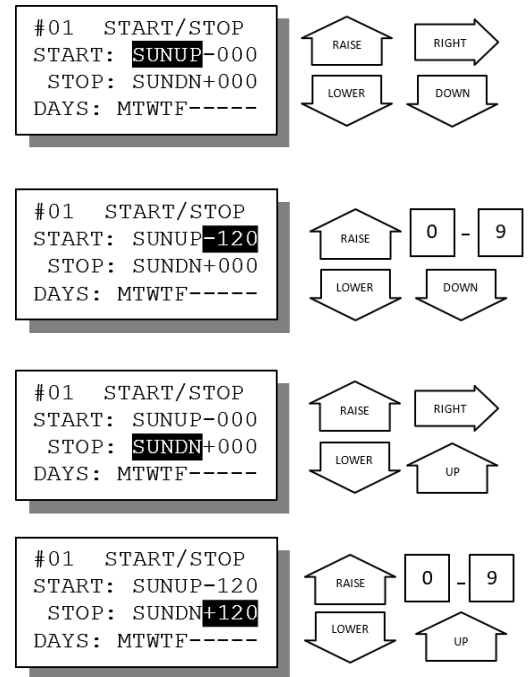
Press the **LOWER** arrow key to select **SUNUP/SUNDN**.

P Use the numeric keypad to enter the offset time (00:00–23:59).

Press the **RIGHT** arrow key to highlight the offset for **SUNDN**.

Press **SAVE** to complete the time input.

In the example shown on the right, the **SUNUP** offset has been set to 120 minutes prior to **SUNUP** and the **SUNDN** offset has been set to 120 minutes after **SUNDN** for weekdays only.



STOP/START (Spanning Midnight)

Note: The days of week for **STOP/START** schedules apply to the **START** schedule only. The **STOP** will occur on the next day. For example, if the **DAYS** field is set for Monday – Friday, the **STOP** will occur on Tuesday – Saturday.

STOP/START – Normal Schedule

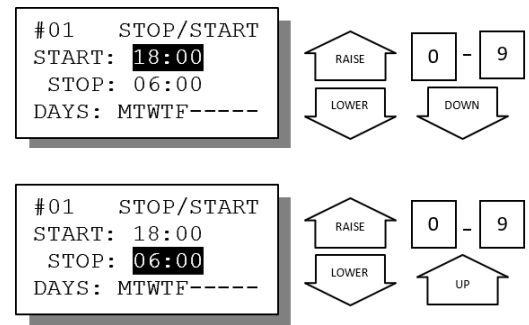
Press the **DOWN** arrow key to highlight the **START** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**. Use the **RAISE/LOWER** keys to display 00:00.

Use the numeric keypad to enter the desired **START** time (00:00–23:59).

Press the **DOWN** arrow key to highlight the **STOP** time field and repeat the step above.

Press **SAVE** to complete the time input.

In the example shown on the right, Schedule #01 is programmed to turn lights **ON** at 6:00 p.m. and **OFF** at 6:00 a.m. the following morning for weekdays only.



STOP/START – OPEN/CLOSE

NOTE: **OPEN** and **CLOSE** times must be defined (via **SCHEDULE SETUP**) in order to use this feature.

Press the **DOWN** arrow key to highlight the **START** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**. Use the **RAISE/LOWER** keys to display **OPEN/CLOSE**.

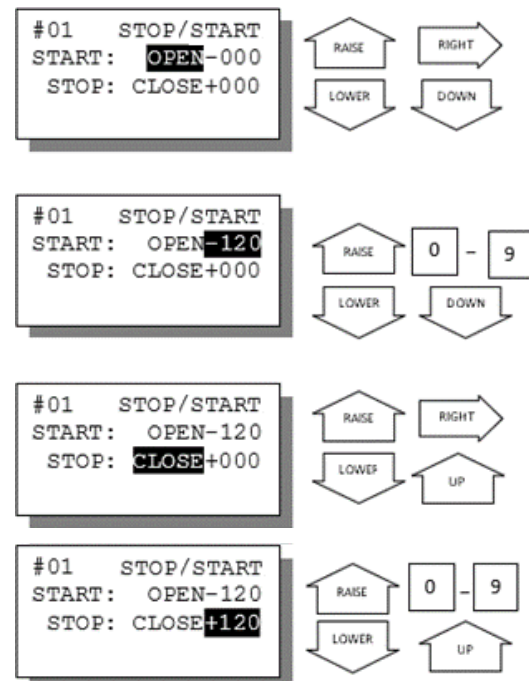
Press the **RIGHT** arrow key to highlight the offset for **OPEN**.

Use the numeric keypad to alter the **OPEN** offset time (in minutes). Press the **RAISE** arrow key for a positive (+) offset and the **LOWER** arrow key for a negative (-) offset.

Press the **DOWN** arrow key to highlight the **CLOSE** offset and repeat the step above to alter the offset time.

Press **SAVE** to complete the time input.

In the example shown on the right, the **OPEN** offset has been set to 120 minutes prior to **OPEN** and the **CLOSE** offset has been set to 120 minutes after **CLOSE**.



START ONLY – Normal Schedule

Press the **DOWN** arrow key to highlight the **START** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**.

Use the numeric keypad to enter the desired **START** time (00:00–23:59).

Press **SAVE** to complete the time input.



START ONLY – OPEN/CLOSE

NOTE: **OPEN** and **CLOSE** times must be defined (via **SCHEDULE SETUP**) in order to use this feature.

Press the **DOWN** arrow key to highlight the **START** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**. Use the **RAISE/LOWER** arrow keys to display **OPEN/CLOSE**.

Press the **RIGHT** arrow key to highlight the offset for **OPEN** or **CLOSE**.

Use the numeric keypad to alter the **OPEN** or **CLOSE** offset time (in minutes). Press the **RAISE** arrow key for a positive (+) offset and the **LOWER** arrow key for a negative (-) offset.

Press **SAVE** to complete the time input.



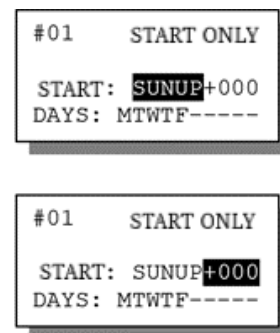
START ONLY – SUNUP/SUNDN

Press the **DOWN** arrow key to highlight the **START** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**. Use the **RAISE/LOWER** keys to display **SUNUP/SUNDN**.

Press the **RIGHT** arrow key to highlight the offset for **SUNUP** or **SUNDN**.

Use the numeric keypad to alter the **SUNUP** or **SUNDN** offset time (in minutes). Press the **RAISE** arrow key for a positive (+) offset and the **LOWER** arrow key for a negative (-) offset.

Press **SAVE** to complete the time input.

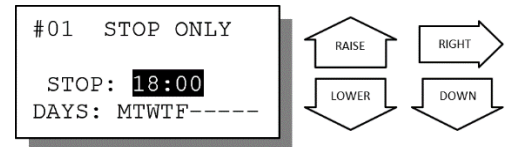


STOP ONLY – Normal Schedule

Press the **DOWN** arrow key to highlight the **STOP** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**.

Use the numeric keypad to enter the desired **STOP** time (00:00–23:59).

Press **SAVE** to complete the time input.



STOP ONLY – OPEN/CLOSE

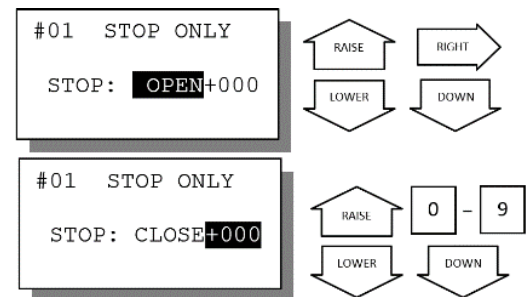
NOTE: **OPEN** and **CLOSE** times must be defined (via **SCHEDULE SETUP**) in order to use this feature.

Press the **DOWN** arrow key to highlight the **STOP** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**. Use the **RAISE/LOWER** keys to display **OPEN/CLOSE**.

Press the **RIGHT** arrow key to highlight the offset for **OPEN** or **CLOSE**.

Use the numeric keypad to alter the **OPEN** or **CLOSE** offset time (in minutes). Press the **RAISE** arrow key for a positive (+) offset and the **LOWER** arrow key for a negative (-) offset.

Press **SAVE** to complete the time input.



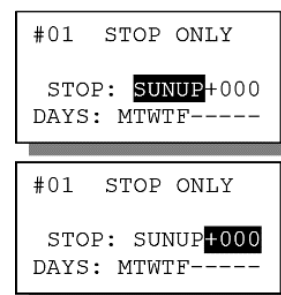
STOP ONLY – SUNUP/SUNDN

Press the **DOWN** arrow key to highlight the **STOP** time field. The options for this field are: **NONE**, **00:00**, **OPEN/CLOSE**, or **SUNUP/SUNDN**. Use the **RAISE/LOWER** keys to display **SUNUP/SUNDN**.

Press the **RIGHT** arrow key to highlight the offset for **SUNUP** or **SUNDN**.

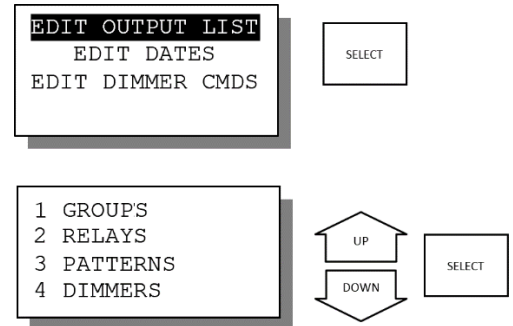
Use the numeric keypad to alter the **SUNUP** or **SUNDN** offset time (in minutes). Press the **RAISE** arrow key for a positive (+) offset and the **LOWER** arrow key for a negative (-) offset.

Press **SAVE** to complete the time input.



Setting Schedule – Output Lists

From the **Regular Schedule** screen, press the **UP/DOWN** arrow keys to highlight **EDIT OUTPUT LIST**. Press **SELECT**.



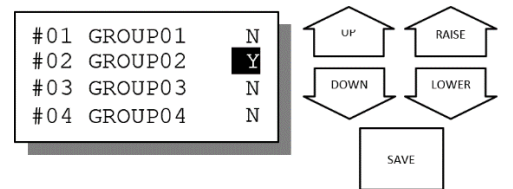
Press the **DOWN** arrow key to highlight the desired field.

Setting Schedule Groups

Press the **UP/DOWN** arrow keys to highlight the desired **Group(s)**.

Press the **RAISE/LOWER** arrow keys to assign each group to the schedule.

Press **SAVE**.

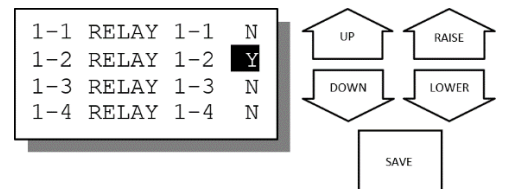


Setting Schedule Relays

Press the **UP/DOWN** arrow keys to highlight the desired **Relay(s)**.

Press the **RAISE/LOWER** arrow keys to assign each relay to the schedule.

Press **SAVE**.

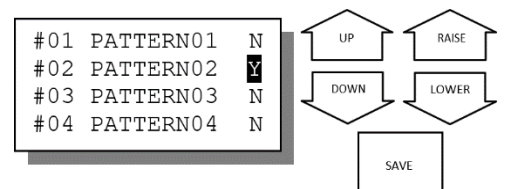


Setting Schedule Patterns

Press the **UP/DOWN** arrow keys to highlight the desired **Pattern(s)**.

Press the **RAISE/LOWER** arrow keys to assign each pattern to the schedule.

Press **SAVE**.

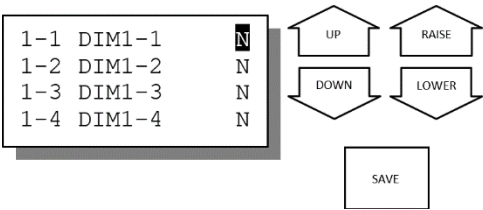


Setting Schedule Dimmers

Press the **UP/DOWN** arrow keys to highlight the desired **Dimmer(s)**.

Press the **RAISE/LOWER** arrow keys to assign each dimmer to the schedule.

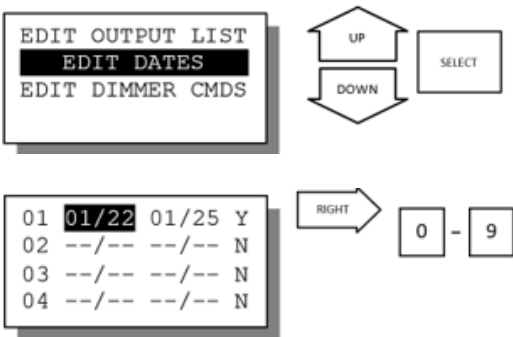
Press **SAVE**.



Editing Schedule Active Dates

From the Regular Schedule screen, use the **UP/DOWN** arrow keys to highlight **EDIT DATES**. Press **SELECT**. The **START** date field will be highlighted.

Use the numeric keypad to enter the **START** date.



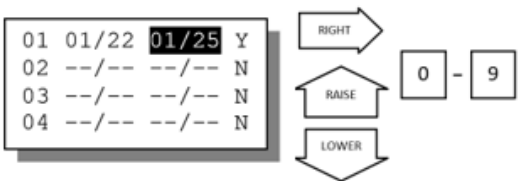
Press the **RIGHT** arrow key to highlight the **STOP** date field.

