Advanced Programming & Systems Design Guide

Z-MAX^{TM} RELAY PRODUCTS

Covering Z-Max Master, Z-Max Remote, & EZ-Max Relay Panels
Software Revision 2.00 and above.

.

Apply the "Emergency Circuits" label, provided, to the front of the door

IMPORTANT SAFEGUARDS

When using electrical equipment, basic safety precautions should always be followed including the following:

a)READ AND FOLLOW ALL SAFETY INSTRUCTIONS

b) Do not use outdoors.

c) Do not mount near gas or electric heaters.

d) Equipment should be mounted in locations and at heights where it will not readily be subjected to tampering by authorized personnel.

e) The use of accessory equipment not recommended by manufacturer may cause an unsafe condition.

f) Do not use this equipment for other than intended use.

SAVE THESE INSTRUCTIONS

All servicing shall be performed by qualified service personnel.

Part I - Front Panel Operation & Visual Status

Part II - Simple Mode Programming

Part III - Advanced Programming Guide

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Overview

Introduction

Thank you for choosing Leviton's Z-MAX line of products for your relay needs. The Z-MAX product line offers a scalable solution of relay and relay control which can fit any application from the simple 2 or 3-circuit needs with time clock control, to a complete campus solution, fully integrated with your building management system products.

This user's guide is has four parts:

1 Detailed operational information,

2 A complete description of Simple programming mode,

3 An Advanced Programming Guide, and

4 A Systems Design Guide.

Part 1 contains detailed information about **panel operation** from the front panel interface. This section walks you through all front panel features with complete descriptions of each.

The second, **Part 2**, contains a complete description of simple programming mode with documentation on all required programming steps and their application.

The **Advanced Programming Guide,** found as **Part 3** of this manual, is your complete manual to configuring your Z-Max product. It covers all Z-Max features with a complete description of all menu options. The advanced programming guide assumes a basic familiarity with relay systems and Z-Max cabinet programming philosophy.

Part 4 of this manual contains the **System Design Guide** and is designed to familiarize yourself with the requirements common to more complex installations of Z-Max and their related products.

NOTE	Leviton recommends always checking our website at http://www.leviton.com/lms for latest version of this guide and late breaking notes, requirements, application information, and firmware updates.

This manual covers all products in the Z-Max product line as the steps given are somewhat generic in nature. The particular requirements for your product, especially as related to terminal location, may differ slightly from that shown. Please review all markings and labels on your product to ensure that your actions are correct.

Product Specifications & Capabilities

The specifications and capabilities for each product are shown in the table below, however, generally your product will fit into one of four categories. As the four categories are used throughout this manual, it's helpful to recognize which category your product fits in so you know which sections of the manual apply to each product type.

Master

"Master" relay panels offer the full suite of capabilities of the Z-Max products including all networking functionality and modular relays. Relay panel sizes range from as few as 8 relays per panel up to 252 relays per panel.

Basic

The "Basic" relay panel is very similar to the Master except the feature set has been reduced. It's designed to be used in stand alone installations where only basic capabilities are desired.

Remote

"Remote" relay panels are designed for remote installation and mounting where relay switching from 4 to 48 load circuits is desired, but control intelligence, programming, and interface to other systems is required at a central location. Exactly (1) Master panel must exist on the same network as the remote relay cabinets, and the remote panels can control relays, accept discrete inputs, and accept an emergency input.

EZ-Max

Panels designated as "EZ-Max" panels are very similar to a "Basic" relay panel except that in addition to the feature set being reduced, the hardware as also undergone change to make it a more economical and easy to install package. For example, on an EZ-Max panel, the relays are not modular. You still get the superior switching technology of the Z-Max panels, just in a non-modular format.

Product Specifications & Capabilities Chart

The table below gives a generalized overview of the specifications and features of a Z-Max Relay Cabinet. In the table, the following abbreviations are used:

Y = Yes

N = No

O = Optional

* = An asterick in any column indicates that there is support for this feature, however, there are conditions with which you should be aware. Consult the specific sections of the manual dealing with this feature for additional information and requirements.

Z-Max Product Type	Min-Max Relays	Relay Types	Weight (lbs (Kg))	Size W", H", D" (Wcm,Hcm,Dcm)	Flush Mount Option	# Discreet Inputs	Opt. Swt In Board	Luma-Net Network	DMX Network	Master/Slave Net	Emergency Input	Emergency Output	Touch-Tone Phone	Data Modem	Ethernet Network	Front Panel Program	Event Scheduler
Master Panel, 8 relays	0-8	Any	16 (7.26)	13" x 13" x 4-9/32" (33 x 33 x 10.9)	Y	8	N	Y	Y	Y	Y	Y	O*	O*	O*	Y	Y
Master Panel, 24 relays	0-24	Any	44 (19.96)	20-1/4"x34"x4-9/32" (54.4 x 86.4 x 10.9)	Y	12	36	Y	Y	Y	Y	Y	O*	O*	O*	Y	Y
Master Panel, 48 relays	0-48	Any	65 (29.48)	20-1/4"x54"x4-9/32" (54.4 x 86.4 x 10.9)	Y	12	36	Y	Y	Y	Y	Y	O*	O*	O*	Y	Y
Basic Panel, 8 relays	0-8	Any	16 (7.26)	13" x 13" x 4-9/32" (33 x 33 x 10.9)	Y	8	N	N	N	N	N	N	O*	O*	N	Y	Y
EZ-Max, 4 Standard relays	4	Std	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	6*	N	N	N	N	Y	N	O*	N	N	Y	Y
EZ-Max, 4 2-Pole relays	4	2PL	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	6*	N	N	N	N	Y	N	O*	N	N	Y	Y
EZ-Max, 4 347V relays	4	347	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	6*	N	N	N	N	Y	N	O*	N	N	Y	Y
Remote, 4 Standard relays	4	Std	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	4	N	N	N	Y	Y	Y	N	N	N	N	N
Remote, 4 2-Pole relays	4	2PL	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	4	N	N	N	Y	Y	Y	N	N	N	N	N
Remote, 4 347V relays	4	347	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	4	N	N	N	Y	Y	Y	N	N	N	N	N
Remote, 24 Max Relays	0-24	Any	44 (19.96)	20-1/4"x34"x4-9/32" (54.4 x 86.4 x 10.9)	Y	12	36	N	N	Y	Y	Y	N	N	N	N	N
Remote, 48 Max Relays	0-48	Any	65 (29.48)	20-1/4"x54"x4-9/32" (54.4 x 86.4 x 10.9)	Y	12	36	N	N	Y	Y	Y	N	N	N	N	N
Z-Max with Breakers, 120V Cabinets and 48 Master or Remote Panel	0-48	Any	195 (88.45)	24"x87"x4-9/32" (61 x 220 x 10.9)													
Z-Max with Breakers, 120V Cabinets and 24 Master or Remote Panel	0-24	Any	174 (78.93)	24" x 67" x 4-9/32" (61 x 170 x 10.9)					Features are defined based on the Z-Max relay cabinet to which it is paired								
Z-Max with Breakers, 277V Cabinets and 48 Master or Remote Panel	0-48	Any	335 (152)	60" x 40-1/2" x 6" (152 x 103 x 15.2)													

Figure 5: General Product Capabilities Chart

Warnings - READ ME FIRST

- Conduit Entry Locations: The cabinets have been designed with specific locations supporting conduit entry for line and low voltage circuits. There are specific areas of the cabinet which are restricted from some or all types of conduit access. Reference the Physical Installation section of this manual for specific details.

- Line & load circuit wiring: The line wiring should come from an over-current device and the load circuit wiring shall go to the specific load to be controlled.   On some models which have integrated branch circuit protection, the line side of the relay has been pre-wired to a circuit breaker. With these products, only the load side of the circuits needs to be connected.

- To be installed and/or used in accordance with appropriate electrical codes and regulations.

- To be installed by a qualified Electrician.

- DO NOT CONNECT line voltage wires to low voltage terminals.

- Mount in a location where audible noise is acceptable.

- When using with fluorescent ballasts, both lighting fixture and ballast must be grounded.

- Use this relay cabinet only with minimum 75° C copper wire at 75% ampacity.

- Disconnect power when servicing the relay cabinet, fixture or when changing lamps.

- Indoor use only.

- TO AVOID FIRE, SHOCK OR DEATH: TURN OFF POWER AT MAIN CIRCUIT BREAKER, OR FUSE, AND TEST THAT THE POWER IS OFF BEFORE WIRING, OPENING THE PANEL, OR REPLACING ANY COMPONENT!

- During operation, cabinet cover is to be removed by qualified personnel ONLY! Heed all caution markings indicating the presence of High Voltage. High voltage may be up to 600V.

- Test each circuit for short circuits before connecting it to relay so damage to the relay and it's electronics can be avoided.

- Verify that all un-used power supply leads are insulated with wire nuts.

Part I - Front Panel Operation & Visual Status

Your relay panel has many unique operational features which can be accessed directly from the front panel. Relay control, relay overrides, and basic status information are all available features. Secondly, both internal and external to your relay panel are several "status" indicators which will assist you in determining how your panel is operating and whether or not it is operating properly. This part of your guide addresses both of these topics.

Operation

This section discusses how your cabinet can be operated from the front panel, and the actions that can be accessed from the front panel. The next sections on configuration deal with the specific configuration and programming of your cabinet.
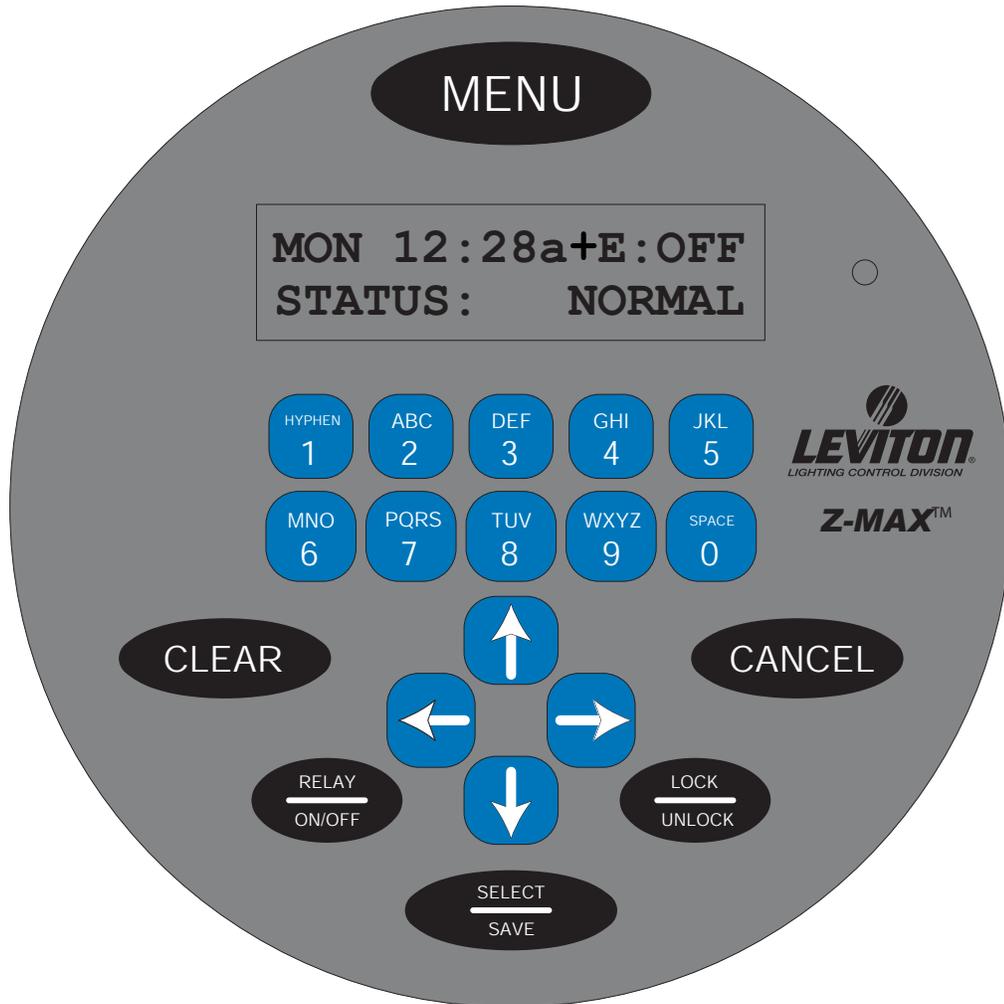
Figure 6: LCD Display

LCD Display

The LCD display helps you determine that the system is operating properly as well as providing an easy and intuitive means of programming the panel.

When the system is operating normally the top line of the LCD display shows the current day, time and the status of the event scheduler. The second line shows the status of your relay cabinet, or in the case of EZ-Max, the status of the four relays in the cabinet.

Here is how you decipher the screen:

- Day and Time - The clock can display in either 12 or 24 hour mode.
  - Daylight Savings settings for 12 Hour Clock
    - Lower case "a" or "p" indicates that daylight savings is inactive
    - Uppercase "A" or "P" indicates that daylight savings is active
  - Daylight Savings settings for 24 Hour Clock
    - Lower case "s" indicates that daylight savings is inactive
    - Lower case "d" indicates that daylight savings is active
    - "+" is shwon for the "Z-MAX Plus" version.
- Panel Lock Status
  - "L" indicates that the panel is in a locked state
  - "u" indicates that the panel is in a temporary un-locked state and will automatically lock after 3 minutes of inactivity
  - "U" indicates that the panel is in an un-locked state and will not automatically enabled the lock
- Event Scheduler
  - "E" will either show
    - "OFF" Indicating that the event scheduler is turned off
    - "---" indicates that no events have executed since the last system reset/ power cycle
    - a number indicates the number of the last event executed
- Bottom Line - If an EZ-Max panel, shows the current status of the four relays in your panel. Either On, or Off. An asterick (*) adjacent to any relay indicate that particular relay is in an override state. The override could be either a timed override or other front panel override.   If the panel is not an EZ-Max panel, this bottom line shows any relevant status messages.

Programming/Function Buttons

The several programming buttons are located around the display:

- **MENU.** Allows the user to navigate through the system
- **SELECT/SAVE.** Causes a new readout on the LCD display.
- **CANCEL:** Returns to the previous menu
- **CLEAR.** Clears the text or value that was just entered.
- **RELAY ON/OFF:** Button that allows a user to turn a relay ON or OFF, execute a timed override, or execute a permanent relay override.
- **ALL ON/ALL OFF:** Forces all relays to ON or OFF state. When in the ON state inputs are temporariily disabled.

NOTE   Many parameters can be modified using the LCD screen and a password (setup code), however these modifications should be made by a qualified factory technician.

Navigation Buttons

The lower center four buttons, used for navigation of menu items, are **LEFT** ⬅ , **UP** ⬆ , **DOWN** ⬇ , and **RIGHT** ➡ . Generally, the **LEFT** ⬅ and **RIGHT** ➡

buttons are used to navigate between 'fields' on the screen, whereas the **UP** ⬆️ and **DOWN** ⬇️ buttons generally change values in the fields.

The ⌨️ keys are used for alpha-numeric data entry.

In many circumstances where only use of the arrows keys are indicated, the number keys work equally as well for data entry.

NOTE After approximately 3 minutes of inactivity on any menu screen, the LCD will revert back to the status screen.

FOR FIELD VALUE CHANGES   **FOR FIELD NAVIGATION**
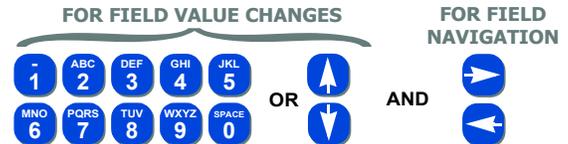
Figure 7: Arrow Key & Alpha-Numeric Key Functions

Auto-Repeat

In some screens where you are adjusting values, you may find it helpful to press and hold an arrow key. After a brief moment, the key will repeatedly issue it's command giving you a quick way to scroll through a broad range of values.

Turning Relays On/Off from the front panel and front panel overrides

Pressing the **Relay** Button enters relay control mode. When in this mode, the following keys can be used

- Use ⬅️➡️ to adjust the relay number (number keys can also be used, but 3 digits are always required)

- Use ⬆️⬇️ to adjust the relay state, UP for ON, DOWN for off.

- Pressing ⬆️⬆️ (up arrow twice) puts the relay into an override ON state. When in this state, no other relay panel function can alter the state of this relay other than the front panel. (Only one arrow press is required if relay is already on.)

- Pressing ⬇️⬇️ (down arrow twice) puts the relay into an override OFF state. When in this state, no other relay panel function can alter the state of this relay other than the front panel. (Only one arrow press is required if relay is already on.)

- Pressing **Select** when in either override on or off mode will allow you to enter a time and then activate Timed Override mode by pressing **Select** again. A timed override forces the relay into the ON (or off) state for the elapsed period of time. Once the time expires, the relay returns to the function indicated by other controlling devices, or off if none are indicated.

To Turn a Relay On or Off

Step 1: Press **Relay**

Step 2: Use ◀ ▶ to select the relay number you want to affect. Use ▲▼ to turn the relay off or on
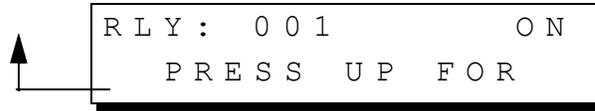
```
R L Y :   0 0 1           O N
    P R E S S   U P   F O R
```

Step 3: Press **Menu** when complete to return to the main screen, or repeat Step 2

To Override a Relay On or Off

Step 1: Press **Relay**

Step 2: Use ◀ ▶ to select the relay number you want to affect. Use ▲ ▲ to override the relay ON, or ▼ ▼ to override the relay OFF
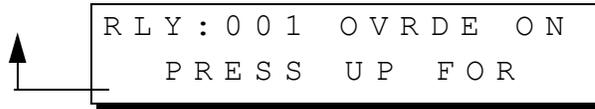
```
R L Y : 0 0 1   O V R D E   O N
    P R E S S   U P   F O R
```

Step 3: Press **Menu** when complete to return to the main screen, or repeat Step 2

To Override a Relay On or Off for a specified time

Step 1: Press **Relay**

Step 2: Use ◀ ▶ to select the relay number you want to effect. Use ▲ ▲ to override the relay ON, or ▼ ▼ to override the relay OFF

```
R L Y : 0 0 1   O V R D E   O N
    P R E S S   U P   F O R
```

Step 3: Press **Select** to access the override timer

```
R L Y : O 0 1   O V R D E   O N
O V R D   T I M E R = 0 0 : 0 0
```

Step 4: Use ⬇ keypad (1 2 3 4 5 6 7 8 9 0)

```
R L Y : 0 0 1   O V R D E   O N
O V R D   T I M E R = 0 0 : 1 5
```

Step 5: Pressing **0 0 1 5** would result in the above screen, entering an override time of 15 minutes.

Step 6: Press **Select** a second time to set and start the timer

Step 7: Press **Menu** to return to the main screen, or repeat steps 2-6.

Internal Relay Cabinet Controls

In addition to front panel controls, your Z-MAX cabinets have two different types of internal override switches for the relays:

- Master Override
- Relay Override

| NOTE | The inside of a relay cabinet, when energized, can be DANGEROUS as HIGH VOLTAGES are present. Fatal accidents are possible. Only trained authorized personnel should have and gain access to the internal workings of your relay panel, access is not required for any normal configuration or operational purpose. |

Master Override

See the figure below for the location of the master override. The master override has three modes of operation:

- Normal - Allows the Control Module and inputs to control the state of the relays
- All ON - Forces all of the relays to the ON state and **the Control Module and inputs can not turn the relays Off**
- All OFF - Forces all of the relays to the OFF state and **the Control Module and inputs can not turn the relays On**

Switch Inputs and DMX Connector-
Wire Range #14 - #24 AWG
Torque2 LB-IN

Luma-Net Connector
Wire Range #12 - #24 AWG
Torque 5 LB-IN

ANALOG/SWITCH INPUT/OUTPUTS TB 1-12*

| IN OUT +24V COM | | | | | | | | | | | |

TB1 S1 · TB2 S2 · TB3 S3 · TB4 S4 · TB5 S5 · TB6 S6 · TB7 S7 · TB8 S8 · TB9 S9 · TB10 S10 · TB11 S11 · TB12 S12

ETHERNET/MODEM

JP30

ANALOG/SWITCH I/O*
SELECTOR S1 THRU S12

JUMPER ON PULLS INPUT HIGH
JUMPER OFF IS DEFAULT

NC
NO   EMERGENCY
        RELAY
COMMON

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EMERGENCY
HEARTBEAT-C
LUMANET
DMX
CAN1
CAN2
ETH/MODEM
5V POWER

ETHERNET MODULE
OR
MODEM MODULE
(OPTIONAL)

LUMA-NET TB13
JP36   VOLTAGE INPUT
        SELECT 3 2 1
        +24V +12V
JP6 TERM

REM+
REM-
COM
+V
TERM
LOCK

COM
EMERG   EMERGENCY
        INPUT - TB21 *

SWITCH BOARD
(OPTIONAL)

J15

COM
D-
D+

J6   USB TYPE B

AUX.   COM 1
SERIAL TX
INPUT   RX

TB17

OX-70121-00-00-01 MASTER
OX-70121-00-00-02 SLAVE

DMX 512
TB 14**

JP7 TERM

JP9 TERM

MASTER/SLAVE

TB20

TB15

SERVICE
ONLY

KEYBOARD/LCD

TB19

J7   (ALT)
RESET   KEYBOARD/LCD
RELAY BUS BOARD J13 J16

AC2   AC1
      JP11
18 VAC IN TERM

TB16

ALL OFF   NORMAL   ALL ON

Figure 8: Location of Master Override Switches for Large and Small Control Modules

Individual Relay Overrides

Each relay has an individual override switch. See the Figures below for the location of these switches in each cabinet.
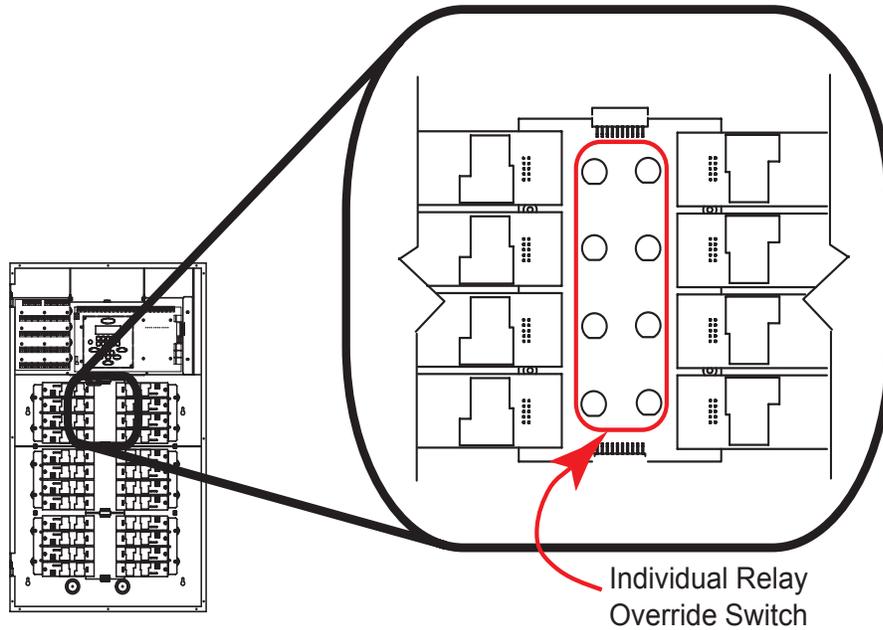
Figure 9: Location of Individual Relay Override Switches in 24 and 48 cabinets
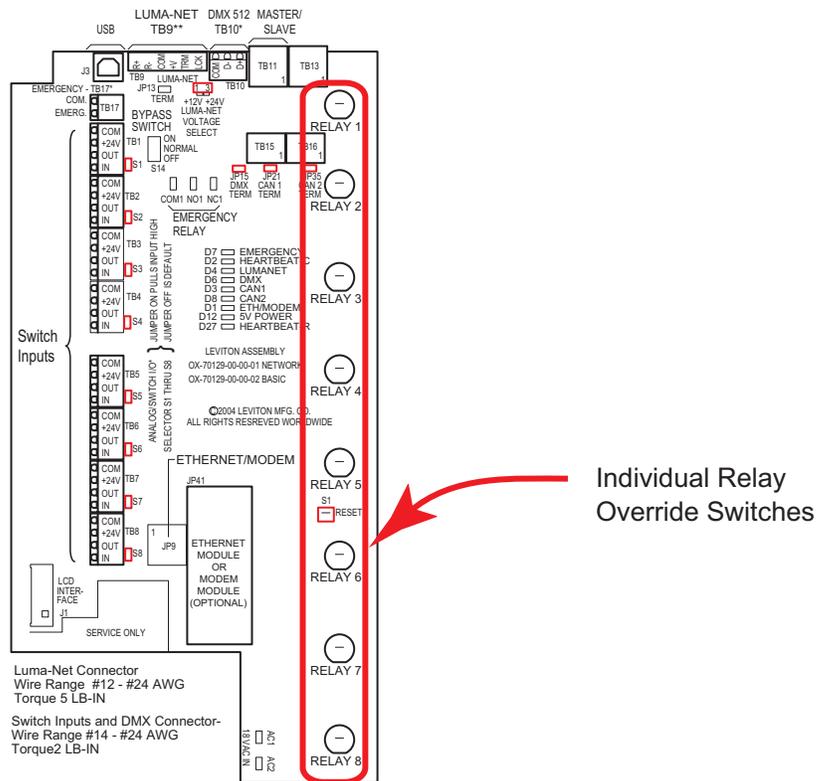
Figure 10: Location of Individual Relay Override Switches in the 8 Cabinet

These switches have one primary use with two modes of operation:

- Local override of individual relay without having to go through the Control Module
  - Temporary - Any control input with a higher priority can change its state
  - Locked Out - Event scheduler and control inputs, regardless of Priority will not be able to alter its state

To temporarily change a relays state using its override Switch:

Step 1: Open the cabinet door using the supplied key

Step 2: Press the switch next to the relay you wish to change
The relay will audibly click when it changes states (ON to OFF and vice versa)

| NOTE | There is a green LED above each relay override switch. If the LED is on, the relay is ON. If the LED is OFF, the relay is OFF. |

Step 3: Press the switch again to turn the relay on and off.

| NOTE | Pressing the individual relay override switch will always clear higher priority overrides for the relay. This allows manual control of the relay even when Emergency or Master Override is active |

To lock out a relay using its override switch:

Step 1: Open the cabinet door using the supplied key

Step 2: Get the relay to the state that you want to Lock it in. For example, if you wish to lock the relay in the On state and it is Off, press the switch one time to toggle the relay to the On state.

Step 3: Press and hold the Switch for approximately 5 seconds until the LED beneath the switch begins to blink.
The relay will audibly click when it changes states (ON to OFF and vice versa)

| NOTE | There is a green LED above each relay override switch. If the LED is mostly on when it blinks, the relay is locked ON. If the LED is mostly OFF when it blinks, the relay is locked OFF. |

To unlock a relay using its override switch:

Step 1: Open the cabinet door using the supplied key

Step 2: Press and release the switch of the relay that is locked out
The relay will change its state from On to Off or vice versa

Visual Status and Operational Feedback

What are all these blinking lights?

Your Z-MAX relay cabinet has a variety of feedback mechanisms which are designed to alert you as to how your panel is operating and the current status of each relay. The main feedback mechanism, the LCD display is covered at the beginning of the "User Interface" chapter. The feedback mechanisms we're discussing here cover all of the red, amber, or green LED's inside the panel.

The LED's inside the panel can be broken up into two categories, 'System Status' and 'Relay Status' LED's.

System Status LED's

System Status LED's are designed to tell you at a quick glance the operational characteristics of your system. For example, whether or not your system is receiving data on one of the communication lines! This will assist you and our technical support team should any diagnostics be necessary.

Use the following table to determine the possible colors and patterns of the LED's which represent their status.

Generally, the following conventions apply:
- Green – All Systems Go! No alerts detected.
- Flashing Green – All Systems Go! Receiving or transmitting data.
- Solid Red – Alert Condition. Specific alert depends on LED
- Slow Flashing Red – Systems operating Normally, usually a heartbeat
- Quick Flashing Red – Alert Condition or Override Condition, specific alert depends on LED.

The specific functions and states of each LED are listed below:

LED Label	LED State	Indication
EMERGENCY	Solid Red	Indicates system is in emergency state
	Off	System is in Normal State
HEARTBEAT-C	Slow Blinking Amber (~1 bps)	Control Module Microprocessor is operating properly
	Fast Blinking Amber (~2 bps)	Control module microprocessor is in boot mode
	Off	Control Module Microprocessor off line - usually indicates system failure
Luma-Net/BACnet	Solid Green	Configured (Negotiating a connection)
	Off	Disabled
	Fast Flash	Negotiating connections/initialization
	Slow Flash	Connected, TX/RX data
DMX/BACnet	Blinking Mostly On	Receiving Valid DMX Data
	Solid	DMX enabled but no data receive
	Off	Either Disabled or Not receiving Valid Data
CAN 1 (Master/Remote)	Blinking Green	Enabled, Receiving Data
	Solid Green	Enabled, but not currently receiving data
	Off	
CAN 2	N/A	Not currently in use
ETH/MODEM/BACnet	Solid Green	Indicates modem or ethernet module is installed, enabled, and link is established
5V POWER	Solid Amber	+5V power supply working normally
HEARTBEAT-R	Slow Blinking Amber	Relay Communications Microprocessor operating properly
	Fast Blinking Amber	Relay Communications Microprocessor detects a hardware alert
	Off	Relay Communications Microprocessor Off Line

Relay Status LED's

Adjacent to each relay switch you will find an LED which indicates the current status of that particular relay card.

The possible states for this LED are as follows:

LED Label	LED State	Indication
RELAY X	Solid Green	Relay On
	Off	Relay Off
	Blinking Green	Relay Override On, could be either local relay override, or if all relay LED's are blinking slowly more likely the master override is On
All RELAYS	All Relay LED's Short Off Long On	Master Override/Bypass On
	All Relay LED's, Long Off, Short On	Master Override/Bypass Off

Determine the Firmware/Software Build

Knowing the current version of the operating software in your cabinet is helpful when communicating with the factory about problems with your cabinet or checking against the software version on the website to ensure that you have the latest software.

NOTE   Leviton recommends checking our website www.leviton.com periodically to ensure that you always have the most current software in your relay cabinet.

The Software version is one of the available menu options directly off of the main menu

Step 1: Press the **Menu** button

Step 2: Press until the display reads:

```
MAIN  MENU  SELECT
  SOFTWARE  BUILD
```

Step 3: Press Select/Save
The display will now show you the version of firmware the unit is running.

How to Decipher the software Build:

Processor
Speed

Firmware
Version

Database
Version

Cabinet
Type

```
24MHzV1.04/001SM
30JUL041651IDPAS
```

Build Date and Time   Luma-Net State (Passive or ID#)
(not applicable to all models)
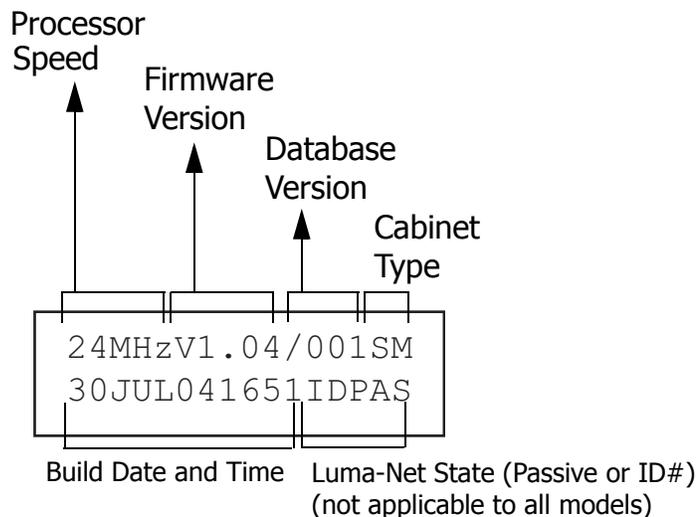
Step 4: Pressing in this screen will show you similar screens, indicating similar software/hardware information regarding other hardware components in your relay cabinet. This information may be useful when diagnosing problems with your relay cabinet or with the relay cards, modem, eithernet, or switch input board modules.

Touch-Tone Telephone Interface

Configuration of your touch-tone telephone interfaces requires carefully setting up security/passcodes as well as several configuration items relating to the modem itself. These processes are covered in detail in the Advanced Configuration Guide. This chapter outlines the user operation of the interface.

The touch-tone interface, TIM, allows for control of groups at one of many security levels over the telephone. Regardless of the "Mode" of operation which is applicable, the following keys and indications are valid

- # key is must be pressed at the conclusion of every entry
- * starts over the entire process as if you just called into the panel
- *# immediately signals the panel to terminate the phone call. (Note that at any time you may hang up your phone and the communication will be terminated)
- After every command, a series of beeps will indicate that the command was completed
  - 1, 2, or 3 short high beeps usually indicate successful execution
  - 1 quick high beep followed by a long low beep indicates command failure or incorrect data entry
  - 1 long low warbling beep indicates that the panel is about to disconnect the call.

Using the TIM requires the following steps:

Step 1: Call your relay panel, wait for it to answer, and wait for (3) short beeps

Step 2: Enter your password followed by the pound (#) key

Step 3: Hear (2) short beeps indicating command or user mode, or (1) short beep indicating admin mode

Step 4: One of the three modes below are entered

Command Mode

If your password is associated with Command mode, upon successful password entry the command is executed and the panel hangs up. All functionality of command mode passwords are completely configured by the system administrator.

User Mode

In user mode, you have complete control over a single "Group" of relays as defined by the panel administrator.

NOTE   Remember that each relay can belong to one or more Groups; groups are global meaning that any network panel which receives a group command will activate it's relays assigned to those groups. This allows a simple way of total system control, from the touch tone interface.

After the two short beeps are heard (step 3 above), any of the following commands can be entered, followed by the pound (#) key:

- 0 - Turn group **off** at normal priority, all other actions can override
- 1 - Turn group **on** at normal priority, all other actions can override
- 2 - Turn group **on** at **high** priority, most other actions can not override
- 3 - Turn group **On** at normal priority only for a defined period of time (defined by your administrator)
- 7 - **Relinquish** control of the group to all other actions and controlling sources
- 8 - Turn group **off** at **high** priority, most other actions can not override
- 9 - Turns group **Blink Warn Off** at normal priority
- 10 - **Cancels** blink warn for this group at normal priority

Administrator Mode

In administrator mode, you have complete control over all "Groups" of relays as defined by the panel administrator. You know that you're in administrator mode because after entering your password, you hear 1 beep instead of two.

In administrator mode, the complete process is as follows:

Step 1: Call your relay panel, wait for it to answer, and wait for (3) short beeps

Step 2: Enter your password followed by the pound (#) key

Step 3: Hear (1) short beep indicating admin mode

Step 4: Enter one of the following commands, followed by the pound (#) key:

- 0 - Turn group **off** at normal priority, all other actions can override
- 1 - Turn group **on** at normal priority, all other actions can override
- 2 - Turn group **on** at **high** priority, most other actions can not override
- 3 - Turn group **On** at normal priority only for a defined period of time (defined by your administrator)
- 7 - **Relinquish** control of the group to all other actions and controlling sources
- 8 - Turn group **off** at **high** priority, most other actions can not override
- 9 - Turns group **Blink Warn Off** at normal priority
- 10 - **Cancels** blink warn for this group at normal priority

Step 5: Hear (2) short beeps indicating that the command is valid

Step 6: Enter a group number followed by the pound (#) key

Step 7: Hear (2) short beeps indicating that the command was executed

Step 8: Repeat steps 4, 5, 6, & 7 or hand up to terminate the call.

Part II - Simple Mode Programming

Your relay cabinets contain two modes of programming: simple, and advanced. Simple mode is designed to give you a very simple, question & answer means of programming your relay panel but only gives you access to a limted feature set of your product. Advanced mode programming in the next part gives you access to the full capabilities of your relay product.

Configuration the Simple Way

Your relay panel has two modes of configuration, Simple Mode and Advanced Mode. The default configuration mode is called Simple Mode and is designed to be a less complex streamlined mode for configuring and operating your relay panel. Simple mode differs from advanced mode in that many of the advanced features and configuration items have been removed from the menu structures. Additionally, all configuration is more question and answer based allowing for more self-navigation without dependence on this manual.

| NOTE | Changing Configuration from either simple mode to advanced mode, or from advanced mode to simple mode will never result in loss of configuration information. This can be used to your and the end-users advantage by first making all required configuration settings, then changing the panel configuration mode to Simple Mode. This will allow the user to make basic changes, but prevent them from making potentially dangerous configuration changes. |

The following configurations and configuration changes can be performed when the panel is in simple mode:

- Setup the Time Clock Date, Time, and Astronomical Time Clock Settings
- Add & Change Scheduled Events
- Configure Inputs, Devices connected to inputs, and relays assigned to inputs
- Change Configuration Mode

All other configuration options must be defined in Advanced Configuration Mode.

Panel Configuration in Simple Mode

Configuration of your relay panel by simple mode is really a simple process. (pun intended) The steps are as follows:

Step 1: Install your cabinet and terminate all power and control wiring

Step 2: Configure your inputs

Step 3: Configure any scheduled events

These three steps of course will vary greatly depending upon your particular installation so generalized instructions are provided here to help you learn what some of the functionality is. The next few pages will show you how to configure a low voltage switch, a photocell, and then an occupancy sensor. That will cover step 2. Step 1 has already been covered in prior chapters. Step 3 illustrates the methods used to create and schedule events, or rather relays turning on or off at a specific time.

Simple Mode Menu Structure

For your reference as you are navigating through the menus, please find below the complete simple mode menu structure:

```
MON 02:37P+E001
STATUS:  NORMAL
```

```
MAIN MENU SELECT
 QUICK SCHEDULE
```
```
MAIN MENU SELECT
 SOFTWARE BUILD
```
```
MAIN MENU SELECT
 CONFIGURATION
```
```
MAIN MENU SELECT
 TIME/DATE/ASTRO
```

```
QUICK SCHEDULE
  NEW EVENT
```
```
CONFIGURATION
CONFIG INPUTS
```
```
TIME/DATE/ASTRO
SET TIME & DATE
```

```
QUICK SCHEDULE
 CHANGE EVENT
```
```
CONFIGURATION
MODE:  SIMPLE
```
```
TIME/DATE/ASTRO
SET ASTRO CLOCK
```

```
QUICK SCHEDULE
 DELETE EVENT
```
```
CONFIGURATION
FACTORY DEFAULTS
```

Changing Configuration Modes

Changing configuraiton modes is a simple process.   To change from simple to advanced, or from advanced to simple, please follow the steps below:

Step 1: Press the **Menu** button, then use ⏶⏷ until the display reads as shown below, then press **SELECT**:.

```
MAIN  MENU  SELECT
  CONFIGURATION
```

Step 1: Use ⏶⏷ until the display reads as shown below, then press **SELECT**:.

```
CONFIGIRATION
MODE:SIMPLE
```

Step 2: You will now notice that the *Mode* line of the display is blinking. Use ⏶⏷ to select either *Simple* or *Advanced*, then press **SELECT**. Your configuration mode has now been changed.

Configure Inputs

```
MON 02:37P+E:001
 STATUS:  NORMAL
```

```
MAIN MENU SELECT
  CONFIGURATION
```

There are three types of inputs which can be configured in your relay cabinet, Low Voltage Switch Inputs, Photocell Inputs, and Occupancy Sensor inputs. All Inputs are configured from the Config Inputs Screen which falls into the menu structure as shown as right. Each of the three types of inputs are then configured from their own menu.

```
 CONFIGURATION
 CONFIG INPUTS
```

```
 CONFIGURATION        CONFIGURATION         CONFIGURATION
  OCC SENSOR            PHOTOCELL             LV SWITCH
```

Low Voltage Switch Inputs

Configuration of this type of input is used when you have some type of switch or other triggering device connected to one of the inputs from which you desire to turn on or off relays. Several different behaviors are available for configuring of this type of input.

```
   C O N F I G   I N P U T S
      L V   S W I T C H
```

Step 1: From the main menu, navigate to Configuration, Config Inputs, then LV Switch.

> **NOTE** Remember that when navigating menus, pressing **Select** always selects the current menu, and pressing **Cancel** always navigates to the previous menu.

Step 2: Enter the input number of the switch input you wish to configure. This is determined by looking at the terminal on your cabinet to which the switch is connected. After entering the number, press the **Select** key

```
E N T E R   L V   S W I T C H
I N P U T   N U M B E R : 0 0 2
```

Step 3: The relay panel now asks for a behavior:

```
S E L E C T   B E H A V I O R
     M O M E N T A R Y
```

Your selection for the behavior of your switch will be determined by the type of switch you have and how you desire it to operate. The available behaviors are as follows:

- Momentary - The first press turns on the assigned relays, the second press turns off the assigned relays

- Momentary Timed - Upon the first press, turn on the assigned relays for the specified amount of time. When the time elapses, control of the relays is relinquished to other controls (which generally results in the relays turning off.) If the switch is pressed a second time, the timer is reset.

NOTE   To specify the amount of time used for timed inputs, change configuration mode to Advanced, go to System Setting under the configuration menu, then Global Defaults and change the Tswit value. Valid settings are 1-254 minuntes

- Maintained - Maintained inputs turn On the relays while the switch is pressed, then turn off the relays when the switch is released
- Preset Off - Turns off all relays in the current preset group.
- Preset On - Turns on all relays in the defined preset group.
- Momentary On/Off - Momentary On/Off is used with switch inputs connected to switches that have separate on & off outputs and in coordination with our switch input adapter cards or switch input adapter kits. These kits provide both the on and off signal on the same switch leg AND require the switch input setting to be defined as Momentary On/Off

Step 4: This optional step only applies when using the Preset On/Off Types

```
ASSOCIATE  PRESET
 NEW  NUMBER:   NO
```

- Z-MAX panels use associate preset groups to define the group of buttons that are all a part of the preset group. All inputs that are part of the same group number work together and only one of the inputs can be active at any one point in time.
- If you have already defined a number for the group to which this input belongs, select **NO** at this prompt and select the number.
- If you have not defined an associate preset group number or need to create a new group, select **YES** at this prompt and then enter the new number.

Step 5: Relay assignment - There are two methods which can be used to assign relays to switch inputs, "Quick" and "Menu."

- Quick method allows you to assign relays to this input by pressing the override button adjacent to the relay. Note that only the LED indicates status, relay state does not change.

- Menu method allows you to use the up/down arrow or number keys to select the relays you wish to assign, and left/right to choose the state.

As the "quick" relay assignment method involves access to the override buttons which requires opening your relay panel, this programming method is only appropriate for both authorized and trained personnel as dangerous voltages are present inside your relay cabinet.

Use ◑◐ *to select your relay assignment method:*

```
ASSIGN  RELAYS
MODE:      QUICK
```

Step 6: If **Quick Assignment Mode** was selected, use the override buttons adjacent to each relay to set whether that relay should be on or off. In this programming mode, the relay will not change state, however, the LED adjacent to each relay will light on or off matching the state of the real as assigned to the input.

Step 7: If **Menu Assignment Mode** is selected, the relays which should be controlled by this input can be selected by using the following keys

- Use ⬅➡ to increase or decrease the relay number
-
- Use ⬆⬇ to select any of the possible three actions for this relay

  - ON - turns this relay on when the switch is pressed
  - OFF - turns this relay off when this switch is pressed
  - IGNORE - instructs the relay panel to not change the state of this relay when the switch is pressed

  Step 8: Press **Save/Select** to save your settings and complete configuration of this input.

Photocell Configuration

Photocells are used with relay panels to control the switching on and off of relays relative to the amount of light received by the relay panel. Two types of photocells are supported by your relay panel, called switching and 0-10V. Switching photocells interact with your relay panel just like a switch. They output a low voltage signal to the relay panel when the amount of light received by the photocell crosses a pre-set threshold. 0-10V photocells output 0-10V, proportional to the amount of light received. Switching photocells must be configured to trip at a specific level which is also appropriate for your project. 0-10V photocells must be optimized for the range of lighting levels to which the photocell is intended.

Step 1: Using the menu navigation buttons, navigate the menus to Configuration, Config Inputs, then to Photocell, and press **Select/Save**

```
C O N F I G U R A T I O N
    P H O T O C E L L
```

Step 2: Enter the Input Number. Usually a photocell is connected to the PhotoCell input and the screen would read as follows

```
E N T E R    P H O T O C E L L
 I N P U T   N U M B E R : P C
```

Step 3: Select Photocell Behavior

```
S E L E C T   B E H A V I O R
      F O R C E   O F F
```

- Force Off - The photocell will be turning <u>off</u> relays when the input receives voltage, usually indicating that the photocell is receiving more light. The trigger to turn on the relays must be from another source, like the scheduler or a switch. This application is useful for parking lot lighting which is turned on by the scheduler and off during the day.
- Force On/Off - The photocell will be turning on and off relays and no other source (at the current or lower priority level) will be able to alter this condition. This behavior is appropriate for applications where the photocell will be the only controlling source for the relays.
- Force On - The photocell will only be turning on lights and some other control will turn off the lights. This behavior is appropriate when lights must be on when it's dark, but only turned off by a switch, building sweep, scheduler, switch, or other control device.

Step 4: Enter the delay time. This is the time between when the photocell triggers the action and the action actually occurs. Longer delay times are

necessary when false triggering due to rapidly changing lighting conditions is likely.

```
ENTER  TIME  DELAY
  DELAY  TIME:005
```

Step 5: Photocell type=0-10V

```
PHOTOCELL  TYPE
  TYPE:  0-10V
```

Step 6: Enter number of fc per volt for your photocell. For example, if you have a photocell with range 0-100fc at 0-10V, that's 10fc per volt

```
PHOTOCELL
FC/VOLT=010V
```

Step 7: Enter fc trigger level, that is when the relays should turn "on", or rather the trigger point of the photocell

```
ENTER  FOOTCANDLE
  ON  FC:085FC
```

Step 8: Add relays which should be controlled

```
ASSIGN  RELAYS
RELAY  001:YES
```

- Use ⬆ or ⬇ to increase or decrease the relay number

- Use ⬆⬇ to select any of the possible three actions for this relay

- YES - turns this relay on (and/or off) when the switch the trigger point is crossed
- IGNORE - instructs the relay panel to not change the state of this relay when the trigger point is crossed

Step 9: Press **Save/Select** to save your settings and complete configuration of this input.

Step 5: Photocell type=Switching

```
PHOTOCELL  TYPE
  TYPE:SWITCHED
```

Step 7: Add relays which should be controlled

```
PC  RELAYS
RELAY  001:ON
```

- Use ⬆ or ⬇ to increase or decrease the relay number

- Use ⬆⬇ to select any of the possible three actions for this relay

- YES - turns this relay on (or off, depending on behavior) when the photocell activates
- IGNORE - instructs the relay panel to not change the state of this relay when the switch is pressed

Step 8: Press **Save/Select** to save your settings and complete configuration of this input.

Occupancy Sensor Configuration

Occupancy sensors are devices which sense when a person enters a particular room or area. Leviton's Occupancy Sensor's are designed for a variety of applications, using a variety of technologies which can be applied to your specific need. The Occupancy sensors which this relay panel is designed to work with are those which are powered by +24Vdc and provide a ~+24Vdc output when the covered area is occupied.

These instructions assume that your Occupancy Sensor is connected to the OCC input. If your Occupancy Sensor is connected to one of the other inputs, configuration will be similar.