Use the numeric keypad to enter the **STOP** date.

Press the **RIGHT** arrow key to highlight the activation field. Press the **RAISE/LOWER** arrow keys to activate the entered dates.

Press **SAVE**.

In the example shown on the right, the **START** date has been set to January 22 and the **STOP** date has been set to January 25.



Editing Schedule Dim Commands

From the **Regular Schedule** screen, press the **UP/DOWN** arrow keys to highlight **EDIT DIMMER CMDS**. Press **SELECT**.

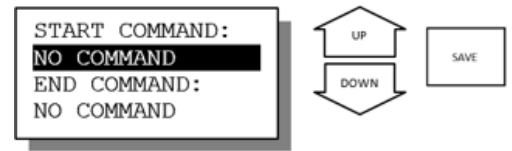


Press the **UP/DOWN** arrow keys to highlight the desired entry for both the **START COMMAND** and **END COMMAND** fields from the following options:

RAMP UP 20%/SEC,
RAMP DN 20%/SEC
HOLD
RAMP 75% 20%/SEC
RAMP 50% 20%/SEC
RAMP 25% 20%/SEC
GO TO 100% NOW,
GO TO 75% NOW
GO TO 50% NOW
GO TO 25% NOW
GO TO 0% NOW
NO COMMAND.

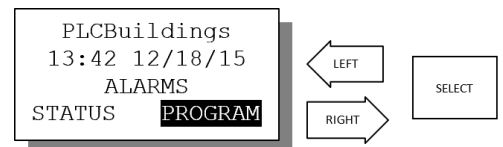
Press **SAVE**.

In the example shown on the right, the Dim Command for both **START** and **STOP** have been set to **NO COMMAND**.

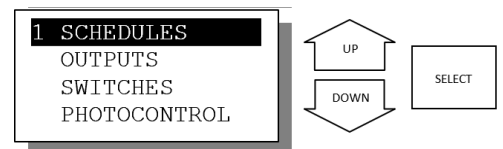


OPEN/CLOSE Setup

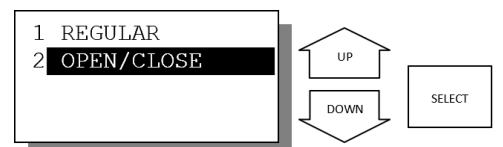
Use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.



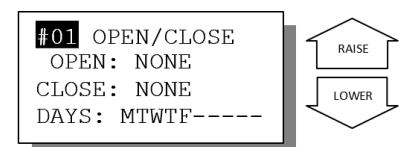
Use the **UP/DOWN** arrow keys to highlight **SCHEDULES**. Press **SELECT**.



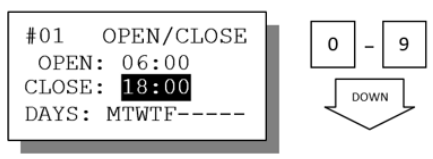
Use the **UP/DOWN** arrow keys to highlight **OPEN/CLOSE**. Press **SELECT**.



Use the **RAISE/LOWER** arrow keys to highlight the **OPEN**, **CLOSE**, or **DAYS** fields.

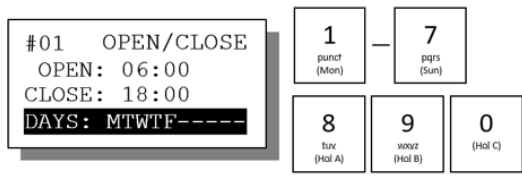


To set **OPEN** or **CLOSE** time, use the numeric keypad to enter the time corresponding to the selected field (00:00–23:59). Press **SELECT**.



Use the numeric keypad numbers **1-7** to activate the schedule days (Monday – Sunday). Use numeric keys **8** and **9** to activate Holiday lists. Press **SELECT** to complete the scheduled **DAYS** selection.

Press **SAVE**.



In the example shown on the right, the **OPEN** time has been set to 6:00 a.m. and the **CLOSE** time to 6:00 p.m. for weekdays only.

Groups

A lighting control group is a set of relays and dimmers that work together in a pre-assigned manner.

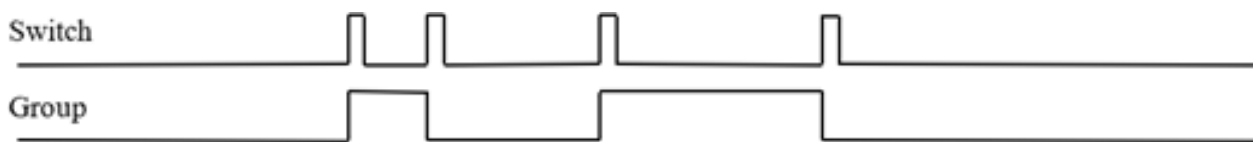
Groups: Setup

The Tandem lighting control system supports up to 32 groups per panel. Groups 1-24 are global, i.e., these groups operate in unison across all panels in the control system. Groups 24-32 are local, operating stand-alone.

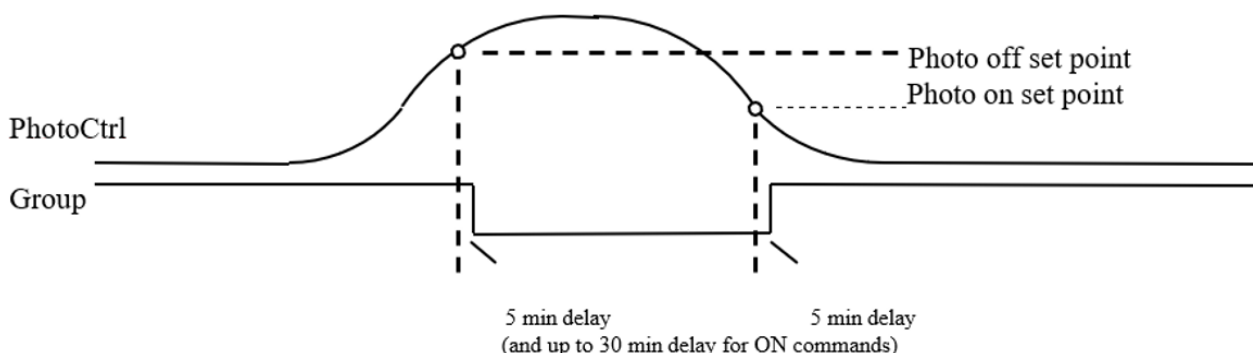
An operational profile is assigned to each group which tells the group how to respond to a time schedule, switch or photosensor input. Relays and dimmers are assigned to a specific group based on the desired operational profile. Tandem lighting control system profiles are described below.

Manual ON/OFF –the group is controlled by low-voltage switches, digital switch buttons and/or photosensors. The group will respond to the last device to issue a command, with the exception of an **OFF** command from a photosensor. In this case, the group will remain **OFF** until released by the photosensor.

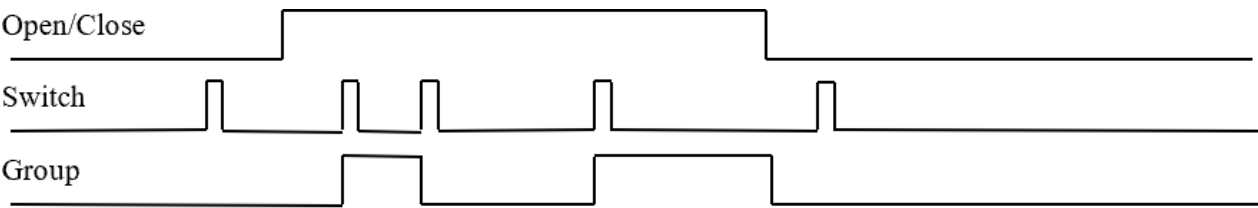
The timing diagram below shows Manual **ON/OFF** group control.



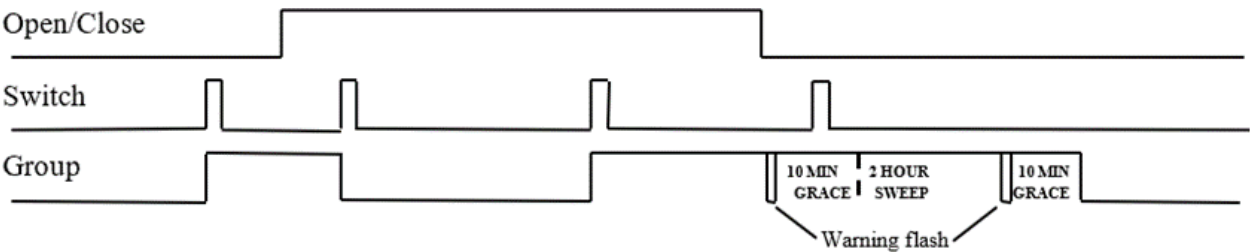
The timing diagram below shows Manual **ON/OFF** group control with a photosensor.



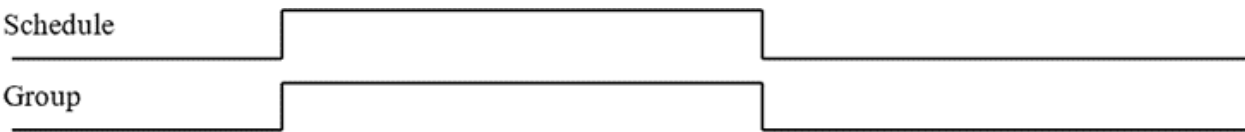
Manual ON/Schedule OFF – the group is turned **ON** by a switch and turned **OFF** according to a preset schedule. Once the group has been turned **OFF**, switch control is disabled until the preset **ON** time. The timing diagram below shows **Manual ON/Schedule OFF** group control.



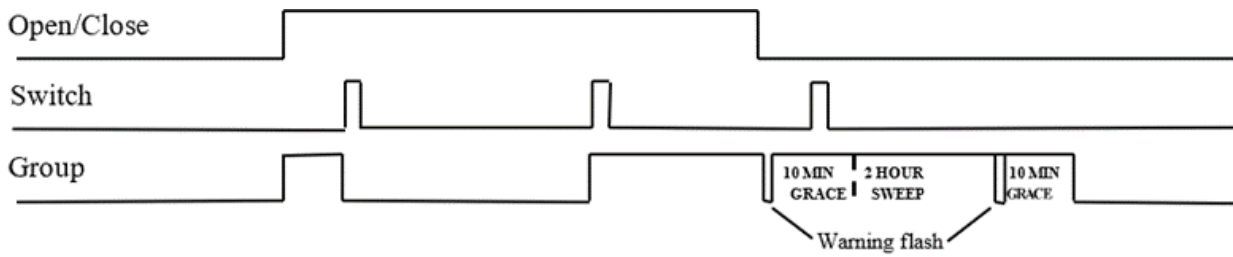
Manual ON/Sweep OFF– the group is turned **ON** by a switch and turned OFF according to a preset schedule. Once the group has been turned OFF, switch control is disabled until the preset **ON** time. In addition, within 10 minutes of the preset **OFF** time, lights will flash as an alert to occupants. Occupants may then use the manual switch to command lights **ON** for two additional hours before another alert occurs. The timing diagram below shows **Manual ON/Sweep OFF** group control.



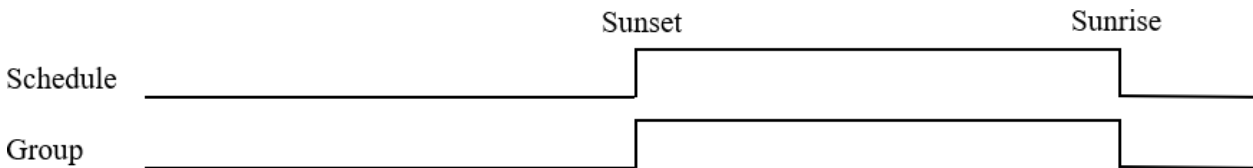
Schedule ON/OFF – the group is turned **ON** and **OFF** according to a preset schedule as shown in the timing diagram below.



Schedule ON/Sweep OFF – the group is turned **ON** and **OFF** according to a preset schedule. In addition, within 10 minutes of the preset **OFF** time, lights will flash as an alert to occupants. Occupants may then use the manual switch to command lights **ON** for two additional hours before another alert occurs. The timing diagram below shows **Schedule ON/Sweep OFF** group control.



Astronomical OFF/ON– The group is turned **ON** at sunset and **OFF** at sunrise of the following day. The timing diagram below shows **Astronomical OFF/ON** group control.

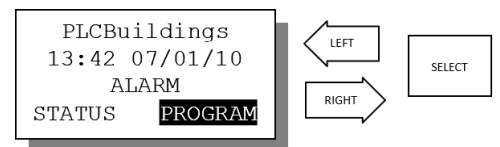


Schedule OFF/ON – the group is turned **OFF** and **ON** (the following day) according to a preset schedule as shown in the timing diagram below.

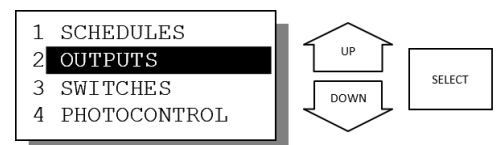


Groups: Programming

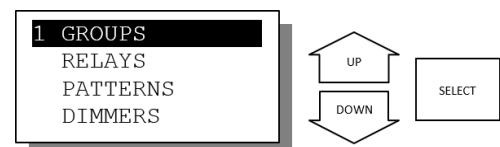
Use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.