Step 1: Using the menu navigation buttons, navigate the menus to Configuration, Config Inputs, then to Occ Sensor, and press **Select/Save**

```
CONFIG  INPUTS
  OCC  SENSOR
```

Step 2: Enter the Input number to which your occupancy sensor is connected. If connected to the input labeled "Occ Sensor", the input number should be "OCC"

```
ENTER  OCC  SENSOR
INPUT  NUMBER:OCC
```

Step 3: Enable or Disable this occupancy sensor

```
OCCSEN:001  LOCAL
  ENABLED:    YES
```

Step 4: Enter the Behavior of the occupancy sensor

```
SELECT  BEHAVIOR
    MANUAL  ON
```

The choices for behavior are as follows:

- Manual On - The occupancy sensor will turn off the assigned relays when the occupancy sensor indicates an occupied state. When the room become occupied, the relays will not be automatically turned on, instead, the user will have to manually turn on the lights from a wall switch or other input.
- Auto On - In this mode, the Occupancy Sensor will turn the assigned relays both on and off based on either an occupied or unoccupied stated indicated by the occupancy sensor

Step 5: If you desire a blink warn to be issued prior to turn turning off the lights, the response to this question should be Yes. If not, the response should be No

```
ENTER  BLINK  WARN
   ENABLED:  YES
```

NOTE A Blink Warn is not only advisable to keep people from suddenly being left in the dark but is also required by some authorities having jurisdiction. When blink warn is enabled, the lights will "blink" prior to actually being turned off. After the blink, the user can press the on button to cancel the off, otherwise, the lights will automatically turn off.

Step 6: Enter the time delay between when the occupancy sensor indicates an unoccupied state and the relays actually turn off

```
ENTER  TIME  DELAY
   MINUTES:  000
```

Step 7: Assign Relays

```
ASSIGN  RELAYS
RELAY:001  YES
```

- Use ⬆ or ⬇ to increase or decrease the relay number

- Use ⬆⬇ to select any of the possible actions for this relay
- YES - turns this relay on (and/or off) when the switch trigger point is crossed
- IGNORE - instructs the relay panel to not change the state of this relay when the trigger point is crossed

Step 8: Press **Save/Select** to save your settings and complete configuration of this input.

Quick Schedule

The quick schedule menus are used to create a new event, change the time of an existing event, and delete an event. An event is an action which occurs at a time. For example, Relays 1, 2, & 4 turn ON at 7:30am is an example of an event which might be schedule in a venue where relays 1, 2, & 4 are connected to lobby lights, when doors open at 8:00am.

NOTE In technical Z-MAX lingo, an "Action" is what actually occurs. In the case of the above example, the action is relays 1, 2, & 4 turning on. An "Event" is one scheduled occurrence of an action. In quick schedule programming, both actions and events are rolled into one seamless programming process.

To create a scheduled event using the quick scheduler:

Step 1: Press the **Menu** button and use ⬆⬇ until the display reads

```
MAIN MENU SELECT
  QUICK SCHEDULE
```

then press **Select.**

Step 1: Use ⬆⬇ until the display reads

```
QUICK SCHEDULE
  NEW EVENT
```

then press **Select.**

Step 2: Enter a name for your event

```
ENTER EVENT NAME
LIGHTS ON        .
```

NOTE Although not required, all events should be given a name which uniquely identifies both the event itself and gives some sort of indication of what the event does. This makes modification of panel programming easy.

- Use **6 7 8 9 0** for alpha-numeric data entry, just like the keys on your cell phone.

Step 3: Enter the time the event is to occur

```
ENTER EVENT TIME
07:30AM          .
```

As always, use

FOR FIELD VALUE CHANGES   **FOR FIELD NAVIGATION**
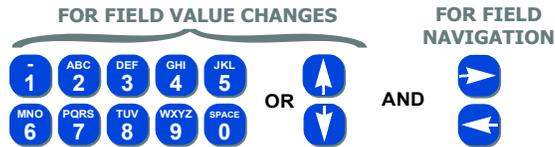
Using combinations of the time entry and am/pm fields, there are a variety of ways to schedule the event:

- Using ⬆ or ⬇ in the am/pm field, will allow you to select
    - AM indicating in the morning
    - PM indicating in the afternoon
    - -SR indicating the specified hours:minutes before sunrise
    - +SR indicating the specified hours:minutes after sunrise
    - -SS indicating the specified hours:minutes before sunset

- +SS indicating the specified hours:minutes after sunset

When done entering the time, press **Select**

Step 4: Enter the days of the week on which this event is to occur

```
    S E L E C T   D A Y S
M T W T F S S     H 1 : O F F
```

- An uppercase day of the week indicates that the event will occur on that day.
- A lowercase day of the week indicates that the event will not occur on that day
- H1:ON indicates that the event will occur on any day which is part of the holiday schedule #1
- H1:OFF indicates that the event will not occur on days which are part of the specified holiday schedule

Step 5: Assign Relays

```
   A S S I G N   R E L A Y S
    R E L A Y : 0 0 1   O N
```

- Use ⬆ or ⬇ to increase or decrease the relay number

- Use ⬍ to select any of the possible three actions for this relay
- ON - turns this relay on when this event occurs
- OFF - turns the relay off when this event occurs
- IGNORE - instructs the relay panel to not change the state of this relay when this event occurs

Step 6: Press **Select/Save** to save your changes.

Part III - Advanced Programming Guide

Advanced configuration mode is designed to allow front panel access, operation, and programming of your relay panel, supporting the full capabilities of the product. This section of this user's guide documents the advanced mode configuration menu structures. Both advanced mode and this documentation assumes that you have familiarity with the relay panel, relay applications, and a good grasp of the Z-Max user interface. As such, many of the discussed procedures leave out irrelevant information and proceed directly to the "meat" of the topic.

If you do not yet have familiarity with the Z-Max relay cabinets and their user interface, please first review the features and procedures found in the previous part of this manual addressing Simple Mode Configuration.

Advanced Mode Menu Structure

For your reference as you are navigating through the menus, please find below the top level advanced mode menu structures. Only top-level menus are shown. Some of the menus have many sub-menus which are detailed in the appropriate sections of this manual

```
┌─────────────────┐
│ MON 02:37P+E:001│
│ STATUS:         │
└────────┬────────┘
         ↓
┌─────────────┐   ┌─────────────┐   ┌─────────────┐   ┌─────────────┐
│ MAIN MENU   │ → │ ACTION EDITOR│ → │ ACTION EDITOR│ → │ ACTION EDITOR│
│ SELECT      │   │ DD/EDIT     │   │ DELETE AN   │   │ EXIT (DONE) │
└──────┬──────┘   └─────────────┘   └─────────────┘   └─────────────┘
       ↓
┌─────────────┐
│ MAIN MENU   │
│ SELECT      │
└──────┬──────┘
       ↓
┌─────────────┐   ┌─────────────┐   ┌─────────────┐
│ MAIN MENU   │ → │ TIME/DATE/  │ → │ TIME/DATE/  │
│ SELECT      │   │ ASTRO       │   │ ASTRO       │
└──────┬──────┘   └─────────────┘   └─────────────┘
       ↓
┌─────────────┐   ┌─────────────┐   ┌─────────────┐   ┌─────────────┐
│ MAIN MENU   │ → │ SCHEDULER   │ → │ SCHEDULER   │ → │ SCHEDULER   │
│ SELECT      │   │ ADD A NEW   │   │ EDIT AN EVENT│  │ DELETE AN   │
└──────┬──────┘   └─────────────┘   └─────────────┘   └──────┬──────┘
       │          ┌─────────────┐   ┌─────────────┐   ┌─────────────┐
       │          │ SCHEDULER   │ → │ SCHEDULER   │ → │ SCHEDULER   │
       │          │ IS NOW ACTIVE│  │ HOLIDAY     │   │ EXIT (DONE) │
       │          └─────────────┘   └─────────────┘   └─────────────┘
       ↓
┌─────────────┐   ┌─────────────┐   ┌─────────────┐   ┌─────────────┐
│ MAIN MENU   │ → │ CONFIGURATIO│ → │ CONFIGURATIO│ → │ CONFIGURATION│
│ SELECT      │   │ N           │   │ N           │   │ FACTORY     │
└─────────────┘   └─────────────┘   └─────────────┘   └──────┬──────┘
                  ┌─────────────┐   ┌─────────────┐
                  │ CONFIGURATIO│ → │ CONFIGURATIO│
                  │ N           │   │ N           │
                  └─────────────┘   └─────────────┘
```

Setting the Date, Time, & Astronomical Time Clock

The menu structures for the set date, time, and astronomical clock are as follows:

```
MON 02:37P
UE001
```

```
MAIN MENU
SELECT
```

```
TIME/DATE/
ASTRO
```

```
TIME/DATE/
ASTRO
```

The AM/PM designation directly following a time value has a specific meaning: A/P - indicates you are in daylight savings time; a/p indicates standard time; s/d indicates you're in 24 hour mode.

Set the Date & Time

Step 1: Press the Menu button

Step 2: Press ⬆ until the display reads as below then press Select/Save:

```
MAIN MENU
SELECT
```

Step 3: To set the time, press UP until the display reads as below, then press Select/Save:

```
TIME/DATE/
ASTRO
```

Step 4: You now will see the screen below:

```
08:33PM  FRI 12H
04/15/2005 D:OFF
```

From this screen, the following can be edited

- Hours
- Minutes
- AM/PM

- 12H or 24H
- Month
- Date
- Year
- Daylight Saving Time
  - OFF - Daylight savings time is disabled
  - US - Daylight savings time is set to "United States" daylight savings mode, with 1 hour adjustment in the fall and spring.
  - EU - Daylight savings time is set to "European" daylight savings mode with 1 hour adjustments in the fall and spring, yet different dates then the US
  - US7 - Daylights savings time is set to "United State" daylight savings mode which is currently scheduled to become active in 2007 per the new Energy Conservation act

The editable field will be flashing. As always, use the following keys

FOR FIELD VALUE CHANGES

FOR FIELD NAVIGATION

OR **AND**
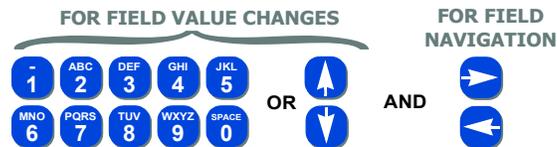
NOTE   To the right of the time field, the day of the week is displayed. This field is not editable and is set based on the date setting.

NOTE   When 12 hour mode is active, the AM/PM field is active for editing. If Daylight Savings Time is active, the field will display in upper case characters. If Daylight Savings Time is inactive, the field will display in lower case characters. If 24 hour mode is active, the AM/PM field is replaced with an "s" or a "d" and is not editable. Instead, the value is determined by the Daylight Savings Time setting. The "s" indicates standard time (Daylight Savings Time inactive); the "d" indicates that Daylight Savings Time is active.

NOTE   If Daylight Savings time is active, the am/pm will be displayed in Upper case letters.

**NOTE**   If you exit from this menu via the MENU or CANCEL button, all changes will be lost.

Set the Astronomical Time Clock

The Z-MAX Scheduler allows you to turn lights on or off in relation to sunrise and sunset. For example, yard lights can be set to turn on an hour before sunset, and turn off an hour after sunrise, according to the time of year.

The astronomical time clock (Astro Time) calculates the time of sunrise and sunset for every week of the year depending on the location of the installation. To use Astro Time you must know the approximate latitude (in degrees) (See Appendix A for various cities in North America) of the controller's location, as well as the present time of sunrise and sunset (often found in the daily newspaper). Visit www.srrb.noaa.gov/highlights/sunrise/sunrise.html for a complete listing of Latitude, Longitude, Sunrise and Sunset information.

To set up the astronomical clock:

Step 1: Press the Menu button

Step 2: Press ⬆ until the display reads

> MAIN MENU
> SELECT

*then press **Select/Save***

Step 3: To set the time, press UP until the display reads

> TIME/DATE/
> ASTRO

*then press **Select/Save***

Step 4: You now will see the screen below:

> SR=07:01A
> SS=08:25P

From this screen, the following can be edited

- SR=Sunrise time of any day this week
- SS=Sunset time of any day this week
- LAT=approximate Latitude of the current location

NOTE Latitude should be rounded to the nearest multiple of "5" to your location. This is normal.

Sunrise and sunset times can be found in your local newspaper, by calling our technical services department, or at http://www.sunrisesunset.com

Step 5: The editable field will be flashing. As always, use the following keys

FOR FIELD VALUE CHANGES FOR FIELD NAVIGATION

1 (-) 2 (ABC) 3 (DEF) 4 (GHI) 5 (JKL) **OR** ⬆ **AND** ➡
6 (MNO) 7 (PQRS) 8 (TUV) 9 (WXYZ) 0 (SPACE) ⬇ ⬅

Global Defaults

```
┌─────────┐      ┌──────────────────┐   ┌──────────────────┐   ┌──────────────────┐
│  MENU   │ ───▶ │   MAIN MENU      │──▶│  CONFIGURATION   │──▶│  SYSTEM SETUP    │
└─────────┘      │    SELECT        │   │  SYSTEM SETUP    │   │    GLOBAL        │
                 └──────────────────┘   └──────────────────┘   └──────────────────┘
```
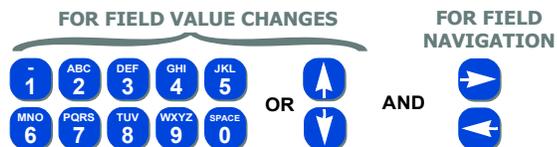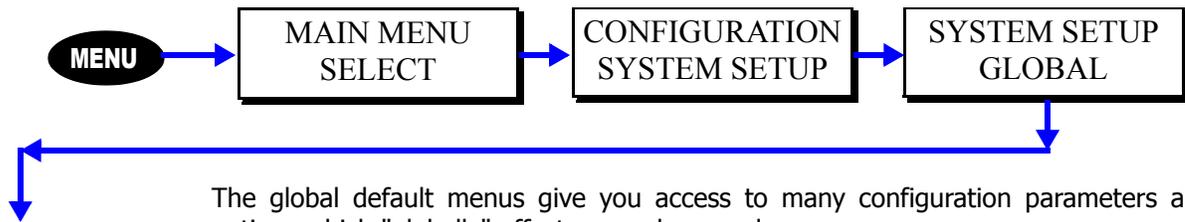
The global default menus give you access to many configuration parameters and options which "globally" affect your relay panel.

Although these settings can help you quickly make changes to your panel, please make sure that you understand and expect the results. For example, changing the relay type in global defaults, will automatically and without warning change the relay type for every relay controlled by this cabinet. As such, any previous changing of relay type at the relay level will be lost.

Changing the # of Local Relays

```
┌──────────────────┐
│    GLOBAL        │
│   DEFAULTS       │
└──────────────────┘
```

Sets the number of local relays in the cabinet. Usually this is set to the maximum number of relays which can be installed in your relay cabinet. For example, if you have an (8) relay cabinet, this setting would be 8. If you have a 24 relay cabinet it would be 24.

The starting relay number for remote relays is dependant upon this setting. The first remote relay is addressed by the relay number indicated by adding 1 to the number of local relays. For example, if you have 24 local relays, the first remote relay is 25.

Remote Relays

```
┌──────────────────┐
│    GLOBAL        │
│   DEFAULTS       │
└──────────────────┘
```

This setting determines the number of remote relays addressed by this relay cabinet when implementing a Master/Remote network. This should be set to the total number of relays in all remote cabinets.

For example, if you have (1) 24 remote relay cabinet and (2) 4 remote relay cabinets, the setting for this entry will be 24+4+4=32 indicating that 32 remote relays will be controlled by this cabinet.

The relay numbers for remote relays start at 1+the number of local relays. So if you have 24 local relays, then in this scenario the local relays are 1-24, remote relays 25-56.

Enable Master/Remote communication

```
┌──────────────────┐
│    GLOBAL        │
│   DEFAULTS       │
└──────────────────┘
```

In order for this cabinet to communicate on a master/remote network, the number of remote relays must be set (see above) <u>and</u> this cabinet must be defined as a master cabinet. This feature has the following settings:

- OFF - disables Master/Remote communication
- MAS - enabled Master/Remote communication with this as a Master relay cabinet. Only one master is allowed per network.

- *Any Number* - If a number is selected, this number is the *MRN* number of this cabinet and this cabinet will participate on the Master/Remote network as a REMOTE relay cabinet. The starting relay number of this cabinet is shown in place of the *** on the display

Enable processing of Remote Inputs

If this relay cabinet is a master cabinet on the master/remote network and your remote relay cabinets have discrete (low voltage) inputs which should be processed by this master cabinet, this setting should be Y for yes.

- Y - This is a master cabinet and should process remote discrete inputs
- N - This cabinet should not process remote discrete inputs.

A remote discrete input is programmed just like any other input and can be programmed in either advanced or simple mode. The discrete input number for remote inputs is the same as the remote cabinet's starting relay number.

Sequence Delay Time

Use this feature to change the delay time between each relay when turning on a group of relays. The system allows you to set the value to a 0.0 delay or up to a 25.0 seconds delay for architectural installations where power surges are a concern.

In most applications, a short sequence delay time is appropriate. For example, if the sequence delay time is set to 0.5 seconds and the relay cabinet is told to turn on relays 1-4, relay 1 will turn on immediately when the command is executed. Relay 2 will turn on 1/2 second later, relay 3 1 second later, and relay 4 at 1.5 seconds.

Level Cut-In Value

Use this feature to change the threshold value that triggers when the relays turn on when responding to a control input other than a switch. This is used when the controls are set up for dimming as well as relays, like a D8000, D4200 or DMX control device.

Level Cut-Out Value

Use this feature to change the threshold value that triggers when the relays turn off when responding to a control input other than a switch. This is used when the controls are set up for dimming as well as relays, like a D8000, D4200 or DMX control device.

NOTE Level cut-in value must always be higher than the cut-out value or dmx input instability will result.

Sweep Interval

The Z-MAX cabinet has a feature that minimizes programming several events to sweep the building lights off after hours. This menu allows you to change the amount of time between these sweeps. The time between sweeps applies to all events that

implement the building sweep feature. The number of sweeps which occur after an event triggers is programmed in the Event Scheduler.

Blink Warn Parameters

GLOBAL DEFAULTS

The blink warn feature is used to issue a warning just before the relay cabinet turns off the lights. The warning is issued in the form of a "blink" of the lights. Hence the term "Blink Warn". The blink warn feature has several configurable parameters to determine the actions of your cabinet.

- *BW Tovrd* - sets the amount of time that the lights will remain on when a user cancels a blink warn for their particular zone. The setting defaults to 120 minutes.

GLOBAL DEFAULTS

- BW *Tblk* - sets the amount of time between when the blink warn is issued and the lights turn off (go black.) The setting defaults to 5 minutes.

- *BW Twto* - sets the length of the flash. The setting defaults to 0.5 seconds.

An example to of the blink warn features is as follows:

- Assume that an over-zealous worker is working in their office late on a Saturday afternoon. The lights in the facility are scheduled to be turned off at 5:00pm.

GLOBAL DEFAULTS

- At 5:00pm, the event triggers to turn off all of the lights. As such, all relays which are enabled for blink warn, turn off for 1/2 second (*BW Twto value)* and then immediately turn back on.

- Since the worker isn't done yet for the day and noticing both blink warn and the fact that his wall switch is flashing, the blink warn for their office can be delayed for the Tovrd value, 2 hours in this instance, by pressing their wall switch.

- Now, at 5:05pm, (*Event time plus BW Tblk value)* all lights in the facility will be turned off except for the worker's office.

- 120 minutes later (*Bw Tovrd value*,) at 7:00pm, a blink warn is issued again this time only for David's office. Again, if the worker is still in his office, he has 5 minutes to delay the blink warn or the lights will turn off.

Momentary Timed interval

GLOBAL DEFAULTS

When using the "momentary timed" switch input type, a switch input will trigger the lights on for the timer period specified in this setting.

Touch Tone telephone timed override interval

GLOBAL DEFAULTS

This setting is the time interval of a timed override when issued from the touch tone telephone interface (TIM.)

Relay Type.

GLOBAL DEFAULTS

Use this feature to modify the relay type for all relays in the cabinet.

Changing this setting will change the relay type for ALL relays in the cabinet, even those to which you have already applied a specific relay type.

The following relay types are possible:

- *STD NO* - The standard relay type. A normally open relay which is electrically held open. Leviton part number RELAY-STD
- *Latching* - Leviton's latching relay module which is mechanically held in the last position indicated by the relay cabinet. P/N #RELAY-LAT
- *STD NC* - Normally closed relay module which requires electricity to keep the relay off.
- *ST SEN L* - Sentry switch Long is for use only with Leviton relay module P/N RELAY-STD. This unique relay type can be used in conjunction with sentry switches. When an Off command is issued, the relay will shut off for a brief time period and then turn back on. This signals the downstream Sentry Switch to turn off the lights, however, the circuit remains energized.
- *ST SEN S* - Sentry switch Short is for use only with Leviton relay module P/N RELAY-STD and is designed to be used with WattStopper AS-100 style switches which require a short pulse to signal the lights turning off yet the relay must remain on.
- *NC SEN L* - Is just like ST SEN L except designed to be used with a normally closed relay module.
- *NC SEN S* - Is just like ST SEN S except designed to be used with a normally closed relay module.
- *PULSE* - type is currently unsupported
- *CUSTOM* - type is currently unsupported.

Set Blink Warn for All relays

GLOBAL DEFAULTS

This setting allows a quick method by which to turn on or off Blink Warn for all relays.

- Y = indicates blink warn should be enabled for all relays
- N = indicates blink warn should be disabled for all relays

After this setting has been applied, and regardless of this setting, you can still turn on or off blink warn for each relay in the relay menu.

Set Level Feedback for all relays

GLOBAL DEFAULTS

This entry will quickly set feedback for all relays controlled by this cabinet also to the indicated value.

- Y = indicates feedback should be enabled for all relays
- N = indicates feedback should be disabled for all relays

After this setting has been applied, and regardless of this setting, you can still turn on or off the feedback setting for each relay in the relay menu.

Set Emergency setting for all relays

GLOBAL DEFAULTS

This setting allows a quick method by which to set the Emergency setting for all relays.

- ON = sets each relay to turn on when emergency mode is active
- OFF = sets each relay to turn off when emergency mode is active

- NC = set each relay to not change state when emergency mode is active

After this setting has been applied, and regardless of this setting, you can still adjust the emergency setting for each relay individually in the relay menu.

GLOBAL
DEFAULTS

Time Master settings

When using Luma-Net and other future protocols in development by Leviton, you can specify the time master network settings for this panel. A time master is a cabinet which acts as the "Master" time clock for the network. All other devices on the network will automatically set their time from the Time Master. This configuration option has the following settings:

- *Auto* - the relay cabinet upon power up will see if a Time Master panel already exists on the network. If it does, it will always set it's time from that panel. If not, control as time master is negotiated between panels
- *On* - upon power-up, this panel will elect itself as the time master for the network. Only one panel on the network should be set to "ON". Although this panel will never relinquish being the master, it's clock can be set by any other panel.

GLOBAL
DEFAULTS

Power On Restore

The power on restore feature when enabled tells the panel to restore the relays to the state they were in prior to any loss of power, when power is restored.

- *Y* - indicates that relay state should be restored upon power up AND that the current state of the relays should be stored to non-volatile memory every two minutes.
- *N* - Indicates that the state of the relay should always be "Off" upon power up and that the current state will not be saved to memory.

The relay state is stored to memory only a few seconds after every relay change so the most recent relay state is always what should be restored. That means that when power returns, the restored state of the relay will be the state the relay was in 2 minutes prior to the time of power failure.

Relays

```
┌─────────┐      ┌──────────────┐    ┌──────────────┐    ┌──────────────┐
│  MENU   │ ───► │  MAIN MENU   │──► │CONFIGURATION │──► │ SYSTEM SETUP │
└─────────┘      │   SELECT     │    │SYSTEM SETUP  │    │   RELAYS     │
                 └──────────────┘    └──────────────┘    └──────────────┘
```
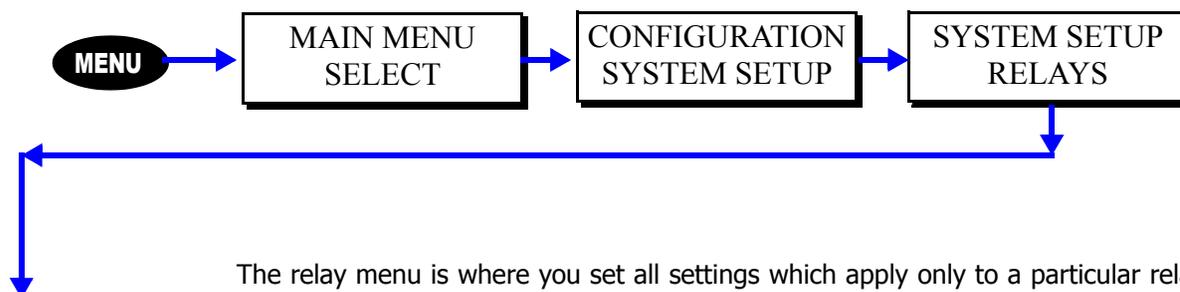
The relay menu is where you set all settings which apply only to a particular relay. If you just read the section on Global Defaults you will note that there are many settings on that menu which apply to "all" relays - this menu changes those settings only for a particular relay.

NOTE Even though a setting for a relay is changed from the relay menu, it can still be globally set/ changed from the global defaults menu.

Navigating the Relay Menu

Navigating the relay menu introcues a few navigational concepts which may be different from what you've already done but also are used throughout the rest of your Z-Max relay cabinet:

- When the entire lower line of the display is flashing, use 🔢 or ◄► to select the relay which you desire to modify.

- When the entire lower line of the display is flashing, use ⬆⬇ to select the value which you desire to modify

- When the lower line is flashing, press **SELECT** to edit the current value for the selected relays. You will notice then that only the editable value is now flashing. You can make edits using any of the appropriate function keys. When editing is complete, press **SELECT** again to save your changes

Not only can local relay settings be made from the relay menu, but settings for all remote relays can also be made from this menu. When editing a remote relay, you will note the right hand part of the display changes from LOC (local) to REM (remote). If the display reads +++, it indicates that this relay is not addressed by this cabinet.

To set the Relay Type

```
┌─────────────────┐
│ RELAY  1    LOC │
│ TYPE:    STD NO │
└─────────────────┘
```

This setting allows you to change the relay type for only the selected relay. The available relay types are as follows:

- *STD NO* - The standard relay type. A normally open relay which is electrically held open. Leviton part number RELAY-STD

- *Latching* - Leviton's latching relay module which is mechanically held in the last position indicated by the relay cabinet. P/N #RELAY-LAT

- *STD NC* - Normally closed relay module which requires electricity to keep the relay off.
- *ST SEN L* - Sentry switch Long is for use only with Leviton relay module P/N RELAY-STD. This unique relay type can be used in conjunction with sentry switches. When an Off command is issued, the relay will shut off for a brief time period and then turn back on. This signals the downstream Sentry Switch to turn off the lights, however, the circuit remains energized.
- *ST SEN S* - Sentry switch Short is for use only with Leviton relay module P/N RELAY-STD and is designed to be used with WattStopper AS-100 style switches which require a short pulse to signal the lights turning off yet the relay must remain on.
- *NC SEN L* - Is just like ST SEN L except designed to be used with a normally closed relay module.
- *NC SEN S* - Is just like ST SEN S except designed to be used with a normally closed relay module.
- *PULSE* - type is currently unsupported
- *CUSTOM* - type is currently unsupported.

To assign relays to groups

```
RELAY  1    LOC
    GROUP  1:
```

Groups are used when you want multiple relays to be controlled collectively from a single button press, occupancy sensor, action,...etc. They are collections of relays which can be all located in a single cabinet or spread throughout multiple cabinets on an entire network. The groups are activated, on/off, by group on/off commands from a controlling source.

A relay can belong to a maximum of 12 different groups, numbered 1-12, and each group is also numbered, 1-9999. Z-Max only allows assignment of group numbers 1-9,999. By default, each of the (12) group associations are set to "None".

Group commands are always broadcast across all data networks. Therefore, group assignments are not specific to each cabinet but are in turn general to the entire network

To make relay 1 part of groups 14 & 57, follow the procedure below:

Step 1: Navigate the menu structure to the relay menu and the group settings for relay #1

```
RELAY  1    LOC
    GROUP  1:
```

Step 2: Press SELECT so that the text "NONE" is flashing

Step 3: Enter "14"

```
RELAY  1    LOC
  GROUP  1:    14
```

Step 4: Press ➡ to advanced to group 2

```
RELAY  1    LOC
    GROUP  2:
```

Step 5: Enter "57" from the keypad

```
RELAY  1     LOC
GROUP  2:      57
```

Step 6: Press **SELECT** to save your settings and continue to editing other relays or relay parameters.

Turning feedback On or Off:

```
RELAY  1     LOC
  FEEDBACK:
```

The feedback setting is used to toggle Luma-Net feedback on or off. When Luma-Net feedback is on for a relay, it means that when a level request is issued from that network, the relay with feedback "on" for that channel will respond.

When more than one relay is assigned to the same Luma-Net channel, only one of them should have feedback turned on.

To alter if a relay will respond to a blink warn message.

```
RELAY  1     LOC
 BLINK WARN:
```

Sometimes, it is necessary to override the relay so it will not respond to a blink warn command. This is especially true of HID fixtures. This feature can be used to turn off or on blink warn for a particular relay. When blink warn is turned off for a relay, the relay will not blink before turning off.

To change the Luma-Net address for a specific relay

```
RELAY  1     LOC
 DMX  ADDR:
```

This setting can be used to change the Luma-Net channel assignment only for this relay. More than one relay may be assigned to the same Luma-Net channel.

If only the starting address needs to be set for the relay cabinet, this can be set in the Luma-Net menu under system setup.

To change the DMX Address for a specific relay

```
RELAY  1     LOC
 DMX  ADDR:
```

Each relay can be assigned a dmx channel. This channel can be assigned/modified from this menu option. By default every relay is assigned a sequential channel starting at the relay cabinets starting channel number as defined from the global defaults menu.

If only the starting channel needs to be set for the relay cabinet, this can be set from the DMX menu under system setup.

```
RELAY  1    LOC
EMERGENCY:  ON
```

Altering the way a Relay Responds to the Emergency Signal:

Each relay can be programmed to respond differently to the Emergency Input Signal (assuming the cabinet is connected in this fashion - Refer to the Installation section for wiring configurations). The valid values for this setting are:

- *ON* - This relay will turn on when the emergency input is connected to common
- *OFF* - This relay will turn off when the emergency input is connected to common
- *NC* - This relay will not change state when the emergency input is connected to common

Luma-Net

```
MENU  →  MAIN MENU SELECT      CONFIGURATION        SYSTEM SETUP
         CONFIGURATION    →    SYSTEM SETUP    →    LUMA-NET
```
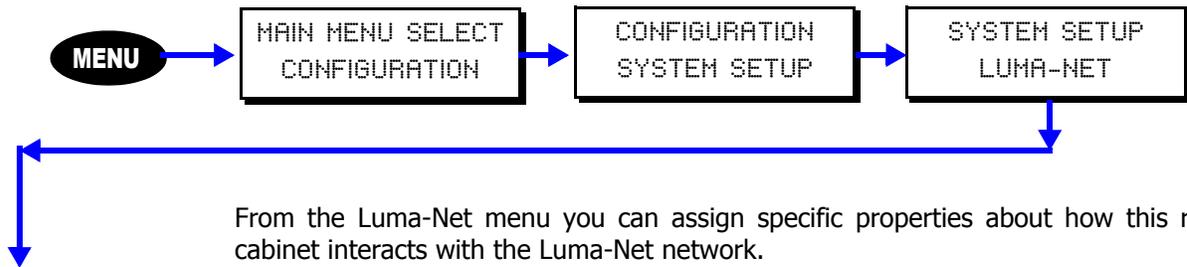
From the Luma-Net menu you can assign specific properties about how this relay cabinet interacts with the Luma-Net network.

Note: Not all relay cabinets have connections for Luma-Net!

The following settings are available from the Luma-Net menu:

```
LUMA-NET SETUP
SYSTEMID:   PASS
```

Cabinet Luma-Net Address

Each Luma-Net device requires it's own unique address on the Luma-Net network to which it is connected. Valid addresses for Luma-Net devices are between 1 & 127. If your cabinet is only going to respond to Luma-Net commands and will never have to issue a command, the cabinet can operate in Passive mode. In passive mode, the cabinet does not need an address as it passively listens and processes commands from the network. Anytime your cabinet must issue a command, anytime you are using groups, or anytime you are using digital switches, your cabinet requires a dedicated system address or system ID.

The valid values for this setting are as follows:

- *PASS* - Indicates the cabinet is in passive mode
- *1-127*- The assigned system id/address for this cabinet. Note that each system id can only be assigned to one device and consequently is unique on the network.

> ***Note: When in doubt about whether or not passive mode is right for you, assign your cabinet a unique id. As long as the id is unique on the network, you will not have any problems.***

> ***Note: Leviton uses system id's 120-127 for its own dedicated network devices. Therefore Leviton recommends only your use of address 1-119.***

```
LUMA-NET SETUP
START ADDR:    1
```

Cabinet start address/Automatic Luma-Net channel assignment

The Luma-Net channel assignment for each relay can be automatically assigned from the start address defined for the cabinet. To assert this automatic channel assignment, simply change the start address under this menu. All relays will be automatically and incrementally renumbered starting from the new start address.
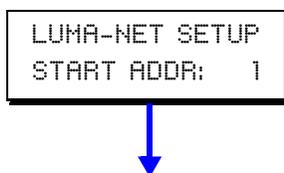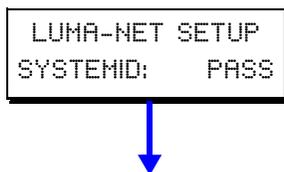
```
 LUMA-NET SETUP
OP MODE: DISABLED
```

Operation Mode

Participation on the Luma-Net network can be enabled or disabled from this menu item.

if BACnet is configured for use on the LN3 port Luma-Net will be disabled.visa versa for reverse operation.

```
 LUMA-NET SETUP
 MASTER FB:  DIS
```

Master Feedback

Feedback is the ability of a relay to respond to a status request. For example, a network device might ask for the on/off status of relay #13. If Master Feedback is on AND relay #13 is instructed to respond to feedback messages, the relay cabinet will respond with the current on/off state of the relay. Likewise, if Master Feedback is OFF and regardless of the feedback setting in the relay menu, the cabinet will not respond to any request for status.

Note: This setting can be used to quickly isolate problems related to multiple relays responding to the same request for level. If multiple responses are made, the Luma-Net network will constantly crash.

BACnet

BACnet is an ASHRAE standard protocol for interfacing to Building Automation Systems. BACnet can be used to monitor, control and override the on/off status of each relay. BACnet can use different wiring styles to carry messages.

BACnet MSTP **is included** with ZMAX and uses a twisted pair of wires to interconnect each relay panel with the BAS interface. Up to 127 ZMAX cabinets may be connected to a MSTP wire.

BACnet IP and BACnet Ethernet uses Category 5 wiring arrangement and **require an optional plug in module. For information on configuring BACnet IP, as well as other protocols such as Lon and Modus, see instructions shipped with option module.**

The following items must be configured to interface to a BACnet MSTP system.
- Port to use.
- Baud Rate.
- BACnet system Device ID.
- MSTP node ID
- Block Relinquish at Priority 8 (Y/N)
- Learn as Analog Output or Binary Output.

LCD Menus:

Under:
MAIN MENU SELECT:
      CONFIGURATION:
            SYSTEM SETUP:
                  BACnet

BACnet Port Setup

The ZMAX does not have dedicated terminals for the BACnet MSTP. You can utilize either the Luma-Net port or the DMX512 port for BACnet. If the Luma-Net port is in use for other purposes, select the DMX port and visa-versa.

```
 BACnet SETUP
 Port:   NONE
```

Choices Are: "NONE", "Luma-Net", "DMX512", or "TIM".

NONE	Disables the feature.
Luma-Net	If chosen uses the LN3 port for BACnet and if Luma-Net was enabled, the LCD shows a warning message and the beeper sounds a warning.
	Likewise if BACnet is enabled on the LN3 port and Luma-Net is enabled, the LCD shows a warning message and the beeper sounds a warning.

DMX512	If chosen uses the DMX port for BACnet and if DMX was enabled, the LCD shows a warning message and the beeper sounds a warning. Likewise if BACnet is enabled on the DMX port and DMX is enabled, the LCD shows a warning message and the beeper sounds a warning.
TIM	If chosen uses the TIM port for BACnet and if TIM/Ethernet/Modem was enabled, the LCD shows a warning message and the beeper sounds a warning. Likewise if BACnet is enabled on the TIM port and TIM/Ethernet/Modem is enabled, the LCD shows a warning message and the beeper sounds a warning.

Baud Rate Setup

BACnet MSTP can operate at several different data rates. Select the proper data or select AUTO to have ZMAX detect the current data rate.

```
 BACnet SETUP
Baud Rate:  9600
```

Choices Are: "9600", "19200", "38400", or "AUTO".

BACnet ID Setup

Each BACnet device in the building system must have a unique ID number. This ranges from 1 to 9999. Select a unique ID number and enter it. Consult with the BAS system programmer if necessary to determine a unique number.

```
 BACnet SETUP
Device ID:  None
```
Choices Are: "None", or "0" to "9999".

Device ID is unique to an entire BACnet system network.

None   Disables the feature.

Node ID Setup

In addition to setting the Device ID, a unique node ID number is also necessary. This is a number from 1 to 127 that is unique only to the ZMAX cabinets on the MSTP wire. Select a unique ID number and enter it. If 2 ZMAX cabinets have the same Node ID, the BACnet MSTP network may not function.

```
 BACnet SETUP
 Node ID: None
```
Choices Are: "None", or "0" to "127".

Node ID for MS/TP only and is unique only to the local MS/TP network.

Block Relinquish

The ZMAX cabinet normally uses priority 8 local via digital and low voltage switches. Block Relinquish will prevent the BA
S system from relinquishing Priority 8 and interfering with the operation of these switches. Select Block Relinquish "Yes" whenever local or digital switches and controls are used in conjunction with the BAS system. If the only control source is the BAS system, then select "No" to allow full controls.

```
  BACnet SETUP
Block Relin@P8:Y
```

Choices Are: "Y" or "N".

Blocks relinquishments to priority eight (8).

Learn As Setup

A BACnet system may wish to "learn" all of the controllable points in the cabinet. These may be learned as standard Binary Output (BO) or Analog Output (AO) control points. Note that any of the ZMAX relays may be controlled as both binary Output or Analog Output points at any time. Select the desired type of control points.

```
  BACnet SETUP
Learn As:    BOs
```

Choices Are: "BOs" or "AOs".

Sets how a learning session on a BACnet client learns the Z-MAX relays.
A Z-MAX on BACnet is always a "server".

Controlling Groups as control points.

The ZMAX reserves control points 1000-1999 to control groups of relays.
All relays assigned to a specific group will be controlled when data is written to the corresponding AO or BO points from the BAS system. Note that control points 1000-1999 cannot be learned and reading the state or priority of these control points may not reflect the actual state of the relay.

DMX512

```
            MAIN MENU SELECT        CONFIGURATION          SYSTEM SETUP
 MENU        CONFIGURATION          SYSTEM SETUP            DMX-512
```
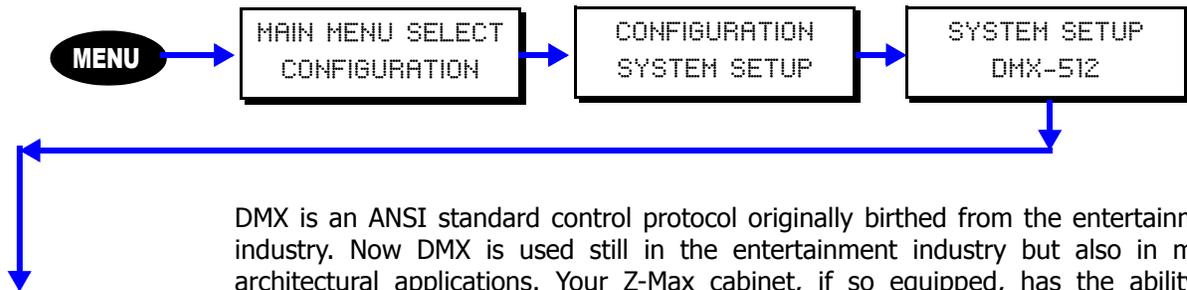
DMX is an ANSI standard control protocol originally birthed from the entertainment industry. Now DMX is used still in the entertainment industry but also in many architectural applications. Your Z-Max cabinet, if so equipped, has the ability to receive DMX and allows each relay to be assigned to one of the 512 DMX channel addresses.

The settings for DMX are described in this chapter.

Operational Mode

```
 DMX512 SETUP
 M:    DISABLED
```

DMX has several operational modes which define how DMX controls the relay cabinet. The available operational modes are as follows:

- Disabled - The cabinet can be programmed to <u>not</u> listen to DMX commands. This is useful when you do not have any DMX devices hooked up to the system.
- PRI ON - REL OFF - DMX operates in last action mode for dmx channels at the same priority level as DMX when levels are greater than 0, and relinquishes control to other channels when the value=0. (last action)
- PRI OFF-REL ON - Relinquishes control to other priority levels when the DMX channel level is greater than 0, and operates in last action mode at the priority level of DMX to turn the relays off when the DMX channel level=0.
- Forced - Means that DMX will always have control over other control sources of the same priority.

DMX Start Address

```
 DMX512 SETUP
 START ADDR:    1
```

When DMX is used to control relays in the cabinet, each relay requires the assignment of a DMX channel, or none, whichever is appropriate. This setting quickly sets and sequentially renumbers all relays in the cabinet, starting at the given start channel. Valid values for DMX channels are 1-512.

Phone/Modem Setup

```
            ┌──────────────────┐   ┌──────────────────┐   ┌──────────────────┐
  ╭─────╮   │ MAIN MENU SELECT │   │  CONFIGURATION   │   │   SYSTEM SETUP   │
  │MENU │──▶│  CONFIGURATION   │──▶│  SYSTEM SETUP    │──▶│ PHONE/ETHERNET   │
  ╰─────╯   └──────────────────┘   └──────────────────┘   └──────────────────┘
```
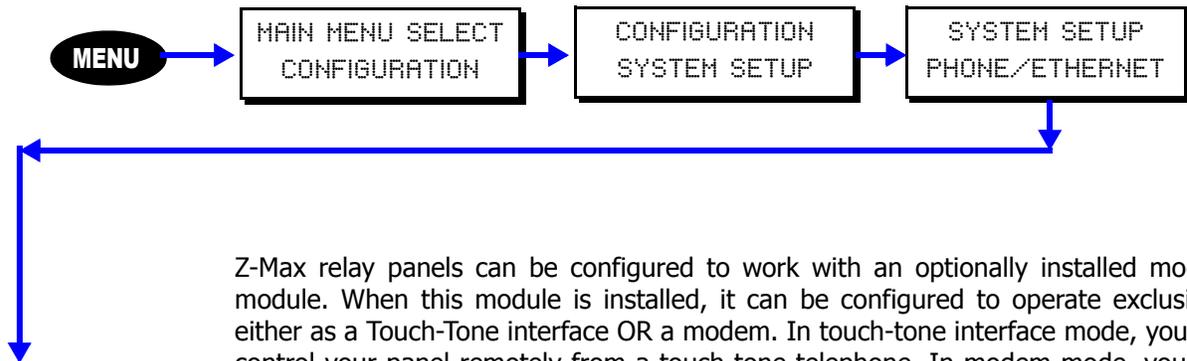
Z-Max relay panels can be configured to work with an optionally installed modem module. When this module is installed, it can be configured to operate exclusively either as a Touch-Tone interface OR a modem. In touch-tone interface mode, you can control your panel remotely from a touch-tone telephone. In modem mode, you can operate your panel from the command line interface (CLIF) or you can transfer data to/from the program from other applications.

> **NOTE** Although this part of the menu structure is entitled phone/ethernet, this section only covers modem setup and configuration. The Ethernet module configuration is covered in a subsequent chapter.

```
┌──────────────────┐
│ PHONE/ETHERNET   │
│  MODE:      TIM  │
└──────────────────┘
```

Operation Mode

The modem has two operation modes:

- *TIM* - Touch-Tone Interface Mode allows for control of your relay cabinet from any touch tone telephone
- *Modem* - Modem mode allows for access to your panel through a traditional data modem connection for terminal based access and control
- *None* - indicates that no module is installed or both modem and ethernet access should be disabled

```
┌──────────────────┐
│ PHONE/ETHERNET   │
│   RINGS:    1    │
└──────────────────┘
```

Rings

Sets the number of rings before the modem answers the line. Valid values are *Off* indicating that the phone should never be answered, or *1-9* rings.

```
┌──────────────────┐
│ PHONE/ETHERNET   │
│  PROMPT: 1.0SEC  │
└──────────────────┘
```

Delay until prompt

The amount of time which should elapse between when the modem answers the phone, and the request for password prompt is issued to the user.

> **NOTE** The modem requires an approximate 2 second delay between when the modem initially answers and when a command will be accepted.

```
┌──────────────────┐
│ PHONE/ETHERNET   │
│ HANGUP TO: 30SEC │
└──────────────────┘
```

Hang-up Delay

The hang-up delay is the amount of time between when the last successful command is entered and the modem automatically hangs up the phone.

Ethernet Module

```
MENU  ──►  MAIN MENU SELECT   ──►   CONFIGURATION    ──►    SYSTEM SETUP
            CONFIGURATION            SYSTEM SETUP          PHONE/ETHERNET
```

Z-Max relay panels can be configured to participate on an TCP/IP Ethernet network. From the ethernet network you can operate your panel from the command line interface (CLIF) or you can transfer data to/from various applications.

> **NOTE** Although this part of the menu structure is entitled phone/ethernet, this section only covers ethernet setup and configuration. The mode module configuration is covered in a previous chapter.

```
PHONE/ETHERNET
MODE:   ETHERNET
```

Operation Mode

The ethernet card has two operation modes:

- *Ethernet* - The ethernet module is installed
- *None* - indicates that no module is installed or both modem and ethernet access should be disabled

```
ETHERNET
DHCP: ENABLED
```

DHCP

On networks which support DHCP for IP address allocation, your ethernet card can be configured to retrieve it's address from a DHCP server. If you have a DHCP server on your network, this option should be enabled.

```
ETHERNET IP ADDR
192.168.001.002
```

IP Address

If DHCP is disabled, you will be asked for an IP address. Please enter a unique IP address when requested.

```
ETHERNET IP MASK
255.255.255.0
```

Subnet Mask

If DHCP is disabled, you will be asked for an subnet mask. Please enter the appropriate mask when requested.

Priorities
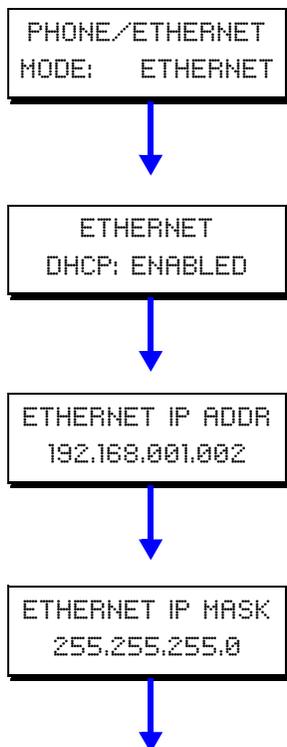
```
            ┌─────────────────┐   ┌─────────────────┐   ┌─────────────────┐
  ╭─────╮   │ MAIN MENU SELECT│   │  CONFIGURATION  │   │   SYSTEM SETUP  │
  │MENU │──▶│  CONFIGURATION  │──▶│  SYSTEM SETUP   │──▶│   PRIORITIES    │
  ╰─────╯   └─────────────────┘   └─────────────────┘   └─────────────────┘
```

There are many control signals and events all coming into the relay cabinet at the same time. Priority levels are used to distinguish which event actually occurs when competing commands are sent.

For example, consider the situation where you want the scheduler to turn the lights on in a lobby at 7:30am and off at 5:30pm so that the lights are on during business hours. Also consider for a moment that there is a switch in the lobby which can be used to turn on/off the lobby lights. Now, consider that the scheduler turns the lights on at 7:30am but Joe the janitor comes in and presses the switch to turn off the lights at 7:45am. The lights could remain off all day long! To resolve this problem, priorities can be used.

Your Z-MAX relay cabinet has (16) priority levels which can be assigned to control signals and events. 1 is considered to be the highest priority, 16 is considered to be the lowest priority.

> **NOTE**   Your Z-MAX relay panel presents a warning when you change the priority level. This warning is present because simply changing the priority level of a control signal can drastically change how your panel operates. Make sure you understand what you're doing and have a good reason for doing it. If not….you probably should leave them alone.