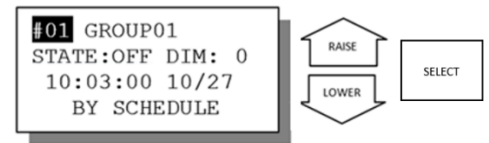
Use the **UP/DOWN** arrow keys to highlight **OUTPUTS**. Press **SELECT**.



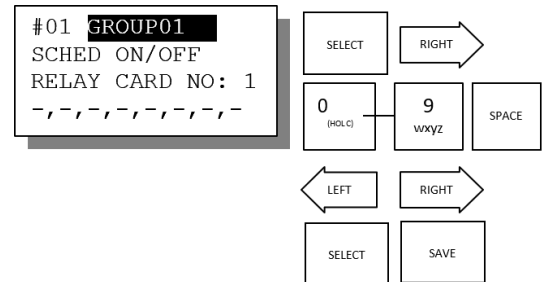
Use the **UP/DOWN** arrow keys to highlight **GROUPS**. Press **SELECT**.



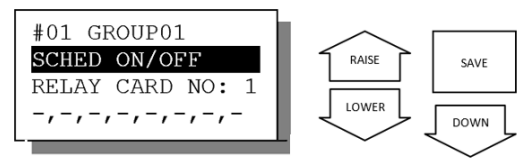
Use the **RAISE/LOWER** arrow keys to scroll to the desired **GROUP** entry. Press **SELECT**.



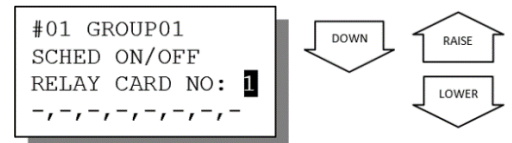
To change a **GROUP** name, press the **RIGHT** arrow key to highlight the **GROUP** name field. A cursor will blink on the first letter of the **GROUP** name. Use the alphanumeric keypad to set each letter of the new name. The cursor is advanced to the next character by pausing 2 seconds between keystrokes. Press **SAVE**.



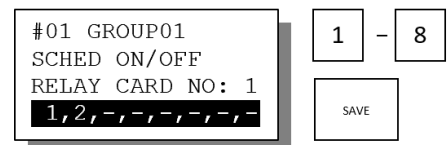
To change a **GROUP** profile, use the **DOWN** arrow key to highlight the **PROFILE** field. Use the **RAISE/LOWER** arrow keys to scroll through the **PROFILE** selections as described above to the desired selection. Press **SAVE**.



To assign relays to a **GROUP**, use the **DOWN** arrow key to access the **RELAY CARD NO.** field. Use the **RAISE/LOWER** arrow keys to scroll to the **RELAY CARD NO.** selections to the desired **RELAY CARD NO.** In the example shown on the right, **RELAY CARD NO. 1** has been selected.

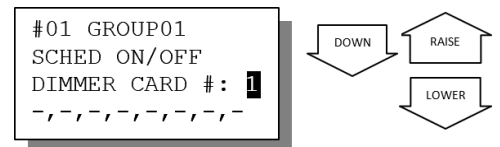


Press the **DOWN** arrow key to highlight the relay selections field. Use the numeric keypad numbers 1 – 8 to assign **RELAYS**. In the example shown on the right, relays 1 and 2 have been assigned to **RELAY CARD NO. 1**.



Press **SAVE**.

To assign **DIMMERS** to a **GROUP**, use the **DOWN** arrow key to access the **DIMMER CARD #.** field. Use the **RAISE/LOWER** arrow keys to scroll through the **DIMMER CARD #** selections to the desired **DIMMER CARD #**. In the example shown on the right, **DIMMER CARD # 1** has been selected.

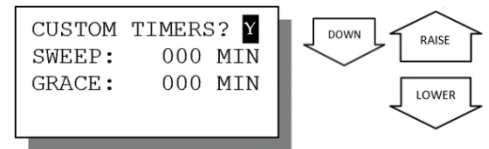


Press the **DOWN** arrow key to highlight the dimmer selection field. Use the numeric keypad numbers 1 – 4 to assign **DIMMERS**. In the example shown on the right, dimmers 1 and 2 have been assigned to **DIMMER CARD NO. 1**.



Press **SAVE**.

To set a Custom Timer for a Group, use the **DOWN** arrow key to access the **CUSTOM TIMERS** screen. Use the **RAISE/LOWER** arrow keys to change the **CUSTOM TIMER** setting. In the example shown on the right, the **CUSTOM TIMER** field has been set to **Y** (Custom Timers enabled).



Use the **DOWN** arrow key to access the **SWEEP** and **GRACE** time settings and the **RAISE/LOWER** keys to change those settings for the selected **GROUP** only.

NOTE: GRACE TIME is the amount of time a group will stay on after the initial warning blink. The default time is 10 minutes.

SWEEP Time is the amount of time a group will stay on after the user has used a switch during the **GRACE TIME** to extend after hours usage. The default is 2 hours.

Relays

Relays: Setup

Each Tandem lighting control system includes up to 48 relays that can be controlled by programs entered through the on-board keypad or from the PLC Designer application transferred from a MicroSD or directly from a computer. Lighting loads are wired from the electrical service panel into the relays in the Tandem enclosure and then out to the lighting fixtures. Automated control of the relays is accomplished by setting up groups of relays and controlling them with switches, photosensors and time schedules.

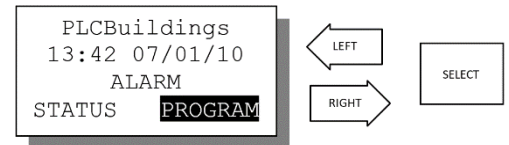
Relay types – Individual relays can be defined to operate as Normal, Inverted, Sentry, AS100, HID or Beacon types.

1. **Normal (default)** – Relays of this type follow the **ON** and **OFF** commands sent from the Tandem controller. When a relay is commanded **ON**, the Tandem will close the relay contacts, when commanded **OFF**, it opens the relay contacts.
2. **Inverted** – Relays of this type invert the **ON** and **OFF** commands. When a relay is commanded **ON**, the Tandem will open the relay contacts, when commanded **OFF**, it closes the relay contacts. A relay is usually defined as inverting if it is controlling a normally-closed contactor.
3. **Sentry** – Relays of this type work in conjunction with a Sentry Switch. When used with occupancy sensors, the Sentry Switch provides vacancy functionality as a centrally-controlled light switch which provides an override for specified building areas.
4. **AS100** – Relays of this type work in conjunction with the Wattstopper AS100 switch.. The power fed to the AS100 switch is controlled by the Tandem using a flash cycle as described below:
 - 1-2 sec flash cycle – Delay **OFF**. The AS100 initiates a 5 minute delay before turning the load off. The locator light blinks and audible beep is emitted (if enabled).
 - 3 sec flash cycle– Turn **ON**
 - 5 sec flash cycle – Turn **OFF**
5. **HID** – Relays of this type follow the **ON** and **OFF** commands sent from the Tandem controller. HID relays will not warn and have a minimum **ON** time of 15 minutes.

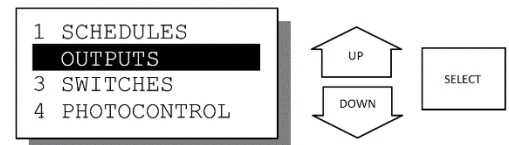
6. **Beacon** – Beacon type relays are intended for alarm applications or to control a secondary relay which will flash a light to warn that a HID relay is about to go off.

Relays: Programming

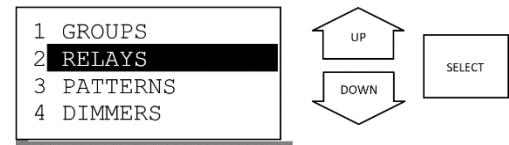
Use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to highlight **OUTPUTS**. Press **SELECT**.

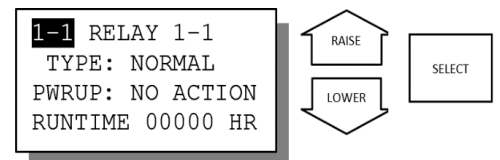


Use the **UP/DOWN** arrow keys to highlight **RELAYS**. Press **SELECT**.

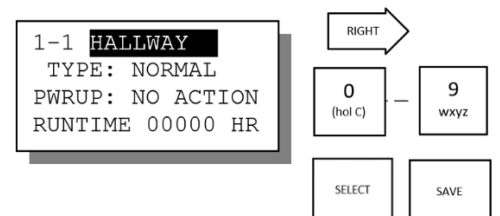


Naming a Relay

Use the **RAISE/LOWER** arrow keys to highlight the desired Relay entry. Press **SELECT**.



Press the **RIGHT** arrow key to highlight the **NAME** field. A cursor will begin blinking on the first letter of the current name. Use the alphanumeric keypad to rename the selected Relay. Press **SAVE** prior to exiting.

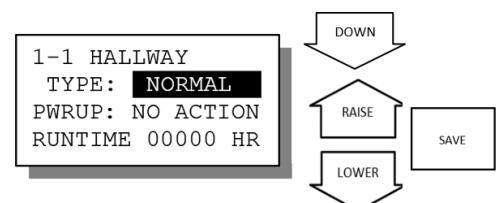


In the example shown on the right, the Relay **NAME** has been changed to **"HALLWAY"**.

Setting Relay Type

Use the **DOWN** arrow key to highlight the Relay **TYPE** field. Use the **RAISE/LOWER** arrow keys to scroll to the desired **Relay TYPE** as described above. Press **SAVE** prior to exiting.

In the example shown on the right, the **Relay TYPE** has been set to **NORMAL**.



Relay Power-up State

Use the **RAISE/ LOWER** arrow keys to highlight the desired **Power-up** selection. Press **SAVE** prior to exiting.

In the example shown on the right, the **Relay** Power-up State has been set to **NO ACTION**.

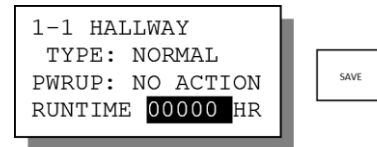


A screenshot of a terminal window showing the '1-1 HALLWAY' configuration menu. The menu options are 'TYPE: NORMAL', 'PWRUP: NO ACTION' (highlighted with a black background), and 'RUNTIME 00000 HR'. To the right of the terminal is a control panel with two arrow keys labeled 'RAISE' (pointing up) and 'LOWER' (pointing down), and a 'SAVE' button.

Clearing Runtime

The Relay Runtime tracks the length of time the relay has been actuated.

Use the numeric keypad to enter a new runtime. Press **SAVE**.



A screenshot of a terminal window showing the '1-1 HALLWAY' configuration menu. The menu options are 'TYPE: NORMAL', 'PWRUP: NO ACTION', and 'RUNTIME 00000 HR' (highlighted with a black background). To the right of the terminal is a control panel with a single 'SAVE' button.

A confirmation message will appear. Press the **RAISE/LOWER** arrow keys to toggle **YES/NO**.



A screenshot of a terminal window showing a confirmation message: 'ARE YOU SURE YOU WANT TO CHANGE THIS RUNTIME?' with 'NO' highlighted in a black box. To the right of the terminal is a control panel with two arrow keys labeled 'RAISE' (pointing up) and 'LOWER' (pointing down), and a 'SAVE' button.

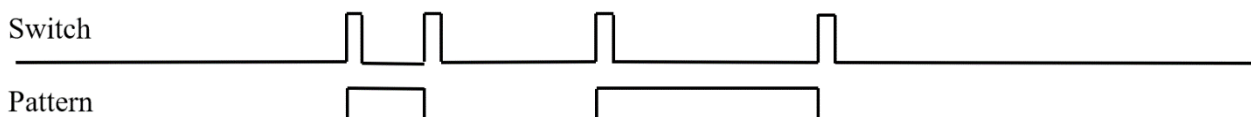
Patterns

Patterns: Setup

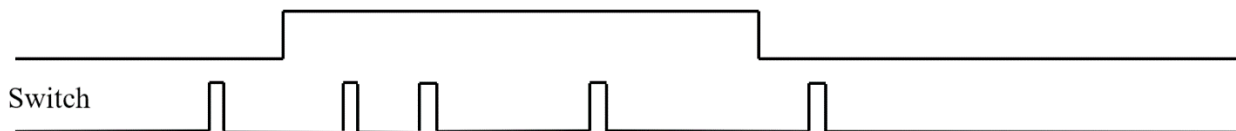
Each Tandem lighting control system supports up to eight patterns per panel. that can be controlled by programs entered through the on-board keypad or from the PLC Designer application transferred from a MicroSD or directly from a computer. Patterns 1-4 are shared to groups across the network and Patterns 5-8 affect groups in the local panel only.

A schedule, switch or photosensor can activate or deactivate a pattern, causing relays to switch as defined by the pattern. Priority of the pattern activation is dependent on the priority of the schedule, switch or other signal that activated it; therefore it is possible to activate a pattern, but still have other inputs control the relays in the pattern. Each pattern in the Tandem lighting control system is assigned a an operational profile that describes relay responses upon activation or deactivation.

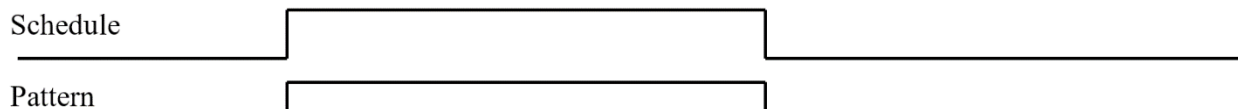
1. Manual ON/OFF – this **Pattern** is controlled by low-voltage switches, digital switch buttons and/or photosensors. In typical operation, the last device sending an activation or deactivation signal will determine the pattern state. The timing diagram below shows a pattern controlled by a two-wire, momentary switch.



2. Manual ON/Sched OFF – the **Pattern** is activated by a switch and deactivated according to a pre-set schedule as shown in the timing diagram below.



3. Sched ON/OFF – the **Pattern** is activated and deactivated according to a pre-set schedule as shown in the timing diagram below.

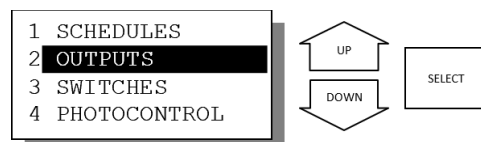


Patterns: Programming

Use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.



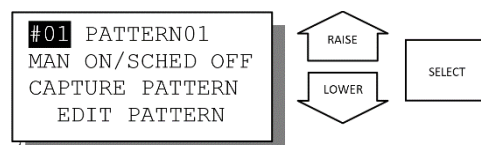
Use the **UP/DOWN** arrow keys to highlight **OUTPUTS**. Press **SELECT**.



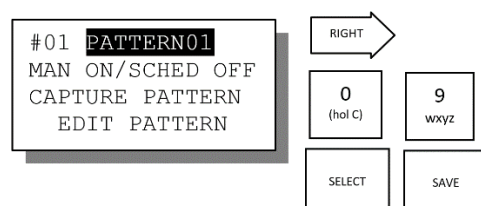
Use the **UP/DOWN** arrow keys to highlight **PATTERNS**. Press **SELECT**.



To change a **Pattern** name, use the **RAISE/LOWER** arrow keys to highlight the desired **Pattern** entry. Press **SELECT**.

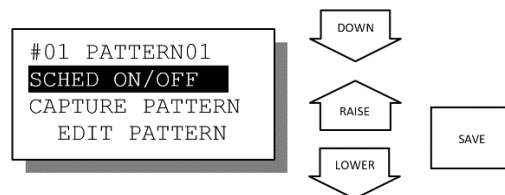


Press the **RIGHT** arrow key to highlight the **NAME** field. A cursor will begin blinking on the first letter of the current name. Use the alphanumeric keypad to rename the selected relay. Press **SAVE** prior to exiting.

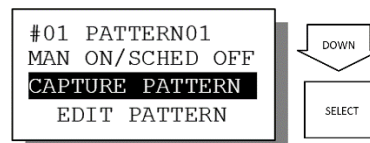


To change a **Pattern** Profile, use the **DOWN** arrow key to highlight the **Profile** field. Use the **RAISE/LOWER** arrow keys to scroll to the desired **Profile** as described above. Press **SAVE** prior to exiting.

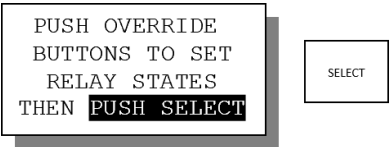
In the example shown on the right, the **Pattern** Profile has been set to **SCHED ON/OFF**.



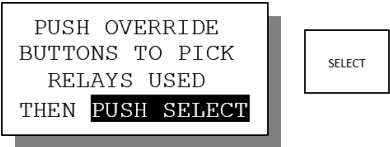
To capture a **Pattern**, first set **Relay(s)** to the desired state to be captured, see **Relays** section for more information on setting **Relay Power-up** states. Use the **DOWN** arrow key to highlight the **CAPTURE PATTERN** field.



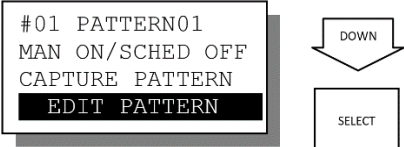
If a change to the **Relay** state is desired, press the keypad **OVERRIDE** button(s) **RY1-RY8** to set **Relay(s)** to desired states. Press **SELECT** to assign the current **Relay** states to the selected **Pattern**.



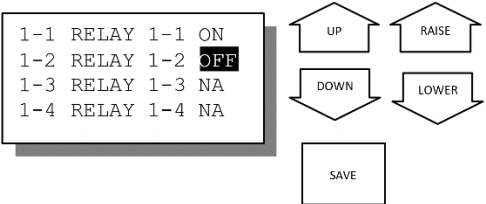
Press the **OVERRIDE** buttons corresponding to the **Relays** to be assigned to the selected **Pattern**. The LED adjacent to the **OVERRIDE** button will flash. Press **SELECT**.



To edit a **Pattern** list, use the **DOWN** arrow key to highlight the **EDIT PATTERN** field. Press **SELECT**.



Press the **UP/DOWN** arrow keys to highlight the desired **Relay(s)**. Use the **RAISE/LOWER** arrow keys to change the **Relay** state. Press **SAVE** prior to exiting.



Dimmers

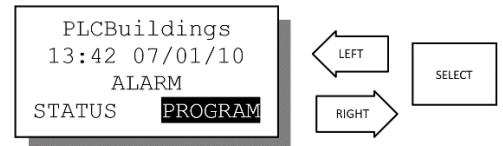
Dimmers: Setup

Each Tandem lighting control system includes up to 24 0-10V output dimmers that can be controlled by programs entered through the on-board keypad or from the PLC Designer application transferred from a MicroSD or directly from a computer. Automated control of the dimmers is accomplished by setting up dimmers in groups and controlling these groups with switches, photosensors and time schedules.

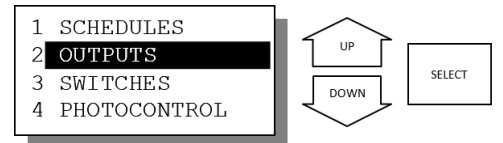
Dimmer Types – Individual dimmers can be defined as either 0-10V Dimmers or None (not used).

Dimmers: Programming

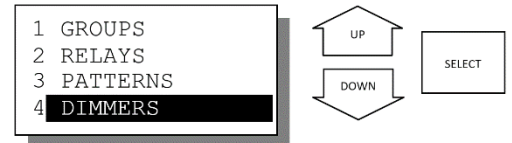
Use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.



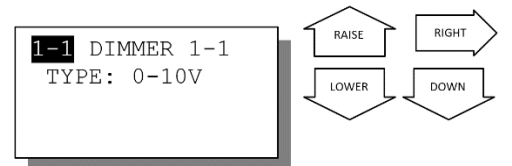
Use the **UP/DOWN** arrow keys to highlight **OUTPUTS**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to highlight **DIMMERS**. Press **SELECT**.

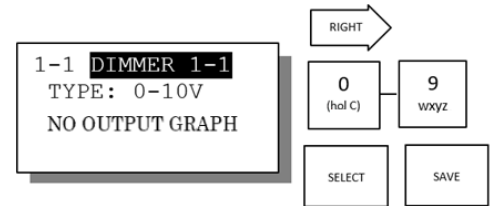


Use the **RAISE/LOWER** arrow keys to scroll to desired **Dimmer**. Press the **RIGHT** arrow key to highlight the **Dimmer NAME** field or the **DOWN** arrow key to highlight the **Dimmer TYPE** field.



Naming a Dimmer

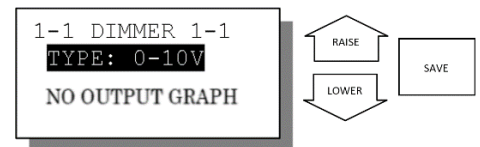
Press the **RIGHT** arrow key to highlight the **NAME** field. A cursor will begin blinking on the first letter of the current name. Use the alphanumeric keypad to rename the selected **Dimmer**. Press **SAVE** prior to exiting.



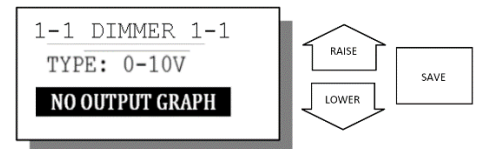
Setting Dimmer Parameters

Use the **DOWN** arrow key to highlight the **Dimmer TYPE** field. Use the **RAISE/LOWER** arrow keys to scroll to the desired **Dimmer TYPE** as described above. Press **SAVE** prior to exiting.

In the example shown on the right, the **Dimmer TYPE** has been set to 0-10V.



Use the **DOWN** arrow key to highlight the **Graphs** selection field. Use the **RAISE/LOWER** arrow keys to scroll to the desired **Graph** settings. Refer to the PLC Designer User Manual for further information regarding **Graph** selection. Press **SAVE** prior to exiting.



Switches

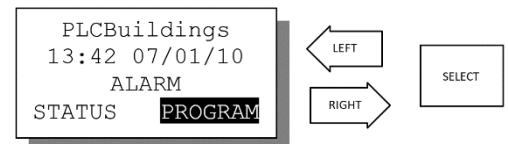
Switches: Setup

Each Tandem lighting control system includes up to 48 low voltage switch inputs. Each low-voltage switch input consists of an ON terminal, +24VDC, OFF terminal and LSO.

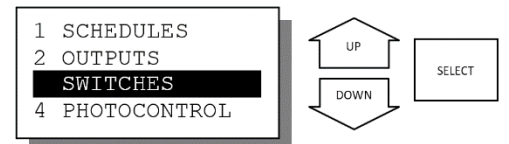
Switch Types – The Tandem Panel supports 2-wire momentary, 3-wire momentary, 2-wire maintained, 2-wire motion sensor, and 2 and 3-wire cleaning override switches.

Switches: Programming

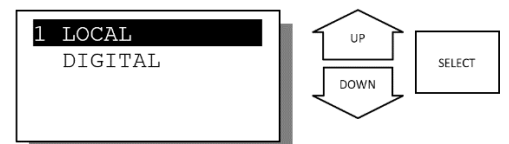
Use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.



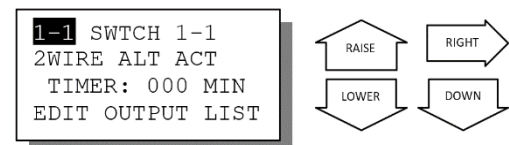
Use the **UP/DOWN** arrow keys to highlight **SWITCHES**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to highlight **LOCAL**. Press **SELECT**.

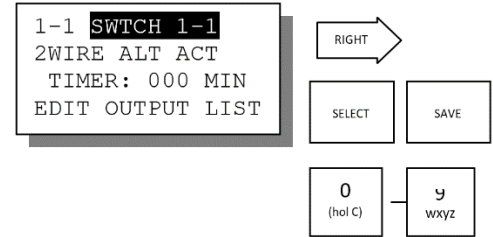


Use the **RAISE/LOWER** arrow keys to scroll to desired **Switch**. Press the **RIGHT** arrow key to highlight the **Switch NAME** field or the **DOWN** arrow key to highlight the **Switch TYPE** field.



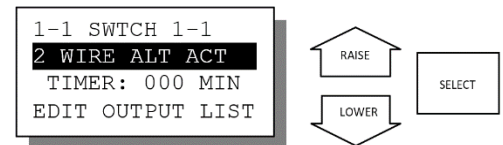
Naming a Switch

Press the **RIGHT** arrow key to highlight the **NAME** field. A cursor will begin blinking on the first letter of the current name. Use the alphanumeric keypad to rename the selected **Switch**. Press **SAVE** prior to exiting.



Setting Switch Parameters

Use the **RAISE/LOWER** arrow keys to scroll to the desired **Switch TYPE** as described above. The table below provides common switch functionality.