Each relay has a defined state at each priority level:

- *ON* - indicates that the relay should be on at the specified priority level and any lower priority commands should be ignored
- *OFF* - indicates that the relay should be off at the specified priority level and any lower priority commands should be ignored
- *RELINQUISH* - indicates that control at the specified priority level is relinquished to a lower priority level

When a relay determines what state it should be in, it steps through each priority level and looks for any controlling commands. When it finds one it executes it. If the command is relinquish, it proceeds to the next priority level. If it steps through all 16 priority levels and finds no on or off commands, then the relay is turned off.

When a signal or event is executed at a priority level, no lower priorities will have any effect on that relay until control at the higher priority level is relinquished. The control signal or event will continue to be updated at the lower priority, it just will have no effect on the relay.

DMX can be somewhat of an exception to the priority rules in that it has a special configuration option called "Force". When DMX is in "Force" mode, DMX will automatically take control over all other control signals at the same priority level anytime a DMX signal is present.

The factory default for priority levels is as follows:

Control Signal	Designation	Priority Level
Internal Bypass switch	BYPASS	1
Emergency Input	EMERGENCY	2
Internal override switch override commands	SWT OVERRIDE	3
Internal override switch on/off commands	SWT NORMAL	8
Front Panel Overrides	KBD OVERRIDE	4
Front Panel Control	KBD NORMAL	8
Luma-Net Input	Luma-Net	8
DMX Input	DMX-512	8
Photocells	PHOTOCELLS	7
Occupancy Sensor inputs	OCC SENSORS	8
Low voltage switch inputs	LV SWITHCES	8
Relays activated by the power restore feature	POWER RESTORE	8
Scheduled Events	SCHEDULER	8
TIM Normal Commands	TIM NORM CMDS	8
TIM High Priority Commands	TIM HIGH CMDS	7

Default Priorities should only be changed with full and complete understanding of the implications of your change and the priority system. Incorrect settings can cause relays to function incorrectly. In the event that a high-priority actions is required, Leviton recommends always using actions to which any execution priority level can be assigned.

Factory Defaults

If it ever becomes necessary to restore the factory defaults and begin the programming from a clean slate, simply:

Step 1: Press the **Menu** Button

Step 2: Press ⬆ until you get to the Configuration Screen

Step 3: Press Select/Save

Step 4: Press ⬆ until you get to the Factory Defaults Screen

Step 5: Press Select /Save

Step 6: Press ⬆ once and the N will change to a Y.

```
FACTORY DEFAULTS
  INITIALIZE ? N
```

Step 7: Press Select/Save

> **NOTE** **Resetting to factory defaults will erase any programming or configuration you've completed. Any parts of this programming you desire to use after the rest will have to be recreated from scratch programming in your system.**

Saving & Restoring Configuration

Your configuration data can be saved and restored to/from a connected PC using our PC configuration program. This program is included on the compact disc included with every cabinet, can be downloaded from our website, or can be ordered from Customer Service. Leviton recommends that a backup of all cabinet configuration files be made so that in the unfortunate event of product failure, a quick means by which to restore configuration is possible.

Passwords

```
 MENU  ───▶  MAIN MENU SELECT  ───▶  CONFIGURATION  ───▶  SYSTEM SETUP
             CONFIGURATION           SYSTEM SETUP         CONFIG PASSWORDS
```
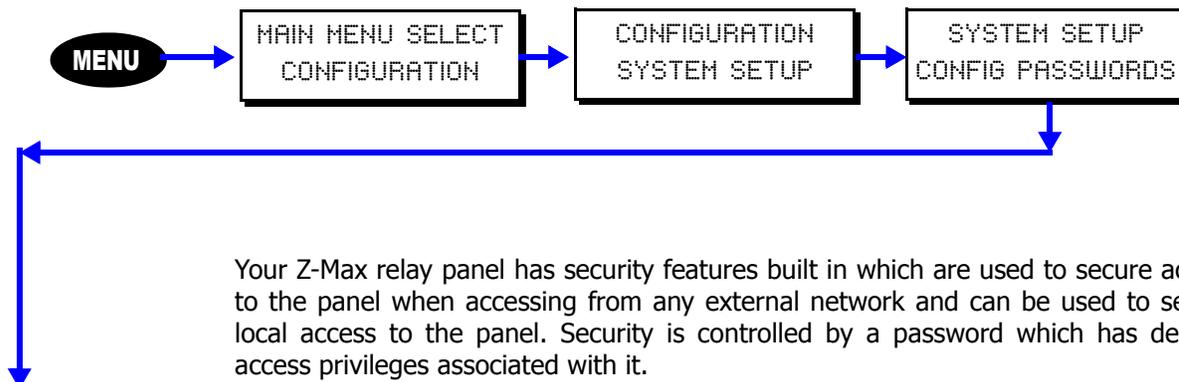
Your Z-Max relay panel has security features built in which are used to secure access to the panel when accessing from any external network and can be used to secure local access to the panel. Security is controlled by a password which has defined access privileges associated with it.

| NOTE | Your relay panel ships as default with an administrative level password of 1234. This password can not be deleted but can be modified. |

Adding Passwords (Access Codes)

```
CONFIG PASSWORDS
  ADD  PASSWORD
```

Up to 256 passwords can be entered into the system. To add a password, select the ADD PASSWORD option from the password configuration menu.

```
ADD:002  PW:0000
GP:0000     ADMIN
```
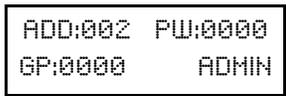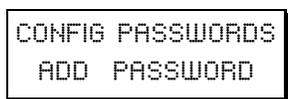
Each password has several settings:

- The "ADD" field is purely information and indicates the number of the added password
- The "Pw" field is the password itself
- The "Gp" field is the group number which can be accessed by this password. Access to all groups is granted if the password mode is ADMIN regardless of this setting. If the password type is USER and the Gp field is 0000, no control will be granted as user access codes can only control a single group.
- The bottom right most field is the MODE field. Mode can be any one of the following:
    - ADMIN - When entered, the user is granted access to all administrative functions of this relay panel
    - INSTALL - This password grants "installation" level access to the relay panel
    - TECH - This mode grants "technician" level access to the relay panel
    - USER - grants user level access to the relay panel
- The modes above grant access to the panel mainly from the front panel. The possible modes as listed below are command level passwords which allow for the specific command to be issued to the specified group from the touch tone interface. When password is entered, the command is executed and the call is then disconnected.
    - OFF - turns off the associated group
    - ON - turns on the associated group

- TON - turns on the associated group for a cabinet specified override time
- BWO - initiates a blink warn for the associated group
- BWC - cancels an in-progress blink warn for the associated group
- OVRDON - turns on the group at the "higher" priority level as specified in the priority system setup option
- OVRDOFF - turn off the group at the "higher" priority level as specified in the priority system setup option
- OVRDREL - relinquishes control of the relay at the "higher" priority level to all lower priority levels

Editing Passwords

```
CONFIG PASSWORDS
 EDIT  PASSWORD
```

Editing is mostly the same process as adding passwords excepting the fact that you first much choose which password you want to edit, then perform your editing activities and then save your changes.

Deleting Passwords

```
CONFIG PASSWORDS
 DEL  PASSWORD
```

Passwords can be deleted by choosing this menu option. You first select the password to delete, and then confirm or deny the deletion. If the deletion is confirmed, the password is permanently removed from the database.

Switch/Discrete Inputs

```
          ┌──────────────┐    ┌──────────────┐
  MENU ──▶│ MAIN MENU SELECT │──▶│ CONFIGURATION │──┐
          │ CONFIGURATION    │   │ INPUTS        │  │
          └──────────────┘    └──────────────┘  │
                                                 │
                        ┌────────────────────────┤
                        ▼                         ▼
          ┌──────────────┐         ┌──────────────┐
          │ DISCRETE INPUTS │      │ DISCRETE INPUTS │
          │ DEFINE TYPES    │      │ ASSIGN ACTIONS  │
          └──────────────┘         └──────────────┘
```
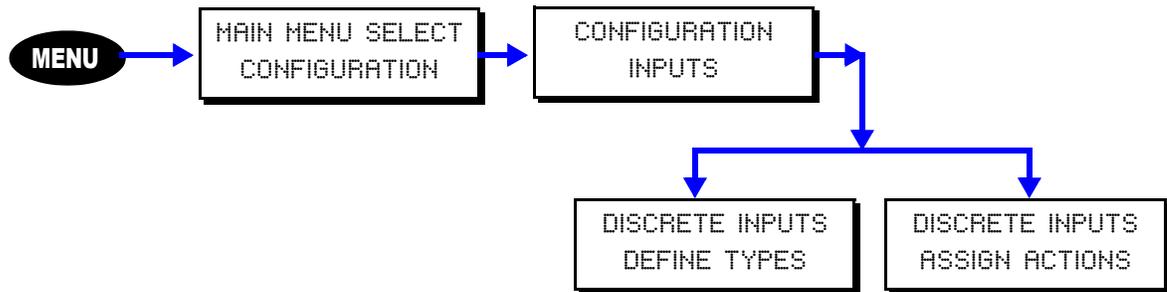
The inputs section of the configuration menus allows you to configure all of the local and remote switch inputs to your relay cabinet. Configuring any switch input is a two-step process:

Step 1: Define the type of switch input

Step 2: Assign actions and behaviors to that input

The define types menu is where you define the type of device or function of the input, and the assign actions menu is where you define what happens when an input signal (or lack thereof) is received at the particular input.

The system accepts the following switch Input types:

- Low Voltage Switches
  - Momentary
  - Preset ON
  - Preset OFF
  - Maintained
  - Momentary Timed
  - Momentary On/Off
- Digital Switches
- Occupancy Sensors
- Photocells
- Contact Closure Inputs
- Remote Inputs from a master/remote network connected panel

Switch Numbering

There are a maximum of 252 definable switch inputs in the programming structure. These inputs are allocated first to any local inputs, second to any remote inputs from master/remote connected panels, and lastly to network switches.

The first available input for a digital switch can be calculated as 1+[number of local relays]+[number of remote relays]. For example, if in the global defaults you had defined 24 local relays and 48 remote relays, then your relay number would be as follows:

- 1-24 local inputs

- 25-72 reserved for remote relays
- 73-240 reserved for network/digital switch inputs

Define Switch Types

The system programming is defaulted for all input types to be set up as Switches and their behavior as Active High. If you do not have any other type of input or behavior type, then you can skip this section.

To define the type of switch input

Step 1: Once "Define Types" has been selected from the menus, press ⬆ or enter a number from the keypad until you get to the desired input number or type in the three digit number from the keypad.

Step 2: Press Select/Save

Step 3: Press ⬆ until you reach the desired switch type. The following are the choices:

- SWT = Switch
- PHO = Photocell
- OCC = Occupancy Sensor
- CC = Contact Closure
- --- = nothing connected (reserved for future use)

Step 4: Press . ➡ once to position the cursor in the next field

Step 5: Press the ⬆ or ⬇ to toggle the input behavior field to the desired value. See the following list for the available behavior types:

- SWT = Switch
    - Act HIGH - Active High (All Leviton Low Voltage Switches and Z-MAX Digital Switches)
    - Act LOW - Active Low
- PHO = Photocell
    - Fc:1-999
- OCC = Occupancy Sensor
    - Act HIGH - Active High
    - Act LOW - Active Low
- CC = Contact Closure
    - Act HIGH - Active High
    - Act LOW - Active Low

Step 6: Press Select/Save and the following menu will appear whenever an input type is changed. Relays and parameters previously assigned to that input will be deleted:

```
CHANGE FORMAT? N
Data Kept As Is!
```

Step 7: Press ⬆ to toggle the N to a Y.

Step 8: Press Select/Save

Step 9: Repeat Steps as necessary for all switch inputs.

Assign Actions to Inputs

```
DISCRETE INPUTS
ASSIGN ACTIONS
```

Once you have defined the Switch type, you must associate an action to that switch. An action consists of two parts, a behavior which dictates how the switch input interacts with the relay cabinet, and second, you must assign relays and/or groups to reach to the input.

When assigning actions, a different menu structure is employed for each of the following previously defined input types:

- Switch Inputs
- Photocells
- Occupancy Inputs
- Contact Closures

The general procedure for assigning actions to inputs is as follows:

Step 1: Select Assign Actions from the inputs configuration menu

Step 2: Select the type of input you wish to configure

```
ASSIGN ACTIONS
SWITCH INPUTS
```

Possible input types are as follows:

- Switch Inputs
- Photocell Levels
- Occupancy Inputs
- Contact Closures

Step 3: Select the input number you wish to configure

```
ASSIGN SWITCHES
001:LOCAL
```

Note: Only the input numbers for the input which are defined as the selected type will show. If for example you are trying to configure an occupancy sensor connected to input #3 yet input #3 doesn't show in the list, it's input type is probably incorrectly defined. Please see the "Define Types" section earlier in this chapter.

Step 4: Select the behavior of this input

```
SWITCH:001 LOCAL
   Momentary
```

Switch input behavior only is shown - all behaviors for each type are discussed below

Step 5: Assign the relays to this input. Typically, there are several menu items associated with this process: ADD, EDIT, DELETE, & EXIT. This menus items are implemented in the next section.

Step 6: Save your changes and proceed to other configuration tasks.

Relay assignment to inputs

The process of assigning relays to inputs is the same regardless of the type of input selected. This section details the process by which relays are assigned to an input.

ADD RELAY/GROUP:

This selection allows a relay, relay range or group number to be added to the input's control.

Step 1: Press ⬆ or ⬇ to select relay or group.

Step 2: If relay is selected, press ➡ to move to the first relay number field.

Step 3: Use ⬆ and ⬇ to select the relay number.

Step 4: Press ➡ to move to the second relay numeric field.

Step 5: Use ⬆ and ⬇ to select the second relay number. This number cannot be larger than the first relay number. If only the first relay number is desired, make the second number the same as the first. If a range is desired, make the second relay number the last number of the range.

Step 6: If group is selected, press ➡ to move to the group number field.

Step 7: Use ⬆ and ⬇ to select the group number desired.

Step 8: Once the relay/group number(s) have been entered, press Select/Save. *The menu will be returned to the point where more relay/group management can be initiated.*

| NOTE | Up to 32 relay/group entries can be assigned to each input.

EDIT RELAY/GROUP:

This menu allows previously programed Relay/Group items to be edited.

From the end of the previous Step:

Step 1: Press ⬆ or ⬇ to select desired relay/group entry to edit.

```
SWITCH:006 LOCAL
EDIT RELAY/GROUP
```

Step 2: Press Select/Save to begin editing.

Step 3: Press ⬆ or ⬇ to change between relay or group if desired.

Step 4: Press ➡ to move to the number field to make appropriate changes using ⬆ and ⬇.

Step 5: Press Select/Save to save the changes.

DEL RELAY/GROUP:

This menu allows previously programed Relay/Group items to be deleted.

From the end of the previous step:

Step 1: Press ⬆ or ⬇ to select desired relay/group entry to delete.

Step 2: Press Select/Save to initiate the deletion.

Step 3: The LCD will prompt for confirmation.

```
SWITCH:006 LOCAL
DEL  RELAY/GROUP
```

Step 4: Press ⬆ to change the default "N", for No, to "Y', for Yes.

Step 5: Press Select/Save to delete the item.

EXIT (DONE):

This item will move back up to ASSIGN ACTIONS menu.

Switch Inputs

There are six behaviors that can be assigned to a switch input:

- Momentary
- Maintained
- Preset On
- Preset Off

- Momentary Timed
- Momentary On/Off

Momentary: This behavior assigns a toggle (push On/push Off) function to the input. Only active states are recognized. Upon a new active state, the input will either turn on or turn off the relays assigned based on their current state.

Momentary Timed: this behavior will allow you to turn "on" the assigned relays for an amount of time specified in the global defaults Tswit setting

Momentary On/Off: This unique input type is used with any momentary on/off (2 pole) center off switch with or without LED feedback. When using this switch input behavior, the input expects to receive approximately +24vdc at the switch input to signal an "ON" state and approximately +12vdc at the switch input to signal an "OFF" state. For this input type, the use of rac00-2sb or rac00-2sc switch input adapters are required, or, the use of an LV240-00W entrance station.

Maintained: Under this behavior, the assigned relays will be on whenever the input detects an active (on) state. The assigned relays will be off whenever the input detects an inactive (off) state.

Preset On: Presets can only operate with a momentary switch. The advantage of a preset input is that it is included in a preset association. This allows multiple switch inputs assigned to the same association to interact together, allowing only one to be on at a time.

> **EXAMPLE** For example, if three inputs are configured as Preset On, with the inputs assigned relays 1, 2 & 3 respectively, only one relay can be on at a time. If Switch 1 is activated, relay 1 turns on. If Switch 2 is then activated, relay 2 turns on and relay 1 turns off along with switch 1 input.

Preset Off: When a switch input has a Preset Off behavior, it will turn off all relays that are assigned to switches configured as Preset On providing they are in the same preset association.

> **NOTE** Remember that Preset On and Preset off have Preset Associations. This allows you to associate switch inputs with different preset associations (groups). Thus you can have several switches that utilize the Preset function but do not affect other switches. A good example of this is a 2 button switch where button 1 is for turning lights on and button 2 is for turning lights off.

Digital Switches

Digital Switches are an extension of low voltage switches in that a digital switch is assigned to a "virtual" discrete input which is then programmed identically to a local

discrete input. The only difference is the way they are wired to the system and how they are networked over Luma-Net. Set up is very similar in philosophy.

For information about inputs which are available for use as a digital switch input, See "Switch Numbering" on page 81.

To set up a digital switch:

Step 1: Press the Menu Button

Step 2: Press ⬆ until you get to the Configuration Screen

Step 3: Press Select/Save

Step 4: Press ⬆ until you get to the Discrete Inputs Screen

Step 5: Press Select /Save

Step 6: Press ⬆ until you get to the Define Types Screen

Step 7: Press Select /Save

Step 8: Press ⬆ until the flashing field reads 49 or greater (this depends on which switch you are trying to set up)

NOTE   You can also type in the 3 digit number of the switch. Therefore if you are trying to set up 49, type 049 from the keypad.

Step 9: Press Select/Save

Step 10: The Cursor will jump to the type field and if still at factory default values, will be flashing SWT as Shown:

Step 11: Press ⬆ until SWT is in the field

Step 12: Press . ➡ once to position the cursor in the next field

Step 13: Press ⬆ until Act HIGH is in the field

Step 14: Press Select/Save to store the settings and move you to the next screen

```
SET NETWORK: ecl
ADD:    X BT:  X
```

Step 15: Press. ➡ once to position the cursor in the field marked ADD. This is the Luma-Net network address of the digital switch you are programming.

Step 16: Press ⬆ until you get to the desired network address

Step 17: Press . ➡ once to position the cursor in the field marked BT. This refers to the physical button number on the station itself.

Step 18: Press ⬆ until you get to the desired button

Step 19: Press Select/Save

Step 20: Repeat Steps 8 - 19 as necessary for every button on every station you are programming.

Step 21: Assign actions just as for a local switch.

Occupancy Inputs

The process for setting up Occupancy Sensors as inputs to your Z-Max relay cabinet is identical to low voltage switches except that the type should be defined as **OCC**.

When assigning actions to occupancy inputs, the following three behaviors can be assigned to the input:

- NORM ON - AUTO OFF: When the occupancy sensor detects movement and goes active, relays assigned to this input will turn on only if all relays have been off for more than the Re-trigger Delay time (set later). Relays will turn off when the occupancy sensor goes inactive after the Off Delay time (set later). This scenario is used to hold off reactivating the relays by the sensor when one or more lights has been manually turned off to temporarily adjust the lighting levels in the room.

- ALWA ON - AUTO OFF: When the occupancy sensor detects movement and goes active, relays assigned to this input will turn on. Relays will turn off when the occupancy sensor goes inactive after the Off Delay time (set later).

- MAN ON - AUTO OFF: If the input is set to this behavior, the occupancy sensor has no effect on the relays when it goes active. Instead, the relays must be turned on via any other means (typically a switch input). When the occupancy switch goes inactive it will turn off the relays. This application is good for when manual control is desired from a switch but you want the lights to turn off when someone forgets to turn them off. This functional operation is required by California Title 24 in most applications.

Additionally, when setting up occupancy inputs, several additional questions are asked:

Blink Warn

```
OccSen:  3  LOCAL
 BLINK WARN: YES
```

Indicates whether or not a blink warn should be issued before turning off the lights associated with this occupancy sensors.

Delay from vacancy until lights off

```
OccSen:  3  LOCAL
 BLINK WARN: YES
```

Allows you to set a delay between when the occupancy sensor indicates that the room has become vacant and the lights turn off.

NOTE If the occupancy sensor used already has an internal delay, the off delay time will be added to the sensor delay. When using sensors with internal delay, set delay to 0 (default)

Re-trigger Delay

```
OccSen:  3  LOCAL
 RTG DELAY:000sec
```

Allows you to set a mandatory delay between when the lights are turned off (by occupancy sensor or other method) and the earliest point at which the lights can be turned on, regardless of occupancy state.

```
OccSen:  3   LOCAL
ADD RELAY/GROUP
```

Relay Assignment

Assign relays and groups to this input just as for other input types.

Contact Closures

Contact closures are switch inputs which instead of having relays or groups assigned to them, instead have actions assigned to them. Contact closures have two possible behaviors:

Maintained: Under this behavior, two actions can be assigned. The first action, Action 1, occurs whenever the input detects an active (on) state. The second action, Action 2, occurs whenever the input detects an inactive (off) state.

Alt Action: This behavior assigns a toggle function to the input. Only active states are recognized. Upon a new active state, the input will issue Action 1 if Action 2 was issued last or Action 2 if Action 1 was issued last.

Photocell and Photocell Levels

Photocells have a variety of uses and applications but most can be broken down into two categories: simple on/off control and the more complex daylight harvesting. Your Z-MAX cabinet is capable of doing both. To connect photocells to your relay cabinet, please see the installation chapter which addresses the installation of a photocell with the cabinet. This section will walk you only through the configuration aspects of photocell operation. Additionally, you may find it helpful to review the sidebar information on this page which addresses both background information on photocell operation and daylight harvesting. Configuration of your Z-MAX cabinet for use with photocells assumes that you're already comfortable with both topics.

Photocells operate in one of three modes, these modes define the characteristics of how photocell operation interacts with the relay panel. It's crucial to understand the three modes prior to commencing programming to ensure that the desired result is achieved. The three modes are as follows:

- Relinquish / Force Off
- Force On / Force Off
- Force On / Relinquish

The modes express what happens to the assigned relays/groups at the "ON" trigger point followed by what happens at the "OFF" trigger point. The On trigger point occurs as the foot candle levels from the photocell drops and the Off trigger point occurs when the foot candle level from the photocell is rising. Another way to think about the modes is that the first part of the mode indicates what action will happen when the "sun" is rising or getting brighter and the second portion of the mode indicates what will occur when the "sun" is setting or getting darker outside.

Mode 1, Relinquish On/ Force Off, is useful for applications where you want to turn relays on manually and off automatically when it gets bright. This mode also allows manual control to turn relays off and on.   This is the typical daylight harvesting application. For example, think about a classroom where there is only an on/off switch for use by the occupants. The teacher comes in the morning, when it's dark outside, and turns on the switch. All of the lights come on. When the sun comes up and natural light fills the space, the photocell would detect lights which would pass the trigger point and then turn off some or all of the lights in the room. When the sun goes down or prolonged cloud cover exists making the room dark again, the photocell would detect the darkness and then turn the associated relays on and then relinquish control back to the manual switch which if in the on position would turn the lights on. Since up to (16) trigger points for the same photocell can be programmed, this can be used with multiple zones of relays to allow different levels of ambient light in the room, or rather multi-zone control.

Daylight Harvesting

In a daylight harvesting application, the goal is to maintain a consistent lighting level within the space, regardless of the source of light which could be either daylight or dimmable artificial light. If this lighting level can be maintained completely with daylight, no artificial light is necessary. However, if the day lighting is not sufficient to meet the desired level, it can be boosted by the artificial light connected to your relay cabinets

Mode 2, Force On / Force Off, is useful for applications where you do not want to to allow manual control of the lights at all. The relays come on when it's dark, and go off when it's bright. Think about parking lot lighting, when it's dark the lights go on, when it's light the lights go off and you don't ever want anything else to override it.