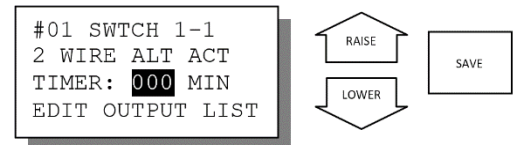


Profile Name	ON condition	OFF condition	Alternate action command (how it happens)	ON action	OFF action	ALT action
"2 WIRE ALT ACT" (alternate action)	n/a	n/a	Switch shorts ON terminal to 24VDC	n/a	n/a	Outputs that are ON will go OFF. Outputs that are OFF will go ON (if no MASTER override)
"3 WIRE MOMENTARY"	Switch shorts ON terminal to 24VDC	Switch shorts OFF terminal to 24VDC	n/a	ON will turn outputs ON if no output is MASTER overridden	OFF will turn outputs OFF if no output is MASTER overridden	n/a
"2 WIRE MAINTAINED"	Switch shorts ON terminal to 24VDC (and stays shorted)	Switch releases ON terminal from +24 (stay release)	n/a	ON will turn outputs ON if no output is MASTER is overridden	OFF will turn outputs OFF if no output is MASTER overridden	n/a
"2 WR MOTIONGRP"	Switch shorts ON terminal to 24VDC (and stays shorted)	Switch releases ON terminal from 24VDC (and stays released)	n/a	ON will turn outputs ON if no output is MASTER is overridden	OFF will turn outputs OFF if no output is MASTER overridden AND IF ALL OTHER SWITCHES THAT ARE 2 WR MOTIONGRP ARE OFF	n/a
"2 -WR ALT MASTER"	n/a	n/a	Switch shorts ON terminal to 24VDC	n/a	n/a	Outputs will alternate between MASTER ON/ NORMAL release
"3 WR MSTR ON/REL" ("3 wire master")	Switch shorts ON terminal to 24VDC	Switch shorts OFF terminal to 24VDC	n/a	ON will turn outputs ON and put them at MASTER priority	OFF will RELEASE outputs to lower priority inputs. If none are found outputs go OFF	n/a
"2 WR MSTR ON/REL" ("2 wire master")	Switch shorts ON terminal to 24VDC (and stays shorted)	Switch releases ON terminal from 24VDC	n/a	ON will turn outputs ON and put them at MASTER priority	OFF will RELEASE outputs to lower priority inputs. If none are found outputs go OFF	n/a
"3 WR MSTR ON/OFF"	Switch shorts ON terminal to 24VDC	Switch shorts OFF terminal to 24VDC	n/a	ON will turn outputs ON and put them at MASTER priority	OFF will turn OFF outputs, previous MASTER override is removed	n/a
"2 WR MSTR ON/OFF"	Switch shorts ON terminal to 24VDC (and stays shorted)	Switch releases ON terminal from 24VDC	n/a	ON will turn outputs ON and put them at MASTER priority	OFF will turn OFF outputs, previous MASTER override is removed	n/a
"3 WR REL/MST OFF"	Switch shorts ON terminal to 24VDC	Switch shorts OFF terminal to 24VDC	n/a	ON will RELEASE outputs to lower priority inputs. If none found outputs go OFF	OFF will turn outputs OFF and put them at MASTER priority	n/a

"2 WR REL/MSTR OFF"	Switch shorts ON terminal to 24VDC (and stays shorted)	Switch releases ON terminal from 24VDC	n/a	ON will RELEASE outputs to lower priority inputs. If none found outputs go OFF	OFF will turn outputs OFF and put them at MASTER priority	n/a
"3 WR ON/MSTR OFF"	Switch shorts ON terminal to 24VDC	Switch shorts OFF terminal to 24VDC	n/a	ON will turn ON outputs. MASTER override is removed	OFF will turn outputs OFF and put them at MASTER priority	n/a
"2 WR ON/MSTR OFF"	Switch shorts ON terminal to 24VDC (and stays shorted)	Switch releases ON terminal from 24VDC	n/a	ON will turn ON outputs. MASTER override is removed	OFF will turn outputs OFF and put them at MASTER priority	n/a
"3 WR MSTR OFF/ON"	Switch shorts ON terminal to 24VDC	Switch shorts OFF terminal to 24VDC	n/a	ON will turn outputs OFF and put them at MASTER priority	OFF will turn ON outputs, previous MASTER override is removed	n/a
"2 WR MSTR OFF/ON"	Switch shorts ON terminal to 24VDC	Switch releases ON terminal from 24VDC	n/a	ON will turn outputs OFF and put them at MASTER priority	OFF will turn ON outputs previous MASTER override is removed	n/a
"3WR MOTIONGRP "	Switch shorts ON terminal to 24VDC	Switch shorts OFF terminal to 24VDC	n/a	ON will turn outputs ON	OFF will turn OFF outputs ONLY if all other inputs of "2 WIRE MOTION" and "3 WIRE MOTION" are currently OFF	n/a
"3 WIRE MOTION "	Switch shorts ON terminal to 24VDC	Switch shorts OFF terminal to 24VDC	n/a	ON will turn outputs ON if no output is MASTER is overridden	OFF will turn outputs OFF if no output is MASTER overridden	n/a
"2 WIRE MOTION"	Switch shorts ON terminal to 24VDC (and stays shorted)	Switch releases ON terminal from 24VDC (and stays released)	n/a	ON will turn outputs ON if no output is MASTER is overridden	OFF will turn outputs OFF if no output is MASTER overridden	n/a

Setting Switch Timer

Use the **RAISE/LOWER** arrow keys to scroll to the **TIMER** field. Use the numeric keypad to enter desired timer value. Press **SAVE** prior to exiting.



Setting Group/Relay/Patterns/Dimmers to a Switch

Use the **RAISE/LOWER** arrow keys to scroll to the **EDIT OUTPUT LIST** field. Press **Select**.



Use the **UP/DOWN** arrow keys to highlight **GROUPS**. Press **SELECT**.



Setting Switch Groups

Use the **UP/DOWN** arrow keys to highlight the desired **GROUP**. Use the **RAISE/LOWER** arrow keys to select whether the **GROUP** will be controlled by the **SWITCH**. Press **SAVE** prior to exiting.

#01	GROUP01	N
#02	GROUP02	Y
#03	GROUP03	N
#04	GROUP04	N

UP

RAISE

DOWN

LOWER

SAVE

Setting Switch Relays

Use the **UP/DOWN** arrow keys to highlight the desired **RELAY**. Use the **RAISE/LOWER** arrow keys to select whether the **RELAY** will be controlled by the **SWITCH**. Press **SAVE** prior to exiting.

1-1	RELAY	1-1	N
1-2	RELAY	1-2	Y
1-3	RELAY	1-3	N
1-4	RELAY	1-4	N

UP

RAISE

DOWN

LOWER

SAVE

Setting Switch Patterns

Use the **UP/DOWN** arrow keys to highlight the desired **PATTERN**. Use the **RAISE/LOWER** arrow key to select whether the **PATTERN** will be controlled by the **SWITCH**. Press **SAVE** prior to exiting.

#01	PATTERN01	N
#02	PATTERN02	Y
#03	PATTERN03	N
#04	PATTERN04	N

UP

RAISE

DOWN

LOWER

SAVE

Setting Switch Dimmers

Use the **UP/DOWN** arrow keys to highlight the desired **DIMMER**. Use the **RAISE/LOWER** arrow key to select whether the **DIMMER** will be controlled by the **SWITCH**. Press **SAVE** prior to exiting.

1-1	DIM1-1	N
1-2	DIM1-2	Y
1-3	DIM1-3	N
1-4	DIM1-4	N

UP

RAISE

DOWN

LOWER

SAVE

Press **EXIT** to return to the main **SWITCH** menu.

1-1	SWTCH	1-1
2WIRE ALT ACT		
TIMER: 000 MIN		
EDIT OUTPUT LIST		

RAISE

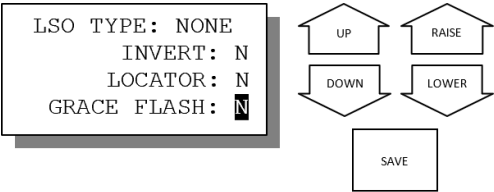
RIGHT

LOWER

DOWN

Setting (Lighted Switch Output) LSO Switch Options

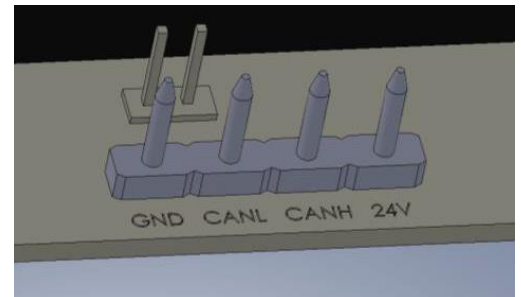
From the main **SWITCH** menu screen, use the **UP/DOWN** arrow keys to highlight the desired **LSO TYPE** and options. Use the **RAISE/LOWER** arrow keys to change the **TYPE** and option setting as described in the tables below. Press **SAVE** prior to exiting.



LSO TYPE	LSO Response
GROUND	LSO does nothing
SCENE	LSO tracks state of any GROUP or PATTERN linked to this switch as long as switch was the last device to command the group. If another device commands the group, the LSO goes OFF
SELF	LSO tracks the state of the switch (last switch command)
GROUP	LSO tracks the commands issued to any GROUP or PATTERN linked to this switch
INVERT	When Switch is ON the LSO will be OFF , when switch is OFF the LSO will be ON
LOCATOR	When the LSO is OFF , it will glow dimly. When LSO is ON , it will be full bright.
GRACE FLASH	When a group that is linked to the switch for this LSO is in its WARN cycle, the LSO will blink. LSO TYPE must set to GROUP .

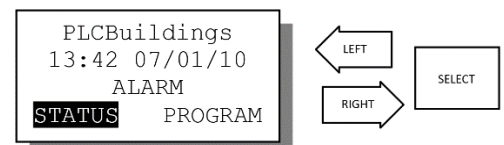
Digital Switches

Each Tandem lighting control system supports a total of sixteen addresses for either Leviton CN225 or GDS TLB-Wdigital switch stations. Each station can include up to five buttons, for a total of up to eighty buttons. The Tandem communicates with digital switches via the CANBus. The digital CANBus port is located on the bottom edge of the Tandem logic board and includes GND, CANL, CANH and 24V input pins. Refer to the Hardware section for information on wiring.

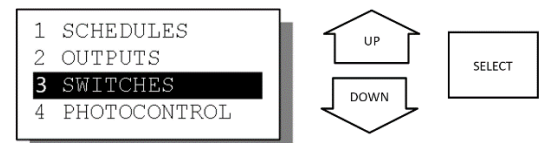


Digital Switches: Status

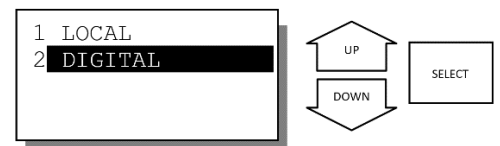
From the main menu screen, use the **LEFT/RIGHT** arrow keys to highlight **STATUS**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to highlight **SWITCHES**. Press **SELECT**.



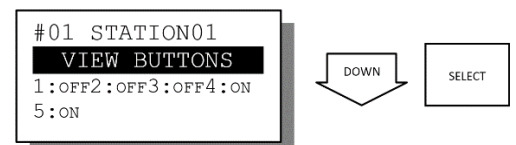
Use the **UP/DOWN** arrow keys to highlight **DIGITAL**. Press **SELECT**.



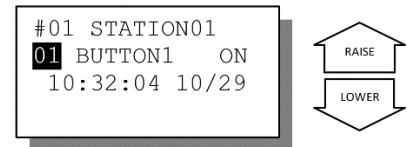
Use the **RAISE/LOWER** arrow keys to scroll to desired **Station** entry.



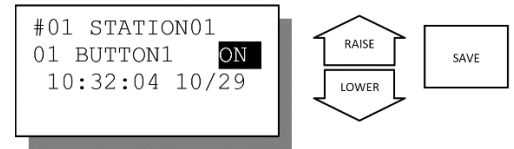
To view **Button** status, use the **DOWN** arrow key to highlight the **VIEW BUTTONS** field. Press **SELECT**.



Use the **RAISE/LOWER** arrow keys to scroll to desired **Button** entry.

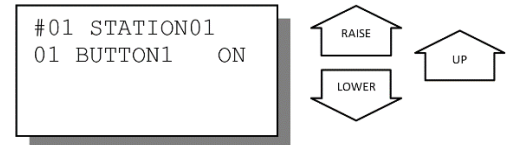


To override **Button** status, use the **RIGHT** arrow key to highlight the **Button** status field. Use the **RAISE/LOWER** arrow keys to toggle **ON/OFF**. Press **SAVE** prior to exiting.



In the example on the right, **Button** 1 of Station 1 has been set to **ON**.

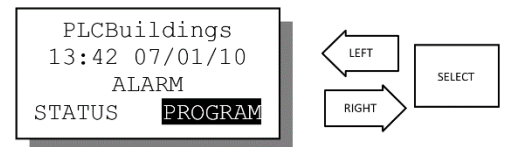
To view **Button** logs, use the **RAISE/LOWER** arrow keys to scroll through **Digital Switch** logs. Press **UP** to move to the **Button** number. Press **EXIT** to end **Review Log** mode.



Digital Switches: Programming

Leviton CN225:

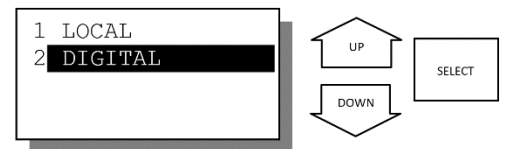
From the main menu screen , use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.



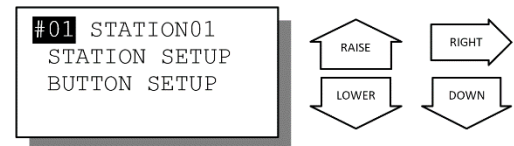
Use the **UP/DOWN** arrow keys to highlight **SWITCHES**. Press **SELECT**.



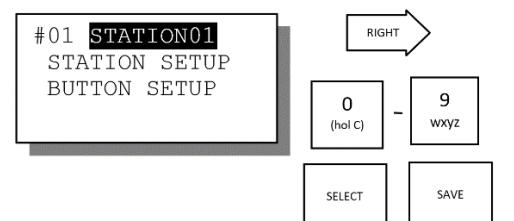
Use the **UP/DOWN** arrow keys to highlight **DIGITAL**. Press **SELECT**.



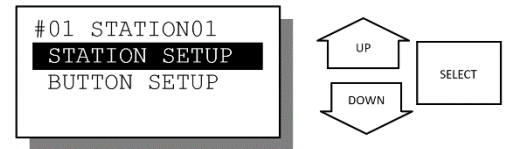
Use the **RAISE/LOWER** arrow keys to scroll to desired **Station** entry.



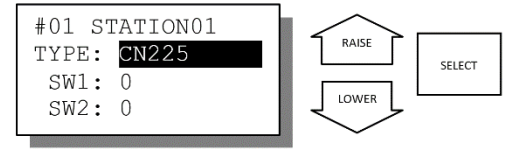
To change a **Station** name, use the **RIGHT** arrow key to highlight the **Station** name field. A cursor will blink on the first letter of the **Station** name. Use the alphanumeric keypad to set each letter of the new name. The cursor is advanced to the next character by pausing 2 seconds between keystrokes. Press **SAVE**.



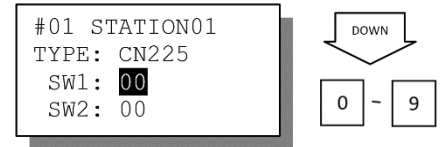
To change a **Station** type, use the **UP/DOWN** arrow keys to highlight the **STATION SETUP** field. Press **SELECT**.



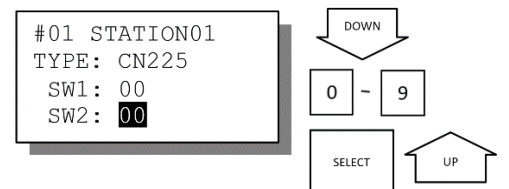
Use the **RAISE/LOWER** arrow keys to select the **Switch** type.



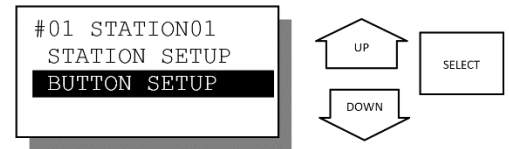
Use the **DOWN** arrow key to highlight the **SW1** address field. Use the numeric keypad to enter the address. For addresses **A-F**, use the numbers **11- 15**, respectively. Press **SAVE**.



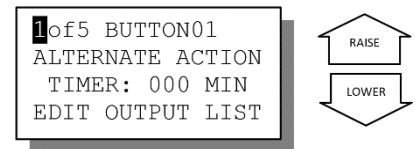
Use the **DOWN** arrow key to highlight the **SW2** address field. Use the numeric keypad to enter the address. For addresses **A-F**, use the numbers **11- 15**, respectively. Press **SAVE**. Press **EXIT** to return to the **Digital Switches** screen.



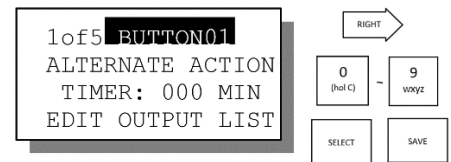
To edit **Station Buttons**, use the **UP/DOWN** arrow keys to highlight the **BUTTON SETUP** field. Press **SELECT**.



Use the **RAISE/LOWER** arrow keys to scroll to the desired **Button**.



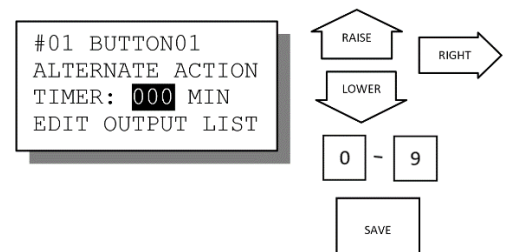
Use the **RIGHT** arrow key to highlight the **Button** name field. A cursor will blink on the first letter of the **Button** name. Use the alphanumeric keypad to set each letter of the new name. The cursor is advanced to the next character by pausing 2 seconds between keystrokes. Press **SAVE**.



To select the **Button** type, use the **RAISE/LOWER** arrow keys to select the Button type. Press **SAVE**.



To set the **Switch Timer**, use the **RAISE/LOWER** arrow keys to highlight the **TIMER** field. Use the **RIGHT** arrow key to highlight the time entry field. Use the numeric keypad to set the **Timer** in minutes. Press **SAVE**.

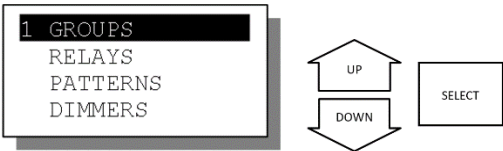


To set **Button Groups, Relays, Patterns, or Dimmers**, use the **UP/DOWN** arrow keys to highlight the **EDIT OUTPUT LIST** field. Press **SELECT**.



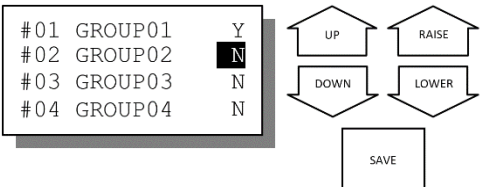
Use the **UP/DOWN** arrow keys to highlight the desired entry. Press **SELECT**.

In the example shown on the right, **GROUPS** has been selected.



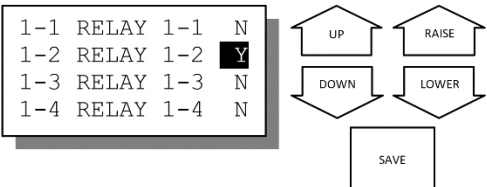
Use the **UP/DOWN** arrow keys to scroll through the **GROUPS** list. Use the **RAISE/LOWER** arrow keys to set **GROUP Button** control. Press **SAVE** prior to exiting.

In the examples shown on the right, only **GROUP 1** has been set for control by **Button 1**.



To set **Button RELAYS**, use the **UP/DOWN** arrow keys to select **RELAYS** from the selection screen shown above. Use the **UP/DOWN** arrow keys to scroll through the **RELAYS** list. Use the **RAISE/LOWER** arrow keys to set **RELAY Button** control. Press **SAVE** prior to exiting.

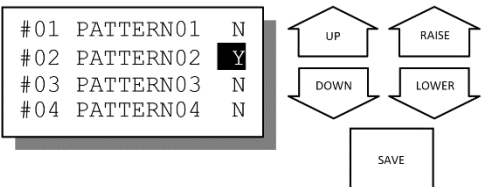
In the examples shown on the right, only **RELAY 1-2** has been set for control by **Button 1**.



To set **Button PATTERNS**, use the **UP/DOWN** arrow keys to select **PATTERNS** from the selection screen shown above. Use the **UP/DOWN** arrow keys to scroll through the **PATTERNS** list. Use the **RAISE/LOWER** arrow keys to set **PATTERN Button** control.

Press **SAVE** prior to exiting.

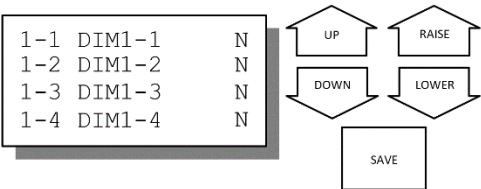
In the example shown on the right, only **PATTERN 02** has been set for control by Button 1.



To set **Button DIMMERS**, use the **UP/DOWN** arrow keys to select **DIMMERS** from the selection screen shown above. Use the **UP/DOWN** arrow keys to scroll through the **DIMMERS** list. Use the **RAISE/LOWER** arrow keys to set **DIMMER Button** control.

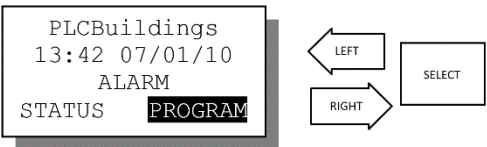
Press **SAVE** prior to exiting.

In the example shown at left, no **DIMMERS** have been set for control by **Button 1**.

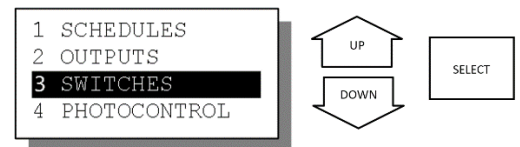


GDS TLB-W:

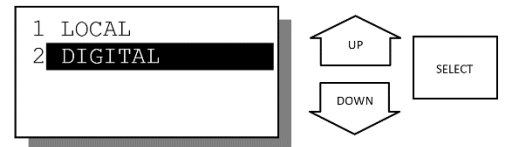
From the main menu screen , use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.



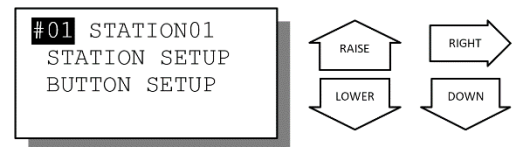
Use the **UP/DOWN** arrow keys to highlight **SWITCHES**. Press **SELECT**.



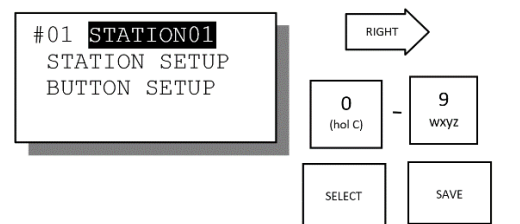
Use the **UP/DOWN** arrow keys to highlight **DIGITAL**. Press **SELECT**.



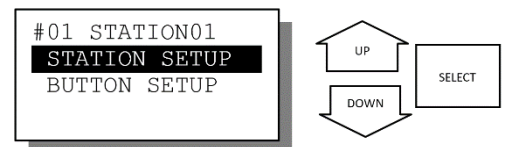
Use the **RAISE/LOWER** arrow keys to scroll to desired **Station** entry.



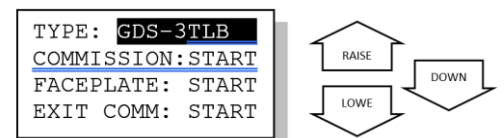
To change a **Station** name, use the **RIGHT** arrow key to highlight the **Station** name field. A cursor will blink on the first letter of the **Station** name. Use the alphanumeric keypad to set each letter of the new name. The cursor is advanced to the next character by pausing 2 seconds between keystrokes. Press **SAVE**.



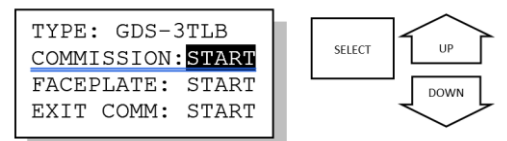
To change a **Station** type, use the **UP/DOWN** arrow keys to highlight the **STATION SETUP** field. Press **SELECT**.



Use the **RAISE/LOWER** arrow keys to select the switch Type. Valid options for GDS switches are: GDS-1TLB, GDS-2TLB, GDS-3TLB, GDS-2TSB, GDS-3TSB, GDS-4TSB, GDS-5TSB. In the example on the right, the GDS-3TLB has been selected. Press the **DOWN** arrow key to proceed to switch commissioning.

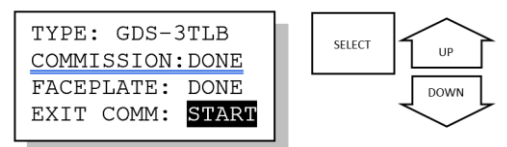


Press **SELECT** to initiate switch commissioning. All LEDs on all GDS stations will flash. Press the topmost button on the GDS station to which you wish to assign addresses. The COMMISSION field will display DONE when assignment is complete.



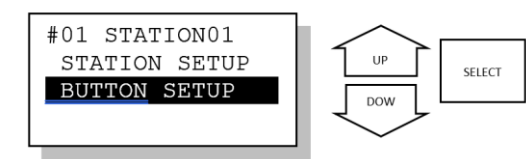
NOTE: This process must be repeated for each station on the CANBus network.

When commissioning is complete, press **SELECT** to end. All LEDs on GDS stations will stop flashing.

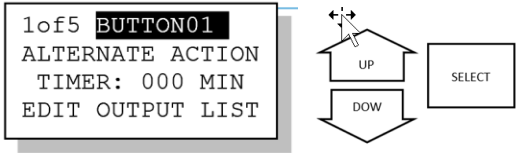


To set a system-wide GDS switch Button address, Use **UP/DOWN**

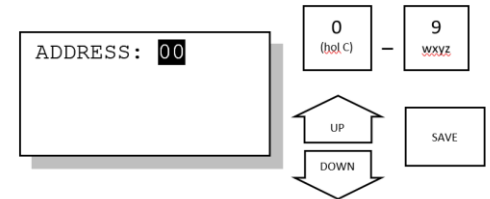
arrow keys to highlight **BUTTON SETUP**. Press **SELECT** to edit button options.



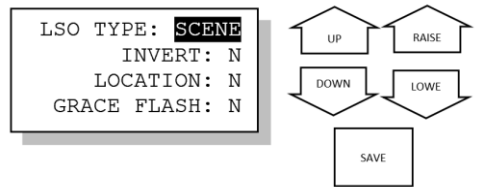
Use the **UP/DOWN** arrow keys to select the desired **Button**.



Enter a button address (1-254). Press **SAVE**. Use the **UP/DOWN** arrow keys to exit.



To set GDS switch LSO options, from the **BUTTON SETUP** screen, use the **UP/DOWN** arrow keys to select **LSO TYPE**. Use the **RAISE/LOWER** arrow keys to scroll to the desired entry as described below. Use the **UP/DOWN** arrow keys to make changes to the additional LSO option fields as described below. Press **SAVE**.



LSO TYPE:

NONE	LSO does nothing
SCENE	LSO tracks state of any GROUP or PATTERN linked to this switch as long as switch was the last device to command the group. If another device commands the group, the LSO goes OFF
SELF	LSO tracks the state of the switch (last switch command)
GROUP	LSO tracks the commands issued to any GROUP or PATTERN linked to this switch

INVERT: Y/N. When Switch is ON, the LSO will be OFF. When switch is OFF, the LSO will be ON.

LOCATOR: Y/N. When the LSO is OFF, it will glow dimly. When ON, it will be full bright.

GRACE FLASH: When a group that is linked to the switch for this LSO is in its WARN cycle, the LSO will blink. LSO TYPE must be GROUP for this option to work.