Mode 3, Force On / Relinquish OFF is useful when you want relays to come on when it gets dark and then allows for manual control when it gets bright. A typical application of this would be when you have a parking lot or step lights and you want the lights to turn on as the sun sets or a large dark cloud rolls in, but you have a switch in the system for manual override purposes.

Configure Photocell Interaction with Relays

Photocells

Photocells are devices which sense the incident light levels, and output a voltage proportional to the dynamic range which the photocell has been pre-configured to support. For example, Leviton's ODC0P-00W calibrated photocell senses 0-70fc. When the photocell receives 0fc of incident light, the output voltage will be 0V. Likewise, when the photocell receives 70fc of incident light, the output voltage will be +10VDC. Your relay cabinet converts this 0-10VDC input to a "FC" level, scaling based on the maximum FC level input when you configure the analog input for a photocell.

As mentioned earlier, each photocell can have up to (16) trigger points and relays or groups of relays which are activated at specified rising (on) and falling (off) levels of the photocell. To configure these trigger points:

Step 1: From the "Discrete Inputs" menu, select "Assign Actions"

Step 2: Use the ⬆ ⬇ to select "Photocell Levels", then

Step 3: Press the Select/Save

Step 4: Use the ⬆ ⬇ to select the number of the photocell which you want to configure, then

Step 5: Press the Select/Save.

Step 6: Choose whether or not this photocell is enabled, the default action is "YES".

Step 7: Select the photocell operation mode,
- Relinquish On/ Forced Off
- Forced On / Forced Off
- Forced On / Relinquish Off

Step 8: Set the Delay Time, valid range is 0-240 min.

Delay Time is used to prevent rapid changes to lighting based on changing conditions in the environment. For example, clouds passing the sun which temporarily darkens the space. It's expressed in minutes and represents the length of contiguous time which the trigger point must have been passed in order for the relays to be turned on or off.

Step 9: Select the trigger point you wish to define, valid are 1-16, then press the ➡ to advance to the next field.

Step 10: Enter the level, in FC, for which you desire these relays to be deactivated when the light levels are RISING (ON). Then press the ➡ . again to advance to the next field.

Step 11: Enter the level, in FC, for which you desire these relays to be activated when the light levels are FALLING (OFF). Then press the ➡ .again to advance to the next field.

Step 12: Press Select/Save to add relays and/or groups to trigger for this trigger point.
This will advance you to a menu where you can select to ADD, EDIT, or DELETE groups. Select the desired option:

Step 13: Use the ⬆ ⬇ to select RLY for relay or GRP for Group, then the ➡ .button to advance to the next field

Step 14: Enter the range of relays you wish to assign to this trigger point, then

Step 15: Press Select/Save to save your changes.

NOTE   Up to 32 relay/group entries can be programmed

Step 16: Repeat steps 10-12 as necessary, and when complete, select "Exit" from the menu.

Step 17: Now you can assign addition trigger points or **CANCEL** to exit the menu

NOTE There is an overall cabinet limit of 254 photocell trigger points that can be programmed.

That covers most of the basic actions and concepts for photocells. For additional help specific to your application, please contact our Technical Services department who are available to help you 24 hours per day, 7 days per week.

Action Editor

```
          ┌─────────────────────┐
 ╭─────╮  │  MAIN MENU SELECT   │
 │MENU │→ │    ACTION EDITOR    │
 ╰─────╯  └─────────────────────┘
                    │
          ┌─────────┴──────────┐
          ▼                    ▼
 ┌─────────────────┐  ┌─────────────────┐
 │  ACTION EDITOR  │  │  ACTION EDITOR  │
 │ ADD/EDIT ACTIONS│  │ DELETE AN ACTION│
 └─────────────────┘  └─────────────────┘
```
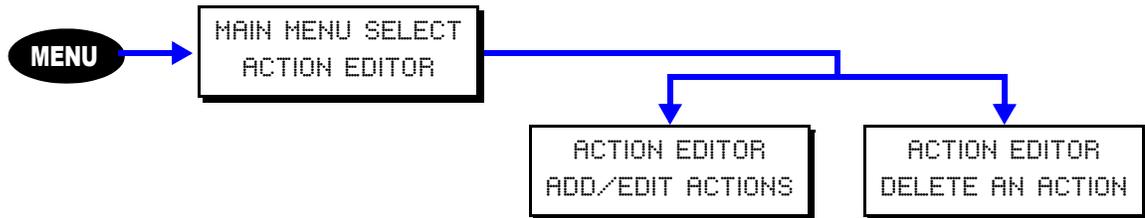
The action editor is used to manage the actions defined in your relay cabinet. Actions are used to execute commands or create groups of commands which are called by a contact closure input or by the event scheduler.

> **NOTE** In order to create any event, an action must first be created. The action is "what happens" the event is "when it happens."

Each action is made up of a list of items. You can have as many action items as desired, up to the system limit of 2000. There are four submenus in the Action Editor

- ADD A NEW ACTION
- EDIT AN ACTION
- DELETE AN ACTION
- EXIT (DONE)

Adding an Action

Step 18: Navigate to the Action Editor

Step 19: Press ⬆ until you get to the Add/Edit Actions Screen

Step 20: Press Select/Save

Step 21: Name the Action: You can change the name using the ⬅ and ➡ arrow buttons to move the cursor and the ⬆ or ⬇ arrow buttons to change the character. You can also use the alpha-numeric keypad to enter characters. Tapping the alpha-numeric button the first time will result in the number, tapping the same button again will result in the character listed above the number on the button. In the case of the 1 and 0 buttons, a hyphen or space character respectively will be displayed. In the case of the number keys 2 - 9, the left most character will be displayed. For these keys, as they are pressed repeatedly, each successive character, from left to right is displayed until all have been displayed, at which time it wraps back to the number and repeats.

Step 22: Press Select/Save when you have finished naming the Action

Step 23: Press ⬆ until you get to the Add A New Item Screen

```
ACTION CHOOSE TO
ADD A NEW ITEM
```

Step 24: Press Select/Save

The Following are the actions items that can be added:
- RLY (Relay)
- GRP (Group)
- BTN (Button)
- PHO (Photo Cell)
- OCC (Occupancy Sensor)
- ACT (Action)
- EVT (Event)

Step 25: Press ⬆ until you get to the desired item
Step 26: Press Select/Save

Action Item Types:

Relay

```
ADDING  NEW ITEM
RLY 01-01 REL De
```

This action item puts a relay or a range of relays into one of 5 states:
- **REL**: Relinquish releases control of the relay at the priority level specified. If the action at this priority was currently in control of the relay, control will be transferred to the next lower priority level action that is in any of the four other states.
- **OFF**: Turns the relay off.
- **ON**: Turns the relay on.
- **BWO**: Activates the Blink Warn sequence for the selected relays provided Blink Warn has been activated for each relay from the Setup Menu. See the Global Default settings for Blink Warn timing settings.
- **BWC**: Cancels the Blink Warn operation for the selected relays.

Step 27: Press ➡ once to position the cursor in the first relay field
Step 28: Press ⬆ and ⬇ until you get to the desired starting relay
Step 29: Press ➡ once to position the cursor in the second relay field
Step 30: Press ⬆ and ⬇ until you get to the desired ending relay
Step 31: Press ➡ once to position the cursor in the relay state field
Step 32: Press ⬆ until you get to the desired relay state (see above for the types of states)

Step 33: Press ➡ once to position the cursor in the priority field

NOTE Any priority level from 1 to 16 can be selected (1 is the highest priority). A priority of "De", for default, will use the default priority that is set in the priority editor of the System Setup menu.

Step 34: Press ⬆ until you get to the desired priority value

Step 35: Press Select/Save

The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Group - GRP

Any Group number can be assigned to an Action

```
ACTION CHOOSE TO
 ADD A NEW ITEM
```

Step 36: Press ➡ once to position the cursor in the Group field

Step 37: Press ⬆ and ⬇ until you get to the desired Group number

Step 38: Press ➡ once to position the cursor in the Group state field

Step 39: Press ⬆ until you get to the desired group state (see above for the types of states)

Step 40: Press ➡ once to position the cursor in the priority field

NOTE Any priority level from 1 to 16 can be selected (1 is the highest priority). A priority of "De", for default, will use the default priority that is set in the priority editor of the System Setup menu.

Step 41: Press ⬆ until you get to the desired priority value

Step 42: Press Select/Save

The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Button - BTN:

A switch (either local or networked) can be controlled via this action item.

```
ADDING  NEW ITEM
BTN:0000 000 REL
```

Step 43: Press ➡ once to position the cursor in the Button Source Number field

Step 44: Press ⬆ and ⬇ until you get to the desired Button source number or enter the number directly from the keypad.

A value of zero indicates a local input. A nonzero number indicates an input on another networked cabinet

Step 45: Press ➡ once to position the cursor in the Button Number field

Step 46: Press ⬆ until you get to the desired Button number or enter the number directly from the keypad.

Step 47: Press Select/Save.

The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Photocell - PHO:

This action item is used to enable or disable a photo cell.

```
ADDING  NEW ITEM
PHO 000 DISABLED
```

Step 48: Press ➡ once to position the cursor in the Photocell Number field

Step 49: Press ⬆ and ⬇ until you get to the desired Photocell number or enter the number directly from the keypad.

Step 50: Press ➡ once to position the cursor in the Enable/Disable field

Step 51: Press ⬆ and ⬇ to toggle between ENABLE and DISABLE

Step 52: Press Select/Save.

The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Occupancy sensor - OCC:

This action item is used to enable or disable an occupancy sensor.

```
ADDING  NEW ITEM
OCC 000 DISABLED
```

Step 53: Press ➡ once to position the cursor in the Occupancy Number field

Step 54: Press ⬆ and ⬇ until you get to the desired Occupancy number or enter the number directly from the keypad.

Step 55: Press ➡ once to position the cursor in the Enable/Disable field

Step 56: Press ⬆ and ⬇ to toggle between ENABLE and DISABLE

Step 57: Press Select/Save.

The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Action - ACT:

An action item can call another action item. This menu allows you to set this up.

> **NOTE** Be sure that you do not create a continuous loop by linking to action items that eventually link back to the original

```
ADDING  NEW ITEM
ACT undefined...
```

Step 58: Press ➡ once to position the cursor in the Action field
The default value is Undefined meaning no action has been selected!

Step 59: Press ⬆ and ⬇ until you get to the desired Action.
Press Clear to return to "undefined" once a number has been selected

Step 60: Press Select/Save.
The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Event - EVT:

This action item is used to enable or disable an event

```
ADDING  NEW ITEM
EVT 001 DISABLED
```

Step 61: Press ➡ once to position the cursor in the Event Number field

Step 62: Press ⬆ and ⬇ until you get to the desired Event number or enter the number directly from the keypad.

Step 63: Press ➡ once to position the cursor in the Enable/Disable field

Step 64: Press ⬆ and ⬇ to toggle between ENABLE and DISABLE

Step 65: Press Select/Save.
The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Edit an Item:

Once items have been added to an action, they can be edited. If you are still in the Add An Action Section:

Step 66: Press ⬆ until you get to the Edit An Action Screen

Step 67: Press Select/Save

Step 68: Press ⬆ and ⬇ to choose the action the item is in

Step 69: Press Select/Save

Step 70: Press ⬆ until you get to Edit An Item Screen

Step 71: Press ⬆ until you get to the item you want to edit

Step 72: Press Select/Save

Step 73: Edit the item using the same instructions that you used to create the item

Step 74: When you are complete with the editing, Press Select/Save
The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Delete an Item:

Once items have been added to an action, they can be Deleted.

Step 75: Press ⬆ until you get to the Delete an Item Screen

Step 76: Press Select/Save

Step 77: Press ⬆ and ⬇ to choose the action the item is in

Step 78: Press Select/Save

Step 79: Press ⬆ until you get to Delete An Item Screen

Step 80: Press ⬆ until you get to the item you want to Delete

Step 81: Press Select/Save

```
RLY 01-01 REL De
  DELETE  Y/N? Y
```

Step 82: Press ⬆ or ⬇ to toggle between Y or N

Step 83: Press Select/Save

To exit the Item Editor

Step 84: Press ⬆ until you get to the DONE Screen

Step 85: Press Select/Save

Editing and Deleting Actions

Once Actions have been created, they can be edited and deleted. From the Main Menu

Edit an Action:

Step 1: From the Action Editor menus, press ⬆ until you get to the Edit An Action Screen

Step 2: Press Select/Save

Step 3: Press ⬆ and ⬇ to choose the action you want to edit

Step 4: Press Select/Save

Step 5: Edit the Name if you desire

Step 6: Press Select/Save

Step 7: Press ⬆ until you get to the function you want to perform
Add an Item
Edit an Item
Delete an Item
Done

Step 8: Edit the item using the same instructions that you used to create the item

Step 9: When you are complete with the editing, Press Select/Save
The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Edit an Item:

Once items have been added to an action, they can be edited. From the Main Menu

Step 1: Press the Menu Button

Step 2: Press ⬆ until you get to the Scheduler Screen

Step 3: Press Select/Save

Step 4: Press ⬆ until you get to the Action Editor Screen

Step 5: Press Select /Save

Step 6: From the Action Editor, edit an action and the proceed to the edit actions item menu and press Select/Save.

Step 7: Press ⬆ and ⬇ to choose the action of the item that you want to edit.

Step 8: Press Select/Save

Step 9: Press ⬆ until you get to Edit An Item Screen

Step 10: Press ⬆ until you get to the item you want to edit

Step 11: Press Select/Save

Step 12: Edit the item using the same instructions that you used to create the item

Step 13: When you are complete with the editing, Press Select/Save
The menu will be returned to the point where another item can be added, edited, or deleted if desired.

Delete an Item:

Once items have been added to an action, they can be Deleted. From the Main Menu

Step 1: Edit an action and proceed to the action item menus. Select "Delete an Item" and then ⬆ and ⬇ to choose the action the item you wish to delete

Step 2: Press Select/Save

```
RLY 01-01 REL De
 DELETE  Y/N? Y
```

Step 3: Press ⬆ or ⬇ to toggle between Y or N

Step 4: Press Select/Save

Delete an Action

Step 1: From the action editor menu, choose the "Delete an Action" menu item.

Step 2: Press Select/Save

Step 3: Press ⬆ and ⬇ to choose the action you want to Delete

Step 4: Press Select/Save

Step 5: Press ⬆ and ⬇ to toggle between Y and N.

Step 6: Press Select/Save

Scheduler

The Scheduler allows preprogramming of events to occur automatically on some sort of schedule. The specific thing that occurs is an "Action" and must be created in the action editor. The schedule that the action occurs on is defined in the scheduler.

There are six submenus that can be selected from the Scheduler Menu screen.
- ADD A NEW EVENT
- EDIT AN EVENT
- DELETE AN EVENT
- HOLIDAY EDITOR
- IS NOW STOPPED

When setting up an event, follow these general rules:

Step 1: Create your Actions

Step 2: Create your Holidays

Step 3: Create your Event

Holiday Editor

Holiday's are events that occur on a specific day of year as opposed to those events which recur on a weekly schedule. In order for holidays to be used, two things must happen: 1. they must be created, and 2. the holiday must be assigned to a holiday list.

| NOTE | Once a holiday is assigned to a holiday list, that day is "removed" from the normal weekly schedule and added into the holiday schedule. That means that in order for an event to occur on that day, the holiday list MUST be enabled for the event. |

From the holiday editor, there are four submenus:
- ADD NEW HOLIDAY
- EDIT A HOLIDAY
- DELETE A HOLIDAY
- EXIT (DONE)

Add a New Holiday

Holidays can be either selected from a standard list of holidays or by entering the custom holiday editor.

Standard Holiday List

Many common North American Holidays are found on this list:
- New Years Eve

- New Years Day
- Martin Luther King Day
- Abraham Lincoln's B-Day
- President's Day
- George Washington's B-Day
- Mothers Day
- Memorial Day
- Fathers Day
- Independence Day
- Labor Day
- Columbus Day
- Veteran's Day
- Thanksgiving Day
- Christmas Eve
- Christmas Day
- Good Friday
- Easter
- St. Patrick's Day
- Cinco De Mayo - May 5
- Ground Hog day
- Halloween
- Mexico Independence Day
- Thanksgiving Day - Canada

Step 1: Press the Menu Button

Step 2: Press ⬆ until you get to the Scheduler Screen

Step 3: Press Select/Save

Step 4: Press ⬆ until you get to the Holiday Editor Screen

Step 5: Press Select /Save

Step 6: Press ⬆ until you get to the Add New Holiday Screen

Step 7: Press Select/Save

Step 8: Press ⬆ and ⬇ to choose a either the Standard List or Custom Holiday

Step 9: Press Select/Save

```
NEW HOLIDAY FROM
  STANDARD  LIST
```

Step 10: Press ⬆ and ⬇ to scroll through the Standard List. Stop on the holiday you want to choose

Step 11: Press Select/Save

```
02/02/an Edt:001
02/02/an MTWTFSS
```

Step 12: The display will now enter a date and day of the week edit screen for that holiday. These have been preset and it is recommended that they not be changed.

Step 13: Press Select/Save

Step 14: The day of the week portion of the LCD changes to the holiday list assignment entry. The holiday can be assigned to any of the four holiday list numbers. Use the ← and → to select the field

Step 15: Press ↑ and ↓ to select the list number.
If the number is displayed, the holiday is included in that list. If the field is an underline, the holiday is not part of that list. A holiday may be a member of more than one holiday list. You must assign the holiday to at least one holiday number.

Step 16: Once the holiday list assignments are completed as desired, Press Select/Save

Step 17: You will now be able to edit the holiday name. It will be defaulted with the selected holiday name and it can be left as is. If you would prefer to change it, use the ← and → to select the character and use ↑ and ↓ to change the character. You can also type in the new name using the keypad.

```
02/02/an Edt:001
02/02/an MTWTFSS
```

Step 18: Press Select/Save once the name is as desired

.

Custom Holiday List

This menu allows you to create your own custom holidays.

Step 1: Press the Menu Button

Step 2: Press ↑ until you get to the Scheduler Screen

Step 3: Press Select/Save

Step 4: Press ↑ until you get to the Holiday Editor Screen

Step 5: Press Select /Save

Step 6: Press ↑ until you get to the Add New Holiday Screen

Step 7: Press Select/Save

Step 8: Press ⬆ and ⬇ to choose Custom Holiday

```
NEW HOLIDAY FROM
  CUSTOM HOLIDAY
```

Step 9: Press Select/Save

```
01/04/00 New:001
01/04/00 MTWTFSS
```

NOTE From the custom holiday editor screen, the date of the holiday can be entered. As can be seen in the image above, there are two date fields. This allows a range of dates to be entered, such as the dates for summer vacation at a school. In addition to the dates, a day of the week field is available for including and excluding days. This is only useful if a date range is entered. A day is included if the initial for the day is upper case, if it is lower case, it is excluded. An example of its usage would be Memorial Day. Memorial Day is defined as the last Monday of the month of May. To set this up, you would select the date range of 5/25 - 5/31, the last full week. Then select only Monday from the day of the week field

Step 10: Press ⬆ and ⬇ to scroll through the month
Step 11: Press . ➡ once to position the cursor in the next field
Step 12: Press ⬆ and ⬇ to scroll through the day
Step 13: Press . ➡ once to position the cursor in the next field
Step 14: Press ⬆ and ⬇ to scroll through the year

NOTE In addition to the standard number ranges, the value "an", short for any, is also included. When a value of "an" is assigned, that portion of the date is not used. For example, if you wanted something special to happen on the 15th of each month, you would enter the dates as "an/15/an".

Step 15: Press . ➡ once to position the cursor in the next field
Step 16: Press ⬆ and ⬇ to scroll through the month
Step 17: Press . ➡ once to position the cursor in the next field
Step 18: Press ⬆ and ⬇ to scroll through the day
Step 19: Press . ➡ once to position the cursor in the next field
Step 20: Press ⬆ and ⬇ to scroll through the year
Step 21: Press . ➡ once to position the cursor in the next field
Step 22: Press ⬆ and ⬇ to scroll through the day of the week.
Step 23: Repeat Steps 21-22 as needed for each day of the week

NOTE   A day is included if the initial for the day is upper case, if it is lower case, it is excluded.

Step 24: Press Select/Save

Step 25: The day of the week portion of the LCD changes to the holiday list assignment entry. The holiday can be assigned to any of the four holiday list numbers. Use the ⬅ and ➡ to select the field

Step 26: Press ⬆ and ⬇ to select the list number.
If the number is displayed, the holiday is included in that list. If the field is an underline, the holiday is not part of that list. A holiday may be a member of more than one holiday list. You must assign the holiday to at least one holiday number.

```
02/02/an Edt:001
02/02/an HD:1-3-
```

Step 27: Press Select/Save, once the holiday list assignments are completed as desired

Step 28: You will now be able to edit the holiday name. If you would prefer to change it, use the ⬅ and ➡ to select the character and use ⬆ and ⬇ to change the character. You can also type in the new name using the keypad.

```
02/02/an New:001
HOLIDAY      1
```

Step 29: Press Select/Save once the name is as desired

Edit a Holiday

This menu allows you to make changes to holidays that you have already assigned to the system.

Step 1: Press the Menu Button

Step 2: Press ⬆ until you get to the Scheduler Screen

Step 3: Press Select/Save

Step 4: Press ⬆ until you get to the Holiday Editor Screen

Step 5: Press Select /Save

Step 6: Press ⬆ until you get to the Edit A Holiday Screen

```
   HOLIDAY EDITOR
   EDIT A HOLIDAY
```

Step 7: Press Select/Save

Step 8: Press ⬆ and ⬇ to choose the Holiday you wish to Edit

Step 9: Press Select/Save

Step 10: Edit the Holiday using the same instructions that you used to create the Holiday

Step 11: When you are complete with the editing, Press Select/Save
The menu will be returned to the point where another Holiday can be added, edited, or deleted if desired.

Delete a Holiday

This menu allows you to Delete holidays that you have already assigned to the system.

Step 1: Press the Menu Button

Step 2: Press ⬆ until you get to the Scheduler Screen

Step 3: Press Select/Save

Step 4: Press ⬆ until you get to the Holiday Editor Screen

Step 5: Press Select /Save

Step 6: Press ⬆ until you get to the Delete A Holiday Screen

```
   HOLIDAY EDITOR
   DELETE A HOLIDAY
```

Step 7: Press Select/Save

```
an/an/an   DEL:001
HOLIDAY      5
```

Step 8: Press ⬆ and ⬇ to choose the Holiday you wish to Delete

Step 9: Press Select/Save

Step 10: Press ⬆ or ⬇ to toggle between Y or N

```
an/an/an  DEL:001
DELETE Y/N? N
```

Step 11: Press Select/Save
The menu will be returned to the point where another Holiday can be added, edited, or deleted if desired.

To exit the Holiday Editor
Step 12: Press ⬆ until you get to the DONE Screen
Step 13: Press Select/Save

Activate or Deactivate the Scheduler:

Step 1: Press the Menu Button
Step 2: Press ⬆ until you get to the Scheduler Screen
Step 3: Press Select/Save
Step 4: Press ⬆ until you get to the Is Now "_____" Menu

```
SCHEDULER MENU
IS NOW ACTIVE
```

Step 5: Press Select /Save
Step 6: Press ⬆ to toggle between Active and Stopped
Step 7: Press Select/Save

Event Editor

Creating an event is the process of "scheduling" or assigning one or more times to an action. As such, in order to be successful with the Event Editor, you must first have added actions.

Add a New Event

The first step in adding a new event is to input the time that event is to occur. There are three different ways that the time can be entered; as an absolute time, as an offset from sunrise (SR) or as an offset from sunset (SS).

Step 1: Press the Menu Button

Step 2: Press ⬆ until you get to the Scheduler Screen

Step 3: Press Select/Save

**Step 4:** Press ⬆ until you get to the Add A New Event Screen

Step 5: Press Select /Save
The following screen will appear. Note that the E# will be the next unused Event number.

```
Add Event  E:002
12:00am
```

Step 6: Use the keypad to key in the desired Event time.

Step 7: Press ⬆ or ⬇ to set the am, pm, +SR, -SR, +SS and -SS
When you choose an offset from Sunrise or Sunset, the time you enter in the Hour:Minute field becomes the time of the offset.