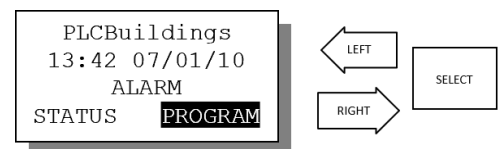
Photosensors

Photosensors: Setup

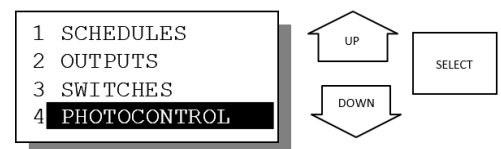
Each Tandem lighting control system includes four photosensor interfaces that supply +24VDC to the connected photosensor and receives a 0-10VDC variable signal. Each interface also includes an option for conversion of a 4-20mA photosensor input to a 1-10VDC signal. The Tandem lighting control system determines whether lighting should be turned **ON** or **OFF** by comparing the output signal(s) from the photosensor(s) to preprogrammed set points and time delays as described below. Refer to the Hardware section for information on wiring.

Photosensors: Programming

From the main menu screen, use the **LEFT/RIGHT** arrow keys to highlight **PROGRAM**. Press **SELECT**.

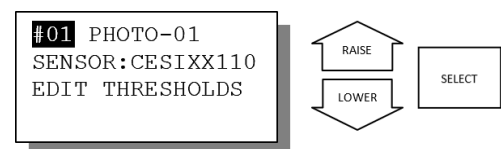


Use the **UP/DOWN** arrow keys to highlight **PHOTOSENSOR**. Press **SELECT**.

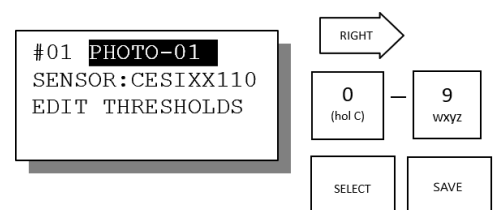


Naming a Photosensor

Use the **RAISE/LOWER** arrow keys to highlight the desired **PHOTOSENSOR** entry. Press **SELECT**.

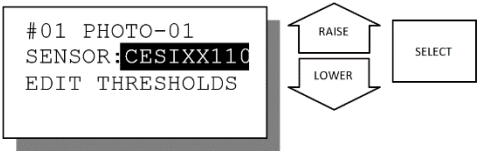


Press the **RIGHT** arrow key to highlight the **NAME** field. A cursor will begin blinking on the first letter of the current name. Use the alphanumeric keypad to rename the selected **Photosensor**. Press **SAVE** prior to exiting.

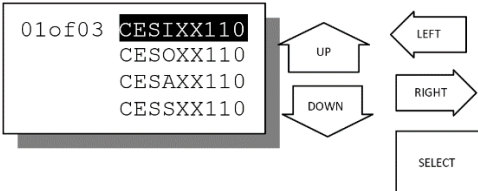


Setting Photosensor Model Number

Use the **RAISE/LOWER** arrow keys to highlight the **SENSOR** field. Press **SELECT**.



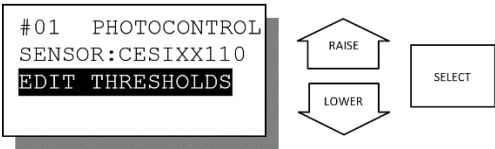
Use the **UP/DOWN** arrow keys to scroll through the displayed list of sensor model numbers. To view additional selections, use the **LEFT** arrow key to highlight the page number field and the **RAISE/LOWER** arrow keys to view the additional model numbers. Use the **RIGHT** arrow key to highlight the desired model number entry. Press **SELECT** to set the sensor model number. Press **SAVE** prior to exiting.



In the example shown above, the sensor model number has been set to **CESIXX110**.

Setting Photosensor Parameters

Use the **RAISE/LOWER** arrow keys to highlight the **EDIT THRESHOLDS** field. Press **SELECT**.



Use the **RAISE/LOWER** arrow keys to highlight the desired **PHOTOSENSOR**. Press the **DOWN** arrow key to highlight the **Threshold Type** field.



Use the **RAISE/LOWER** arrow keys to highlight either **DAYLIGHT HARVEST** or **NIGHT TIME** control. Press **SELECT**.

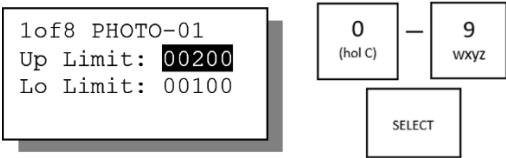


NOTE: Open-Loop table options are only accessible using PLC Designer.

To set **Photosensor Thresholds**, use the **UP/DOWN** arrow keys to highlight the **SET LIMITS** field. Press **SELECT**.



Use the alphanumeric keypad to set the desired upper limit threshold (in FC). Press **SELECT**.



Use the alphanumeric keypad to set the desired lower limit threshold (in FC). Press **SAVE** prior to exiting.

In the example shown above, the upper photosensor threshold has been set to 200FC and the lower photosensor threshold has been set to 100FC.

To link **GROUPS** to a selected **PHOTOSENSOR**, use the **UP/DOWN** arrow keys to highlight the **EDIT OUTPUT LIST** field. Press **SELECT**.

Use **UP/DOWN** to highlight the **GROUPS** field. Press **SELECT**.

Press the **UP/DOWN** arrow keys to scroll to the desired **GROUP(S)**. Use the **RAISE/LOWER** arrow keys to select "**Y**" to link the highlighted **GROUP** to the **PHOTOSENSOR**. Press **SAVE** prior to exiting.

In the example shown on the right, **GROUP 02** has been linked to **PHOTO-01**.

To link **RELAYS** to a selected **PHOTOSENSOR**, use the **UP/DOWN** arrow keys to highlight the **RELAYS** field. Press **SELECT**.

Press the **UP/DOWN** arrow keys to scroll to the desired **RELAY(S)**. Use the **RAISE/LOWER** arrow keys to select "**Y**" to link the highlighted **RELAY** to the **PHOTOSENSOR**. Press **SAVE** prior to exiting.

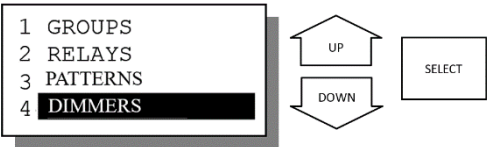
In the example shown on the right, **RELAY 1-2** has been linked to **PHOTO-01**.

To link **PATTERNS** to a selected **PHOTOSENSOR**, use the **UP/DOWN** arrow keys to highlight the **PATTERNS** field. Press **SELECT**.

Press the **UP/DOWN** arrow keys to scroll to the desired **PATTERNS(S)**. Use the **RAISE/LOWER** arrow keys to select "**Y**" to link the highlighted **PATTERN** to the **PHOTOSENSO**. Press **SAVE** prior to exiting.

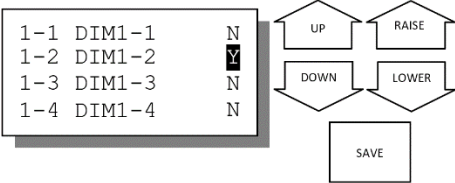
In the example shown on the right, **PATTERN 02** has been linked to **PHOTO-01**.

To link **DIMMERS** to a selected photosensor, use the **UP/DOWN** arrow keys to highlight the **DIMMERS** field. Press **SELECT**.



Press the **UP/DOWN** arrow keys to scroll to the desired **DIMMERS(S)**. Use the **RAISE/LOWER** arrow keys to select **"Y"** to link the highlighted **DIMMER** to the **PHOTOSENSOR**. Press **SAVE** prior to exiting.

In the example shown on the right, **DIM1-2** has been linked to **PHOTO-01**.



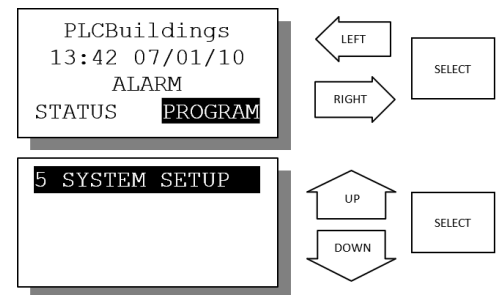
System Setup

Tandem Panel system-level parameters are set up as using the panel keyboard as described below.

System-level parameters may also be set up using PLC Designer software which can be downloaded from the PLC Multipoint website. Refer to the PLC Designer Installation and Maintenance Manual for further instructions.

The System Logs program may be used to retrieve all log records from a Tandem Panel to an Excel file. Refer to the System Log Installation Manual for further instructions.

To set status parameters, use the **LEFT/RIGHT** arrow keys located on the right-hand side of the keypad to highlight the **PROGRAM** on the display. Press **SELECT**. Use the **UP/DOWN** arrow keys to navigate to **SYSTEM SETUP**. The desired option can be accessed by either pressing the **SELECT** key when that option is highlighted or by pressing the number appearing to the left of each option on the numeric keypad.



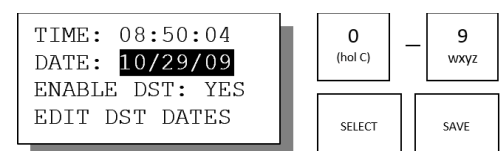
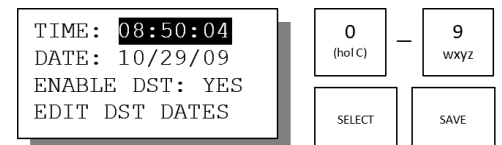
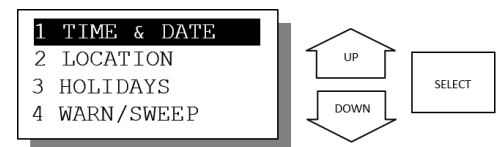
Time & Date

TIME & DATE can be accessed by pressing the **SELECT** key when that option is highlighted or by pressing the number "1" appearing to the left of the option on the numeric keypad.

A flashing cursor will appear on the hour field. Enter the new time (hour, minutes, and seconds). Press **SELECT** to end input. Press **SAVE** to set the new time.

In the example shown on the right, the **TIME** field has been set to 08:50:04.

Press the **DOWN** arrow key to move to the **DATE** field. Press **SELECT**. A flashing cursor will appear on the month field. Enter the new date (month, day, and year). Press **SELECT** to end input. Press **SAVE** to set the new date.



In the example shown on the right, the **DATE** field has been set to October 29, 2019.

Press the **DOWN** arrow key to move to the **DST** (Daylight Savings Time) field. Use the **RAISE/LOWER** arrow keys to enable/disable daylight savings time. Press **SAVE**.

In the example shown on the right, DST has been enabled.

The dates for the beginning and end of Daylight Savings Time can be modified, if necessary. Press the **DOWN** arrow key to move to the **EDIT DST DATES** field. Press **SELECT**.

Use the **LEFT/RIGHT** and **UP/DOWN** arrow keys to access the **DST DATES** fields. Use the **RAISE/LOWER** arrow keys to change the week, day of week, and month fields. Press **SAVE**.

In the example shown on the right, Daylight Savings Time is set to begin on the second Sunday of March and end on the first Sunday of November.

Press **EXIT** at the bottom left of the keypad to return to the previous System Setup menu screen.

TIME: 08:50:04
DATE: 10/29/09
ENABLE DST: YES
EDIT DST DATES

TIME: 08:50:04
DATE: 10/29/09
ENABLE DST: YES
EDIT DST DATES

BGN: 2ND SUN MAR
END: 1ST SUN NOV

Panel Location

PANEL LOCATION can be accessed by pressing the **SELECT** key when that option is highlighted or by pressing the number "2" appearing to the left of the option on the numeric keypad.

Press the **RIGHT** arrow key to access the state selection field and the **RAISE/LOWER** arrow keys to scroll through the list of states. Press **SAVE** to set the state selection.

Use the **LEFT** arrow key to access the city selection field and the **RAISE/LOWER** arrow keys to scroll through available selections for city. Press **SAVE** to set the city selection.

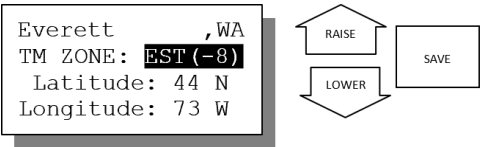
In the example shown on the right, the city and state have been set to Everett, Washington.

1 TIME & DATE
LOCATION
3 HOLIDAYS
4 WARN/SWEEP

Everett, WA
TM ZONE: PST (-8)
Latitude: 47 N
Longitude: 122 W

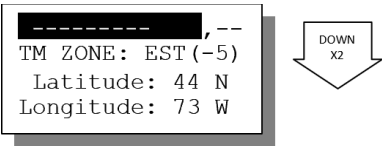
Time Zone

Use the **RAISE/LOWER** arrow keys or the **SPACE** key to scroll through the time zone selections. Press **SAVE** to set the time zone.

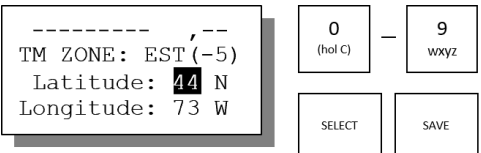


Latitude and Longitude

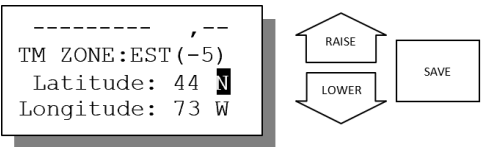
To manually enter Latitude and \Longitude, enter '0' in the state field, the field will display "--". Press the **DOWN** arrow key twice to move to the Latitude field. Press **SELECT**.