Step 8: Press Select/Save

Step 9: Use the ⬅ and ➡ to select the day of the week and use ⬆ and ⬇ to toggle the day On or Off. An upper case letter indicates that the day of the week is included, a lower case letter indicates that the day is excluded.

Step 10: Once you have selected the days of the week, you can assign one of the 4 Holiday lists to the event. Use the ➡ to move the cursor to the

Holiday list. Use ⬆ and ⬇ to toggle the Holiday List on or off. Use the ➡ to move to the next field.

> **NOTE** If your system is controlling a building that is evacuated on holidays, like an office building, and the event you are scheduling is for interior lighting then generally you would not include holiday list(s) in an event. The converse is also true. If your building is usually occupied on holidays, you <u>must</u> include the holiday list in the event. Remember that once a holiday is put into a holiday list, that day is "removed" from the general calendar and events will only be triggered on that day if the holiday list is included with the event.

Step 11: Once you are complete with the Holiday Lists, Press Select/Save

Step 12: Press the ⬆ and ⬇ to select the Action you want to associate with the Event. If you forgot to add an Action, you can select the New Action List, to add additional Actions

Step 13: Press Select/Save

Step 14: Press the ⬆ and ⬇ to toggle between Yes or No for if the event is to be a Single event

> *If single event is set to YES, the event will happen the next time the event is scheduled for and will be automatically disabled so it only occurs once. If single event is set to NO, the event will happen every time the scheduled time is met*

```
12:00am  New:004
Single Event=NO
```

Step 15: Press Select/Save

Step 16: Press the ⬆ and ⬇ to set the number of Sweeps, if any, that you want to occur with this event.

```
E:001  Act   20
Sweep Count=000
```

Step 17: Press Select/Save

> *The Menu will bring you back to a point where more Events can be edited. Press Cancel to take you back to the Main Menu.*

Edit an Event

Once an Event has been added, it can be edited.

Step 1: Press the Menu Button

Step 2: Press ⬆ until you get to the Scheduler Screen

Step 3: Press Select/Save

Step 4: Press ↑ until you get to the Edit An Event Screen

Step 5: Press Select /Save

Step 6: Press the ↑ and ↓ to choose the Event you want to Edit

> **NOTE** The left & right arrows keys can be used to change the sort method, either by event ID # or by even time.

Step 7: Press Select/Save

Step 8: Use the keypad to key in the the new Event time.

Step 9: Press ↑ or ↓ to set the am, pm, +SR, -SR, +SS and -SS if a change is desired

Step 10: Press Select/Save

Step 11: Use the ← and → to select the day of the week and use ↑ and ↓ to toggle the day On or Off. An upper case letter indicates that the day of the week is included, a lower case letter indicated that the day is excluded.

Step 12: Press Select/Save

Step 13: Use the ← and → to select the character you want to change and use the ↑ and ↓ to change the character or use the keypad to type in the characters directly.

Step 14: Press the ↑ and ↓ to select the Action you want to associate with the Event. If you forgot to add an Action, you can select the New Action List, to add additional Actions

Step 15: Press Select/Save

Step 16: When you are done with adding and editing items, use the ↑ to choose the Exit (Done) Screen.

Step 17: Press Select/Save

Step 18: Press the ↑ and ↓ to toggle between Yes or No for if the event is to be a Single event

> *If single event is set to YES, the event will happen the next time the event is scheduled for and will not happen again. If single event is set to NO, the event will happen every time the scheduled time is met*

```
12:00am  New:004
Single Event=NO
```

Step 19: Press Select/Save

Step 20: Press the ↑ and ↓ to toggle between Yes or No to Enable or Disable the event

Step 21: Press Select/Save

Step 22: Press the ↑ and ↓ to set the number of Sweeps, if any, that you want to occur with this event.

Step 23: Press Select/Save

> *The Menu will bring you back to a point where more Events can be edited. Press Cancel to take you back to the Main Menu.*

Delete an Event

Once an Event has been added, it can be Deleted.

Step 1: Press the Menu Button

Step 2: Press ⬆ until you get to the Scheduler Screen

Step 3: Press Select/Save

Step 4: Press ⬆ until you get to the Delete An Event Screen

Step 5: Press Select /Save

Step 6: Press ⬆ and ⬇ to choose the event you wish to Delete

> **NOTE** The left & right arrows keys can be used to change the sort method, either by event ID # or by even time.

Step 7: Press Select/Save

Step 8: Press ⬆ or ⬇ to toggle between Y or N

Step 9: Press Select/Save

The menu will be returned to the point where another Holiday can be added, edited, or deleted if desired.

Updating Firmware

On occasion, it may be necessary to update the Z-MAX's operating system. This can be accomplished via a PC running a terminal program connected to the controller board inside the cabinet via USB.

USB Port
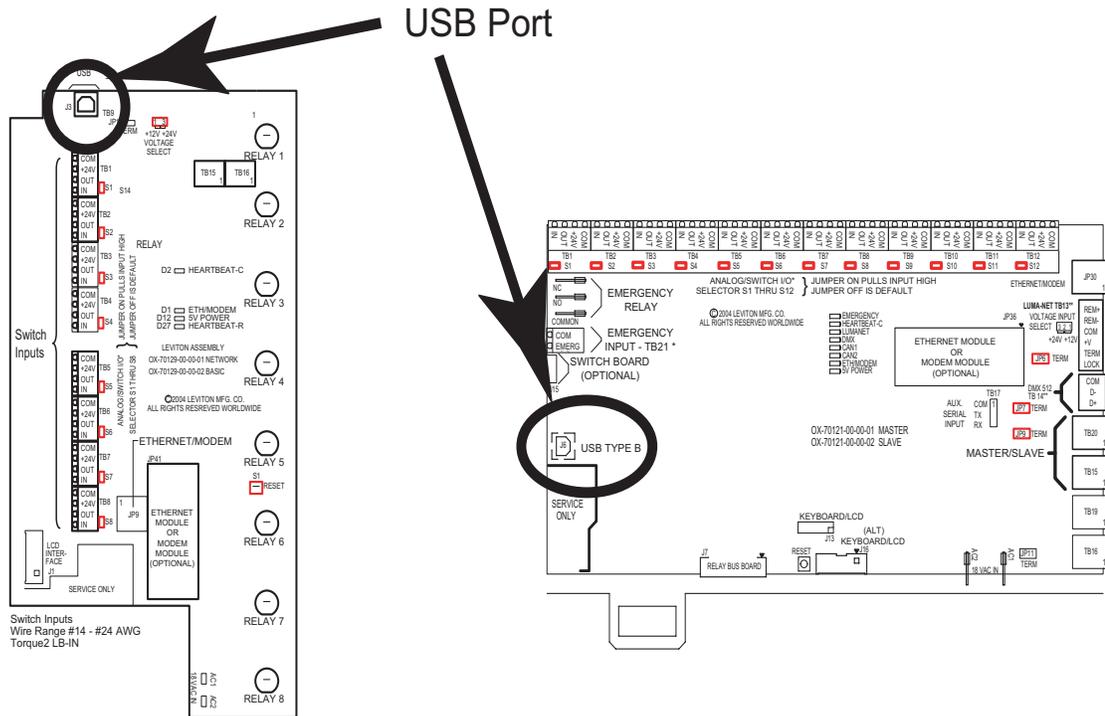
8 Basic and Network Cabinets   24 and 48 Master Cabinets

NOTE   New operating system files can be found on Leviton's web site under product Information and then Lighting Controls

NOTE   A USB driver for the Z-MAX cabinet can be found on Leviton's web site.

Any terminal program, such as Window's Hyper Terminal, should work, however we recommend a freeware program called Tera Term, http://hp.vector.co.jp/authors/VA002416/teraterm.html, because of its superior efficiency.

NOTE   The Tera Term install file can also be found on Leviton's web site.

The terminal programs settings are as follows:

- COM Port - set to port number of the USB port.
- Baud Rate - 115200
- Data - 8 Bit
- Parity - None
- Stop Bits - 1
- Flow Control - Hardware

Step 1: To set up Tera Term, first start the program. You will be asked to select a connection type. Select Serial along with the COM port assigned to USB port and click OK.
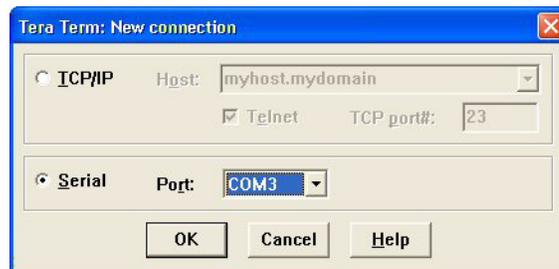
Step 2: To setup the serial port, select the Setup item from the menu bar and click on Serial Port.
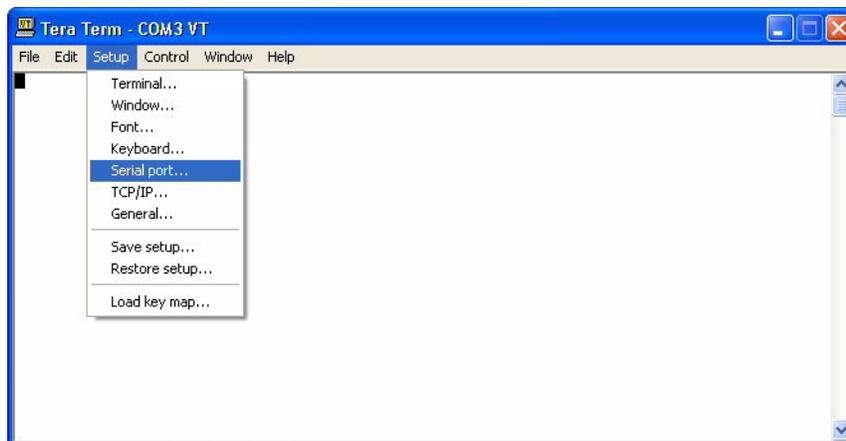
Step 3: Enter in the parameters listed above.
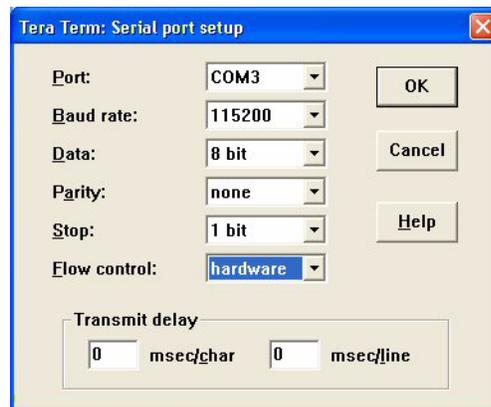
Once you have the terminal program configured you should be able to communicate to the Z-MAX cabinet.

Step 4: Tap Enter on the PC's keyboard and you should see a prompt appear on the terminal program's text window.

Since you will be replacing the operating system of the control board, you must jump out of the main operating system that is managing the communications and into a boot section of code that will perform the file transfer.

Step 5: To enter the boot system, type EXIT followed by Enter at the prompt.

```
Tera Term - COM3 VT
File  Edit  Setup  Control  Window  Help

Z-MAX [USB]: EXIT█
```
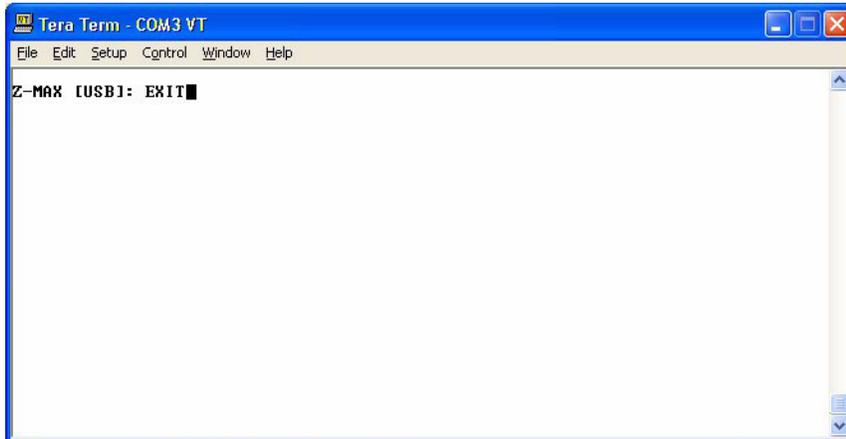
You will be prompted to confirm that you wish enter the boot mode. You will have 5 seconds to type "b" or "B" to proceed, otherwise the system will return to main application.

```
Tera Term - COM3 VT
File  Edit  Setup  Control  Window  Help

** Leviton Z-MAX Boot CLIF V1.00**

  Press 'B' or 'b' to enter boot loader.  1█
   Or, press any other key to go to main application.
```

The prompt will now be "Boot" instead of "Z-MAX".

```
Tera Term - COM3 VT
File  Edit  Setup  Control  Window  Help

** Leviton Z-MAX Boot CLIF V0.06**


Boot [USB]:
```
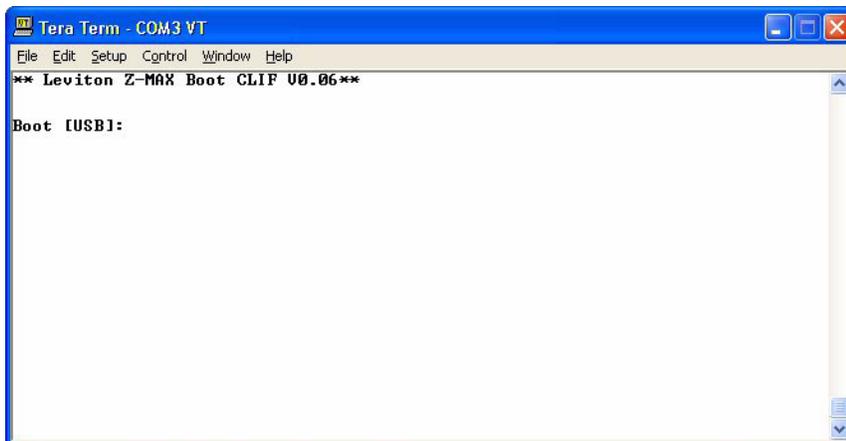
Only a few commands are necessary to load the operating system. To see all commands available, type HELP.

| NOTE | Many of the commands listed are for trained personnel and used improperly could render the Z-MAX cabinet inoperable. Therefore, only use those commands listed below as described. |

Step 6: To transfer the new operating system file, issue the PUT command. In most cases you will only want to upgrade the operating system. In this case, use the "C" parameter following the PUT command.

Step 7: Tap Enter. You will be prompted to begin the transfer from your terminal program.
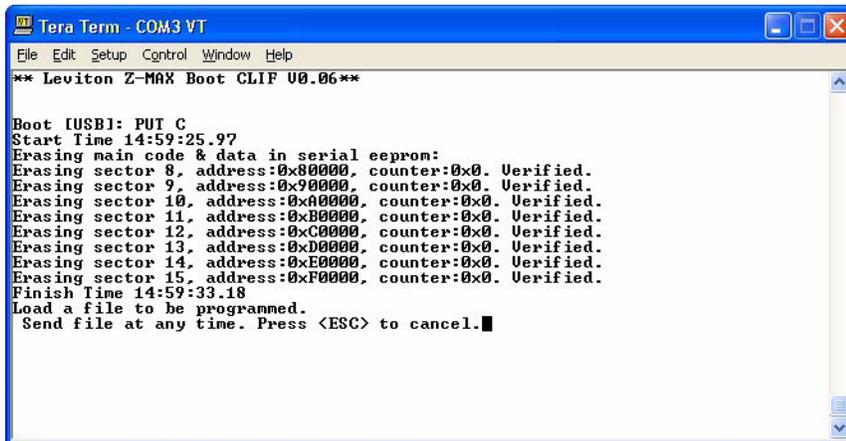
Step 8: To transfer the file using Tera Term, select the "send file..." item from the File menu.

.
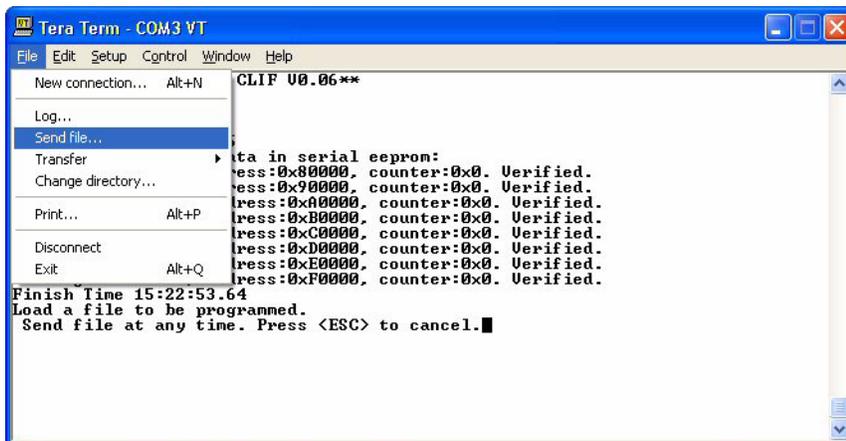
Step 9: Then select the file from the dialog box.
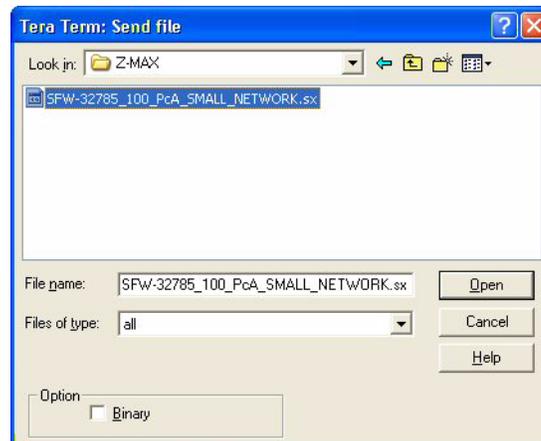
The new operating system will then be transferred.
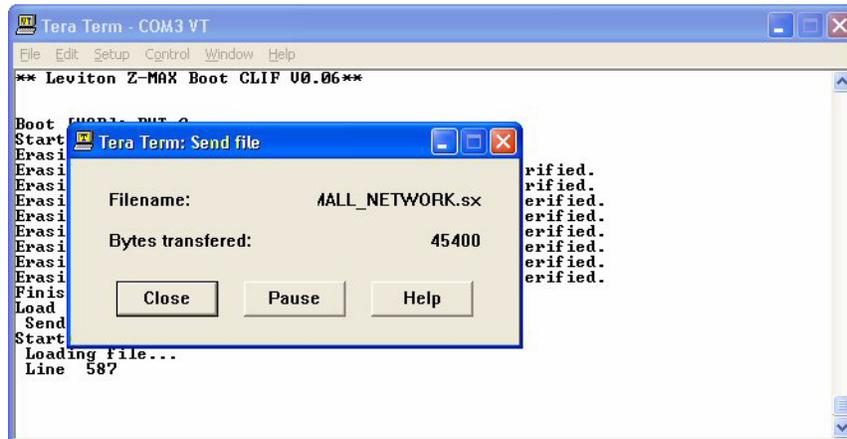
When the transfer is complete, you will again be prompted to select between boot mode or the main application. This time, enter the main application by pressing any key other than "B" or "B", or let the 5 second timer expire.

The new system will then start.

```
Tera Term - COM3 VT

File  Edit  Setup  Control  Window  Help

Please Wait.../
<1>.LCD/KBD Manager Thread Loop Starting....... Slot=003 -
<2>.WatchDog Manager Thread Loop Starting...... Slot=001
Task <03> LCD/KBD Manager...... Registered With 30.0 Second<s> Time Out.
<3>.MemoryManager Thread Loop Starting......... Slot=005
Task <05> Memory Manager....... Registered With 30.0 Second<s> Time Out.\
<4>.MMI Manager Thread Loop Starting........... Slot=004
Task <04> MMI Manager.......... Registered With 30.0 Second<s> Time Out.
<5>.Relay Manager Thread Loop Starting......... Slot=006
Task <06> Relay Manager........ Registered With 30.0 Second<s> Time Out.
<6>.Scheduler Manager Thread Loop Starting..... Slot=007
Task <07> Scheduler Manager.... Registered With 90.0 Second<s> Time Out.
<7>.Network Manager Thread Loop Starting....... Slot=009
Task <09> Network Manager...... Registered With 30.0 Second<s> Time Out.
<8>.Discrete Manager Thread Loop Starting...... Slot=008
Task <08> Discrete Manager..... Registered With 30.0 Second<s> Time Out.!
<9>..Serial Port Manager Thread Loop Starting... Slot=002
Task <02> Serial Port Manager.. Registered With 60.0 Second<s> Time Out.

TUE JUL 20, 2004  04:00:59


Z-MAX [USB]: █
```

To verify the new code in the cabinet:

Step 1: Press the Menu button

Step 2: Press ⬆ until the display reads:

```
MAIN MENU SELECT
  SOFTWARE BUILD
```

Step 3: Press Select/Save
The display will now show you the version of firmware the unit is running.

Part IV - System Design Guide

Welcome to the Systems Design Guide portion of this manual. This guide is intended to orient you to the system requirements and recommendations to achieve complete success of your total system layout. Many important topics are addressed specifically as related to networking systems and their unique requirements.

Power Considerations for Control Systems

The control system should be carefully planned to take these important issues into consideration:

- Power Supply for connected devices
- Wire Size for Power Runs

On systems where full factory drawings have been provided, our Applications Engineering department has already managed these calculations for you so you need only follow the instructions on the system drawings. However, on any installation where factory drawings were not provided, the information contained within this guide must be followed to ensure that all of your devices operate properly and without failures or complete in-operability.

NOTE	This chapter contains information which applies to many Leviton products and is not necessarily limited to the product which is primarily included in this manual. There may be information in this chapter which is not relevant to your particular installation. If you have questions about ANY information contained herein, please immediately contact our Technical Services Department <u>prior</u> to proceeding with installation.

Terminology

Please review these definitions which are used throughout this chapter:

- *Power Supply* or *Supply* - references a device which supplies power to other devices
- *Power Control Device (PCD)* - refers to a device which controls power. Examples of Devices in the Leviton product line which control power are dimming racks, relay panels, A-2000, i-series e, Z-MAX, etc. Generally PCD's also supply a certain amount of power to connected low voltage control devices
- *Control Devices* or *Low Voltage Control Devices* or *Device* - these terms all refer to control devices which connect to a Power Control Device (PCD).   These devices could be simple low voltage switches, Occupancy Sensors, or D8000 control stations
- *Luma-Net* - is one of our network lighting control protocols. Luma-Net is an RS-485- based control protocol used by D8000 & D4200 control devices. Many of our PCD (Power Control Device) products have a direct data connection for a Luma-Net device. All Luma-Net Control Devices require power in one form or another. This power generally accompanies the data wires
- *Unit Load* - (1) Unit load is defined as 25mA, or 0.025A. It is an arbitrary definition by Leviton and was created to simplify power calculations

Power Requirements & Maximum Run Length

Each Control Device used in your system has a different load (draw) and each PCD can support a different total load (supply.) The steps for determining the total load of your network and verifying that the supply is sufficient are simple--or at least logical:

Step 4: Determine the maximum available current of your supply, be it a PCD or other Power Supply. Convert this to the maximum number of Unit Loads if necessary.

Step 5: Sum the required load of each Control Device, expressed in unit loads

Step 6: Verify that the Sum from Step 2 <= the maximum available power from your supply in Step 1.

- If this verification fails, the Sum of required loads is > than the available supply, either use an external power supply or reduce the number of control devices. Or, contact our Technical Services department for help.

> **NOTE**   One Unit Load = 25mA =.025A

| Control Station A Unit Load
X
Quantity of Station A's attached | + | Control Station B Unit Load
X
Quantity of Station B's attached | + | Same formula
for any other attached
control Station | < | Power Supply's
Available Unit Load |

Figure 7: Load Rating Verification Formula

Power Control Devices - Available Supply Current

The Z-MAX cabinets are designed to be able to power external control loads from the internal power supply. See the table below for the available power from each cabinet.