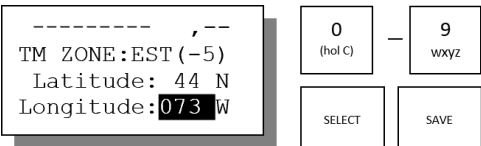
A flashing cursor will appear on the Latitude field. Enter Latitude to the nearest whole degree. Press **SELECT**.



Press the **RIGHT** arrow key to move to the **N/S** Latitude field and the **RAISE/LOWER** arrow keys to change the selection. Press **SAVE**.

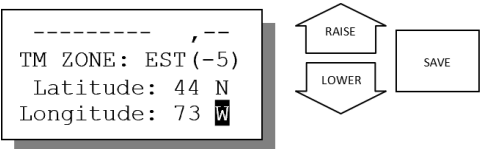


Press the **DOWN** arrow key to move to the Longitude field. Repeat the process described above to set the Longitude.



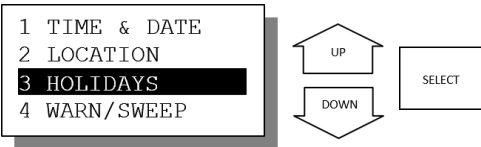
In the example shown on the right, the Latitude has been set to 44 degrees North and 73 degrees West.

Press **EXIT** at the bottom left of the keypad to return to the previous System Setup menu screen.

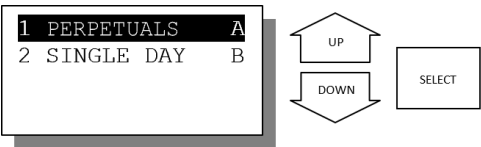


Holidays

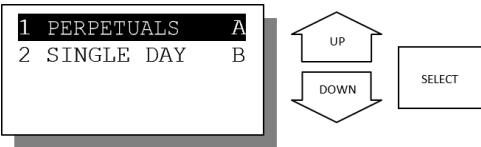
Use the **UP/DOWN** arrow keys to access the **HOLIDAYS** field. Press **SELECT**.



Use the **UP/DOWN** arrow keys to select Perpetual holidays. Press **SELECT**.



Use **UP/DOWN** arrow keys to access **PERPETUALS – A**. Press **SELECT**.

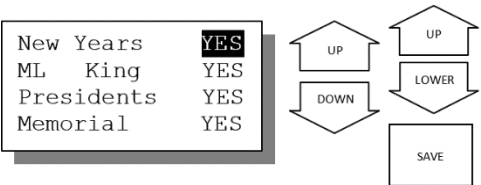


The following holidays have pre-entered:

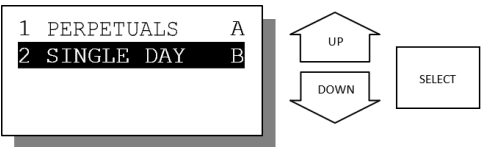
- New Year
- ML King
- Presidents
- Memorial
- Indpendnce
- Labor
- Columbus
- Veterans
- Thanksgvng
- Black Fri
- ChristEve
- Christmas
- NewYr Eve
- Junteenth

Use the **UP/DOWN** arrow keys to scroll through the pre-entered list. Use the **RAISE/LOWER** arrow keys to enable or disable the holiday using the **YES/NO** field. Press **SAVE** prior to exiting.

NOTE: It is not possible to add entries to the Perpetual-A holidays list. Additional holidays must be entered using the **SINGLE DAY** function described below.



Use **UP/DOWN** arrow keys to access **SINGLE DAY – B**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to scroll through the pre-entered list. Use the numeric keypad to enter the holiday date.

NOTE: Entries are automatically repeated annually. Press **SELECT** to end the date input. An entry may be cleared by entering 00/00. Press **SAVE** prior to exiting.

Press **EXIT** at the bottom left of the keypad to return to the previous System Setup menu screen.

HOLIDAY01	--/--
HOLIDAY02	--/--
HOLIDAY03	--/--
HOLIDAY04	--/--

UP

DOWN

SELECT

0 1 2 3 4 5 6 7 8 9 -

Warn/Sweep

The **WARN/SWEEP** function provides the user with a way of notifying occupants prior to lights turning off by flashing the lights off for a brief amount of time. This allows occupants the opportunity to extend the amount of time the lights remain on.

Use the **UP/DOWN** arrow keys to access **WARN/SWEEP**. Press **SELECT**.

1 TIME & DATE

2 LOCATION

3 HOLIDAYS

4 **WARN/SWEEP**

UP

DOWN

SELECT

Use the **RAISE/LOWER** arrow keys to enter a flash warn time between 0.5–4.5 seconds.

NOTE: Entries are automatically saved.

In the example shown on the right, the flash time has been set to 0.5 seconds.

Press **EXIT** at the bottom left of the keypad to return to the previous System Setup menu screen.

FLASH: 0.50 SEC

RAISE

LOWER

SAVE

Setting to Defaults and Clearing Logs

Default settings may be restored for both Programs and Logs. Setting Program defaults will clear all user setups including groups, schedules, switches, etc. Setting Logs defaults will clear all logged information about events that have occurred previously in the system.

Use the **UP/DOWN** arrow keys to access **SET DEFAULTS**. Press **SELECT**.

5 **SET DEFAULTS**

6 POWERUP INPUT

7 BACKUP/RESTORE

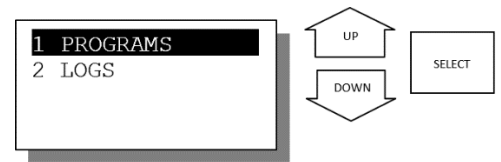
8 PANEL ADDRESS

UP

DOWN

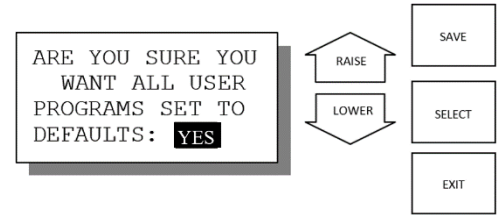
SELECT

Use the **UP/DOWN** arrow keys to access **PROGRAMS**.

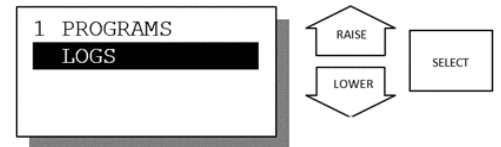


A confirmation screen will appear as shown in the example on the right. Use the **RAISE/LOWER** arrow keys to select **YES**.

Press **SELECT** or **SAVE** to set **PROGRAMS** to defaults.



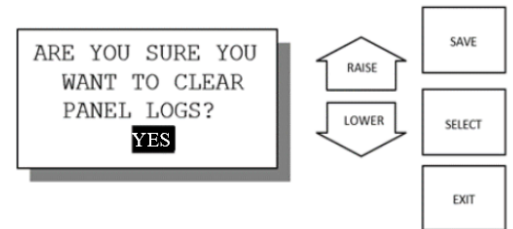
Use the **UP/DOWN** arrow keys to access **LOGS**.



A confirmation screen will appear as shown in the example on the right. Use the **RAISE/LOWER** arrow keys to select **YES**.

Press **SELECT** or **SAVE** to clear Panel logs.

Press **EXIT** at the bottom left of the keypad to return to the previous System Setup menu screen.



Powerup Input

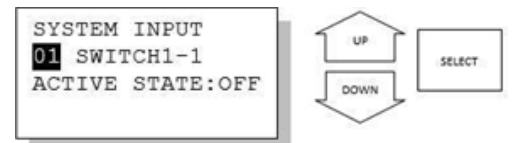
The powerup state of switches may be set either **ON** or **OFF**.

Use the **UP/DOWN** arrow keys to select **POWERUP INPUT**.

Press **SELECT**.

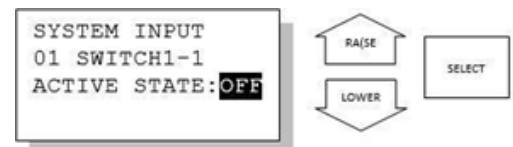


Use the **UP/DOWN** arrow keys to select Switches 1-48. Press **SELECT**.



Use the **RAISE/LOWER** arrow keys to select the **ACTIVE STATE** for the selected Switch.

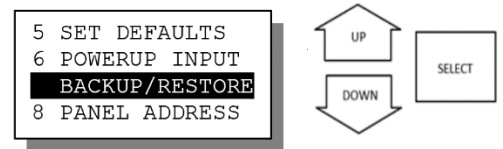
Press **EXIT** at the bottom left of the keypad to return to the System Setup menu screen.



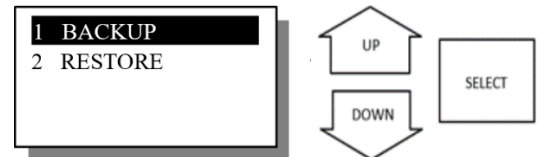
Backup/Restore

Tandem user backup files are stored in CSV format (comma separated values).

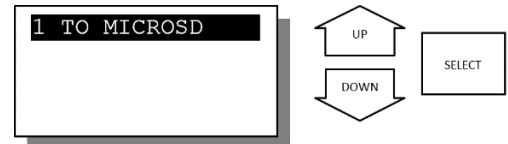
Use the **UP/DOWN** arrow keys to select **BACKUP/RESTORE**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to highlight **BACKUP**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to highlight **TO MICROSD**. Press **SELECT**.

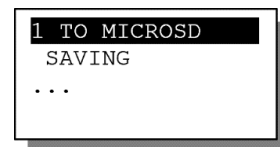


To initiate a backup to the highlighted file name, press **SELECT** or **SAVE**. The file name of no more than 8 characters may be changed by entering the new name from the alphanumeric keypad. To save the new name, press **SELECT** or **SAVE**. Once a file name is selected, the backup will initiate.



NOTE: Use **UP/DOWN** arrow keys to scroll through the backup file directory.

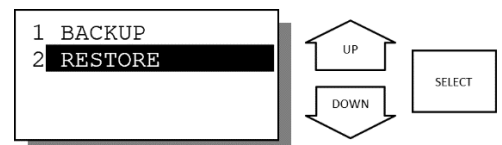
As shown in the example on the right, the screen will indicate that the backup is in process.



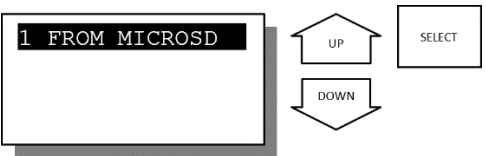
NOTE: The screen will indicate a missing or improper MicroSD card with an **INVALID CARD** message. The screen will indicate that the backup file could not be located with a **MISSING FILE** message

Press **EXIT** to complete the **BACKUP** process.

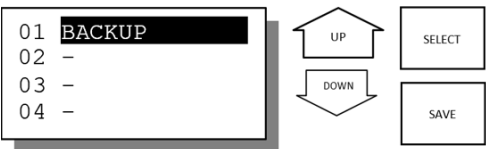
To restore from a previous backup file, use the **UP/DOWN** arrow keys to highlight **RESTORE**. Press **SELECT**.



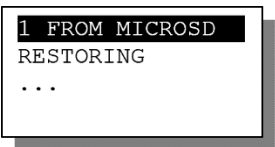
Use the **UP/DOWN** arrow keys to select **FROM MICROSD**. Press **SELECT**.



Use the **UP/DOWN** arrow keys to select the backup file. Press **SELECT** or **SAVE** to initiate the restore.



As shown in the example on the right, the screen will indicate that a **RESTORE** is in process. This process may take several minutes.

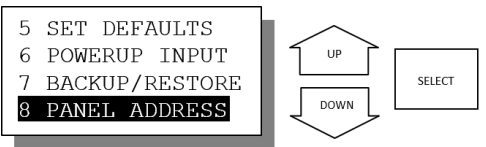


NOTE: The screen will indicate a missing or improper MicroSD card with an **INVALID CARD** message. The screen will indicate that the backup file could not be located with a **MISSING FILE** message.

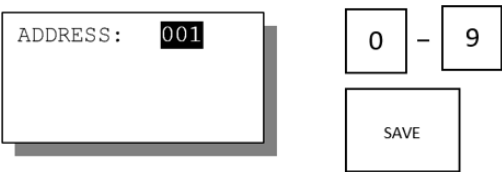
Press **EXIT** at the bottom left of the keypad to return to the previous System Setup menu screen.

Panel Address

Use the **UP/DOWN** arrow keys to highlight **PANEL ADDRESS**. Press **SELECT**.



Use the numeric keypad to enter a network address (valid range is 1 to 254). Press **SAVE**.



In the example shown on the right, the network address has been set to 001.

Press **EXIT** at the bottom left of the keypad to return to the previous System Setup menu screen.

Tandem BACnet IO Board

The Tandem Panel features an optional BACnet IO Board. The BACnet IO Board enables communication between the Tandem lighting controller and any BACnet compatible building automation system. While the Tandem controller operates autonomously, lighting system information is also shared and may be controlled by the building automation system via BACnet. Refer to the BACnet Quick Start Guide for further information.

Tandem Web Interface

The Tandem Panel features an optional web interface that provides remote network LAN/WAN access via standard Ethernet. Refer to the Tandem Web Installation and Maintenance Manual for further information.