Power Control Device (PCD)	Maximum # of Unit Loads	Supply (VDC)	Power Control Device (PCD)	Maximum # of Unit Loads	Supply (VDC)
a-2000D, 12 Circuit, Standard Power Supply	52	12VDC	Z-MAX 8 Cabinet	20	24 VDC
a-2000D, 18 Circuit, 277V, Standard Power Supply	49	12VDC	Z-MAX 24 Cabinet (Master or Slave)	20	24 VDC
a-2000D, 24 Circuit Standard Power Supply	46	12VDC	Z-MAX 48 Cabinet (Master or Slave)	20	24 VDC
a-2000D, 12 Circuit, Large Power Supply	120	12VDC	Z-MAX Switch Input Board (accessory to Z-MAX 24 & 48 size Cabinets)	20	24 VDC
a-2000D, 18 Circuit, 277V, Large Power Supply	117	12VDC	EZ-MAX	6	24 VDC
a-2000D, 24 Circuit Large Power Supply	114	12VDC	RRP - Z-MAX Remote Relay Panel	6	24 VDC

Power Control Device (PCD)	Maximum # of Unit Loads	Supply (VDC)	Power Control Device (PCD)	Maximum # of Unit Loads	Supply (VDC)
NPC – XP	49	12-24 VDC	i Series e (all Racks)		
NPC – DHV	N/A	N/A			
NPC – DLR	49	12-24 VDC			

Power Supply Maximum Unit Loads

NOTE   The sum of all devices connected to all power output terminals can not exceed the Maximum number of Unit Loads available in the PCD or supply.

Control Devices	Unit Load @12VDC	Unit Load @24VDC	Station Type	Unit Load @ 12VDC	Unit Load @ 24VDC
D4200 LCD	5	2	Z-MAX Digital Switch, 1 Button	N/A	0.6
D4200 Entry (Button),	2	1	Z-MAX Digital Switch, 2 Buttons	N/A	0.8
D4200 Room Combine Station	3	1	Z-AX Digital Switch, 3 Buttons	N/A	1.0
D4200 Remote I/R	2	1	Z-MAX Digital Sw., 4 Buttons	N/A	1.1
Luma-Net Hub	6	3	Z-MAX Digital Switch, 5 Button	N/A	1.3
D8000 LCD	3	2	Z-MAX Digital Switch, 6 Button	N/A	1.0
D8000 Entry (Button)	2	1	Z-MAX Digital Switch, 8 Button	N/A	1.1
D8000 Slider	2	1	Z-MAX Digital Sw., 10 Button	N/A	1.3
D8000 Key switch	1	1	1 Button Low Voltage Switch	N/A	0.6
D8000 I.O Port	2	1	2 Button Low Voltage Switch	N/A	0.9
D8000 Combine/ Closure (Advanced)	11	10	3 Button Low Voltage Switch	N/A	1.2
Infrared Only Occ Sensor	N/A	1.2	4 Button Low Voltage Switch	N/A	1.5
Ultrasonic Only Occ. Sensor	N/A	1.2	5 Button Low Voltage Switch	N/A	1.8
Multi-tech Occ Sensor	N/A	1.2	6 Button Low Voltage Switch	N/A	2.1
Ultrasonic 2-Way Occ. Sensor	N/A	1.4	8 Button Low Voltage Switch	N/A	2.7
Multi-tech 2-Way Occ, Sensor	N/A	1.4	10 Button Low Voltage Switch	N/A	3.3
Photocell, odc0p-00w			Photocell, pcatr-000		
Photocell, pcind-000			-		
Photocell, pcout-000			-		
Photocell, pcsky-000			-		

Control Device Loads

Power Wire - Run Length

The maximum total run length of each segment is a function of the total number of unit loads. A run becomes too long when the voltage drop, due to wire size and run length, increases to a point where the station does not have sufficient voltage to operate. The maximum run length, in feet, based on the total number of unit loads is shown below:

> **NOTE** (2) Tables are provided, (1) @ 12VDC and (1) at 24VDC. Make sure that you use the correct table!

	14 AWG (Feet)	12 AWG (Feet)	10 AWG (Feet)
10 Unit Loads	1905	3000	4800
20 Unit Loads	950	1500	2400
30 Unit Loads	630	1000	1600
40 Unit Loads	475	750	1200
50 Unit Loads	380	600	960
60 Unit Loads	315	500	800
70 Unit Loads	270	425	685
80 Unit Loads	235	375	600
90 Unit Loads	210	330	530
100 Unit Loads	190	300	480
110 Unit Loads	170	270	435
120 Unit Loads	155	250	400

Wire Size vs. Length of Runs - Power Wiring @12 VDC

Wiring with an External Power Supply

When needed, an external class 2 power supply can be used to supply power to Low Voltage devices connected to the low voltage inputs. When this is required, wire the system by following the diagram below.
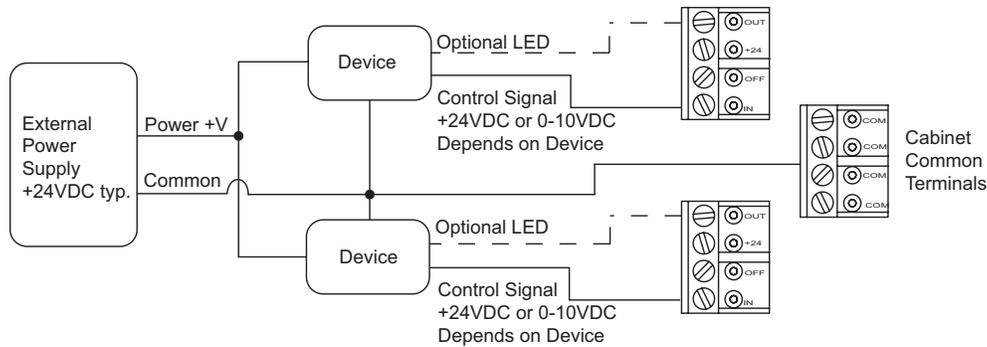
Figure 8: Using an External Power Supply

You must consider the following when using an external power supply:

- Use the external supply for +24V (or other required device) and common to the devices
- Any return from a device which is connected to a switch input must not exceed +24VDC.
- Connect the common from the external supply to the common of any switch input
- Use the device output (Control Signal) to the "IN" terminal of the respective switch input
- Use the "OUT" terminal from the switch input for device feedback, like a low voltage switch LED
- WARNING DO NOT connect the +V of the external supply to any of the +24V terminals of the relay panel. This will nullify the Class 2 rating of the power run.

Special Considerations for Networks

Z-Max products support a variety of different networks which can be used to extend and expand the capabilities of the system. These networks and their primary functions are discussed below. Each network type has both different installation and configuration requirements. The specific configuration and features of each of these different types of networks is covered in the Advanced Configuration Guide. The installation of each of these networks is covered in the later pages of this installation guide. For the specific networking options which are available to your cabinet type, please reference the General Product Capabilities Chart on page 3.

Luma-Net Network (page 153)

Luma-Net is used for communication between Z-Max panels and for control of Z-Max panels by Dimensions D-8000 and D-4200 products. Luma-Net is a proprietary control protocol developed by Leviton.

DMX Network (page 149)

DMX is used for connection to control by devices emitting a DMX signal. Generally, DMX control devices are Entertainment Lighting Consoles or Advanced Architectural Control systems.

Modem Network (page 171)

Extending your panels with a modem allows for control by a touch-tone telephone, control and advanced diagnostics from a terminal program, or remote configuration in concert with our Microsoft Windows based PC Programming package. The modem is an option hardware module that if installed prohibits the simultaneous installation of the Ethernet module.

Ethernet Network Overview (page 175)

Interfaces to a TCP/IP Ethernet network of a 10/100BaseT topology. Specific features vary depending on your hardware combination and installed firmware version. The Ethernet module is an option hardware module that if installed prohibits the simultaneous installation of the modem module.

Master/Remote Network (page 135)

The Z-Max master/remote network allows for the use of remote relay panels controlling loads and accepting input with all of the configuration and programming being performed at the master relay panel.

Master/Slave Network Topology

There are some basic rules and requirements of Master/Slave networks which must be observed for your network to function. These rules are as follows:

Specification	Description
Maximum End to End Run Length	1500 feet
Maximum number of relays per network	252 (Master + Slave)
Maximum number of nodes on the network	250
Network Topology	Daisy-Chain
Interconnection Method	Category 5e or better wire with RJ-45 connectors
Maximum number of master panels per master/slave network	1
Recommended Wire	Belden 1700A or Equivalent
Network Protocol	Z-MAX Master/Slave over CAN

NOTE Any combination/mix of remote relay panels may be used on a single Master/Slave network so long as there is only one master and you do not exceed the maximum number of relays per network.

Network Topology

All Master/Remote panels must be connected in a daisy-chained fashion. For example, please consider the illustrations below:

Category 5 or better wiring between cabinets

48 Relay Master Cabinet

24 Relay Remote Cabinet

4 Relay Remote Cabinet

4 Relay Remote Cabinet

4 Relay Remote Cabinet
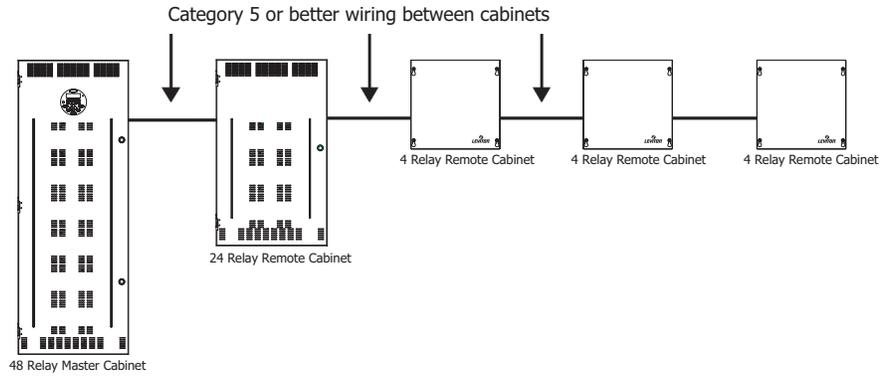
Figure 9: The right way - Daisy-Chain Wiring

Do not wire as shown!!

4 Relay Remote Cabinet

4 Relay Remote Cabinet

48 Relay Master Cabinet

24 Relay Remote Cabinet

4 Relay Remote Cabinet
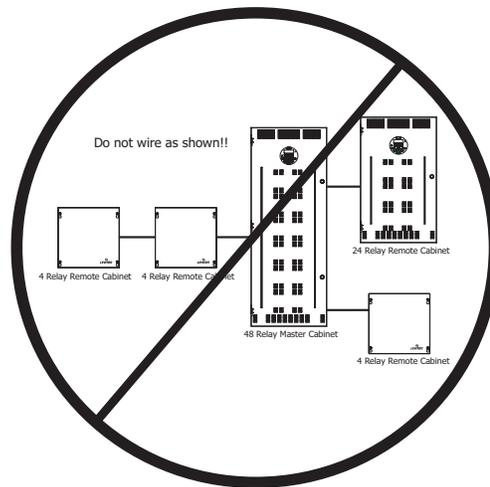
Figure 10: The wrong way - Star or other scheme

Physical Requirements

Master/Slave cabinets are interconnected via category 5 cable with RJ-45 connectors on each end. Termination is also required at each physical end of the Master/Slave network.

RJ-45 Pinout

There are two major standards for the pinout of RJ-45 connectors. These two standards are often referenced as TIA-568A & TIA-568B. Although either is acceptable so long as it is consistent throughout a project, Leviton recommends the use of only the TIA-568B standard. The only difference between the standards is what color wires terminate to each of the (8) RJ-45 pins. Per the TIA-568B standard, the pinout for your RJ-45 connectors are as follows:

TIA-568B Wiring Standard Chart		
Pin	Pair #	Color
1	2	Orange/White
2		Orange
3	3	Blue/white
4	1	Green
5		Green/white
6	3	Blue
7	4	Brown/White
8		Brown

NOTE   Unlike some other wiring systems, Category 5 networking wiring requires that the connectors at both ends of the cable be wired the same.

RJ-45 connectors must be "crimped" onto the end of your Category-5e cable in order to successfully make your connections. This requires a special tool made specifically for this purpose called an "RJ-45 Crimper" or other similar terminology. <u>Always</u> use one of these crimpers when making these connections. Read and understand the instruction by the crimpers manufacturer prior to use. Leviton offers a crimper as Leviton part number 47613-EZC.

Termination

All CAN based networks must be terminated at both ends. The Z-MAX Master/Slave network is no exception.

Each panel has a termination jumper. When a relay panel is the <u>last</u> panel on the run, it's termination jumper must be installed.
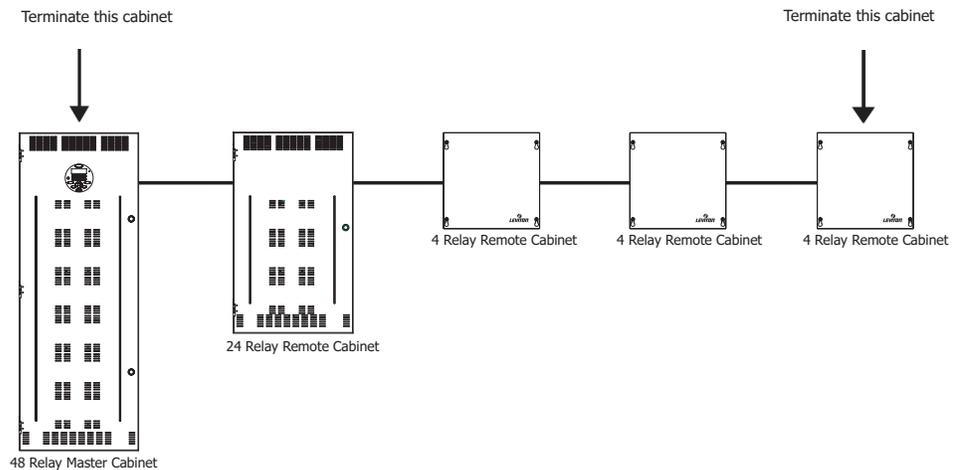
Figure 11: Cabinets requiring termination

How to Terminate Relay Cabinets

Step 1: Locate the termination jumper which corresponds to the Master/Slave communication receptacles on your relay panel

ANALOG/SWITCH INPUT/OUTPUTS TB 1-12*

TB1 S1 TB2 S2 TB3 S3 TB4 S4 TB5 S5 TB6 S6 TB7 S7 TB8 S8 TB9 S9 TB10 S10 TB11 S11 TB12 S12

NC
NO
COMMON

EMERGENCY RELAY

ANALOG/SWITCH I/O*
SELECTOR S1 THRU S12

} JUMPER ON PULLS INPUT HIGH
JUMPER OFF IS DEFAULT

ETHERNET/MODEM

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ALL RIGHTS RESERVED WORLDWIDE

COM
EMERG

EMERGENCY
INPUT - TB21 *

EMERGENCY
HEARTBEAT-C
LUMANET
DMX
CAN1
CAN2
ETH/MODEM
5V POWER

SWITCH BOARD
(OPTIONAL)

J15

Terminator Jumper

JP7 TERM

J6 USB TYPE B

OX-70121-00-00-01 MASTER
OX-70121-00-00-02 SLAVE

JP9 TERM

MASTER/SLAVE

TB20

1

TB15

1

AC2 AC1 JP11 TERM
18 VAC IN

Step 2: Install the jumper. Your cabinet is now terminated.

Network Layout Planning

The previous section illustrated some of the technical requirements and physical layout for Master/Slave networks. When planning your network, it's equally important when considering the numbering of relays.

Relays are divided into two types: local and network. The local relays are the relays inside the master cabinet, and the network relays are the remote or slave cabinet relays. By default, all relay cabinets are configured for 1-48 "local" relays, and all slave cabinets without dipswitches are out of the box programmed to start at relay number 49.

No two relays can have the same relay number and there are a limited number of relay numbers available on a Master/Slave network. In some installations it may make sense to decrease the number of local relays to only the number of actual relays in the master cabinet so that the total number of controlled relays per network can be maximized.

Example 1 - 48 Relay Master, 24 Relay Remotes

A (48) relay master cabinet and a (24) relay slave cabinet is the required equipment for your project. The number of local relays in the master is by default 48 which matches the number of local relays, so you're ok. Also, by default, the (24) relay slave cabinet starts at relay number 49. Considering the facts of this example, everything is OK using the default settings. In summary:

- Master Cabinet with (48) relays, relay numbers 1-48 (default)
- Remote Cabinet with (24) relays, relay numbers 49-72 (default)

Example 2 - 48 Relay Master, (2) 24 Relay Remotes

Extend the above example and add a second (24) relay remote cabinet. Remembering that by default the remote relay cabinets without dipswitches (like the 24) start at relay number 49, and remembering that we already have relay numbers 49-72 used in the first remote cabinet, we can conclude that the added remote cabinet must be configured via USB to start at relay number 73. In summary:

- Existing Master Cabinet with (48) relays, relay numbers 1-48
- Existing Remote Cabinet with (24) relays, relay numbers 49-72
- Added Remote Cabinet with (24) relays, relay numbers 49-96, must be reconfigured via USB since out of box the default setup is addressed to relay numbers 49-72 which would have been in conflict with the existing cabinet.

Example 3 - 8 Relay Master, (2) 24 Relay Remotes, (3) 4 Relay Remotes

In order to execute this example, with (68) total relays, it's required to decrease the number of local relays in the (8) relay master cabinet so that you can stay within the (96) relay maximum per master/slave network, relay numbers are contiguous, and the number of available relays are maximized.

First Let's look at the "out of the box" configuration:

- (8) Master cabinet, (8) relays, but # of local relays is 1-48
- (24) Remote #1, (24) relays, 49-72 (out of box config)

- (24) Remote #2, (24) relays, 49-72 (out of box config)
- (4) Remote #1, (4) relays, starting relay number 0 (out of box config)
- (4) Remote #2, (4) relays, starting relay number 0 (out of box config)
- (4) Remote #3, (4) relays, starting relay number 0 (out of box config)

You will note that there are substantial conflicts with the out of the box configuration.

Therefore, the new configuration will look like this:
- (8) Master cabinet, (8) relays, but # of local relays is 1-8
- (24) Remote #1, (24) relays, relay numbers 9-32
- (24) Remote #2, (24) relays, relay numbers 33-56
- (4) Remote #1, (4) relays, relay numbers 57-60
- (4) Remote #2, (4) relays, relay numbers 61-64
- (4) Remote #3, (4) relays, relay numbers 65-68

In order to achieve this configuration, the following configuration changes must be made:

1. The number of local relays, a setting under Global Defaults on the master cabinet, must be reduced to 8;
2. The two (24) relay cabinets must be configured from a PC over USB as starting relay numbers 9 and 33;(See "Remote Cabinet Configuration" on page 143.)
3. The three (4) relay remotes, must be configured via the control module dipswitch, for starting relay numbers 57, 61, & 65.

For instructions specific to your project, please contact our Technical Services Department. The phone number can be found on the back page of this manual.

Relay Numbering Chart

Leviton recommends that when planning your network, you fill out the chart on the following page, or other similar chart which you prefer to document your system. This completed chart should be stored with your master relay panel complete with the circuit schedules of all of the relay panels.

Relay Numbering Chart

Panel #	Starting Relay #	Ending Relay #	Panel Name	Notes
P1	1			
P2				
P3				
P4				
P5				
P6				
P7				
P8				
P9				
P10				
P11				
P12				
P13				
P14				
P15				
P16				
P17				
P18				
P19				
P20				
P21				
P22				
P23				
P24				

Remote Cabinet Configuration

All of the functional configuration of your relay cabinet is performed at the master control module. However, prior to the master control module being able to address the remote relay cabinets, there are two primary configuration steps which must occur:

- Set the Starting Relay Number
- Set the starting relay & remote input number

Before we get into the specific configuration of the above items, please review the basic rules of Master/Slave networks and network topology on page 135. The rules expressed in that section are critical to the successful operation of your network.

Out of the Box Configuration

The steps required to successfully configure your remote relay panel are as follows:

Step 1: Configure the Slave Cabinets

Step 2: Configure the Master Cabinet for Master/Slave

Step 3: Verify Network Communication

Step 4: Configure relay functionality at the Master

Remote/Slave Cabinet Configuration

The remote relay cabinets must be configured with their starting relay number. On some of the relay cabinets this is performed using a dipswitch on the circuit board inside the cabinet, on other relay cabinets this configuration must be performed from a PC connected via USB.

Comments & Examples on Relay Numbering

Please find a discussion with examples of relay numbering found on page 140. This information may be helpful when configuring your relay panels.

Configuration of Remote Relay Cabinets with Dipswitches

Locate the 8 position dipswitch and set the "MRN" code which corresponds to the starting relay number. The MRN code and corresponding starting relay numbers can be found in the table on the next page. The MRN code equals the sum of all the values "enabled" by the dipswitch.

Table of MRN Codes & Starting Relay Number

MRN Code	Start Relay Number
1	1
2	5
3	9
4	13
5	17
6	21
7	25
8	29
9	33
10	37
11	41
12	45
13	49
14	53
15	57
16	61
17	65
18	69
19	73
20	77
21	81
22	85
23	89
24	93

To Set the MRN Code:

Step 1: Choose the MRN code that corresponds to your starting relay code as shown in the Table of MRN Codes & Starting Relay Number on page 144.

Step 2: Enter the MRN code into the dipswitch by adding the value of each lever in the "On" position. The values of the levers are as follows:

1 = 1
2 = 2
3 = 4
4 = 8
5 = 16
6 = 32
7 = 64
8 = 128
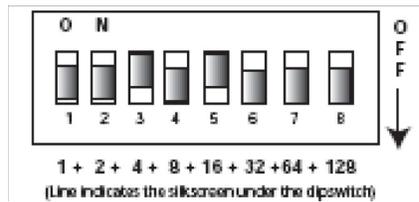
For example, if you wanted to set the starting relay number to 77, you would reference from the starting relay number to MRN code chart that

Starting Relay Number 77 = MRN Code 20

From that you then would deduce that you need Lever 3 & 5 in the on position because 16 + 4 , the values associated with levers 3 & 5 sum to 20, resulting in a starting relay number of 77.

Configuration of Remote Relay Cabinets without Dipswitches or via USB

Remote relay cabinets that do not have dipswitches for setting the starting relay number must be configured via USB. The instructions contained in this part of the manual assume that you already have a successful connection between your PC and your relay cabinet. For instructions connecting your PC to your relay cabinet, please reference the instructions contained at our website, www.leviton.com and in your master control panel user guide. Additionally, for this purpose, your PC requires additional software and drivers which must be downloaded from our website.

Once connected to the relay panel via USB and you have the terminal program open at the Z-MAX prompt, there are several settings which can be set to affect operation of master/slave cabinets. From the terminal prompt, the command 'help' (without quotes) can be used at anytime to list out all commands and their syntax. Note that not all settings are applicable to remote panels.

- MRN Code - sets the MRN code determining the starting relay for this panel. This is usually the only option you're going to need to set for Remote relay panels. A table of MRN codes and their corresponding starting relay number can be found on page 144.

- MRE Code - The setting is only used in Master panel configurations to set the number of external relays. On slave cabinets this should always be set to 0, the default setting

- MRI Code - Set the number of local (or internal) relays to the cabinet. This should be set to the maximum number of relay module positions in the cabinet.

Configuration of Master Control Panel

Enable Master/Slave Communication

Configuration of the master control panel can be performed from the LCD. There are three settings which need to be set on the Master Control panels to enable Master/Slave Communication

- Remote Relay (RMT RLY) Setting, to enable Master/Slave communication
- Number of Local Relays (LOC RELAY) if a setting other than the default of (48) is required
- Set the Remote Node ID of the Master panel to indicate that it is a master (MAS).

Enabling Master/Slave Communication

Step 1: Press the **MENU** button to enter the menu structure

Step 2: Use the arrow keys and the **SELECT/SAVE** key to navigate to Configuration, System Setup, then Global Defaults

Step 3: Using the arrow keys, find the menu below:

```
GLOBAL  DEFAULTS
REMOT  NODEID  OFF
```

Step 4: Press **SELECT/SAVE** until the OFF is blinking, then use the arrow keys to set it to MAS

```
GLOBAL  DEFAULTS
REMOT  NODEID  MAS
```

Step 5: Press **SELECT/SAVE** to save the setting

NOTE
If it is desired to have a Master relay panel operate as a Slave panel, set the RMT RLY to an MRN code from the preceding table which will define both this panel as a Remote panel and set the starting relay number.

Setting the Total number of Remote Relays

The total number of remote relays controlled by this master must be set so that the master cabinet knows how many relays it needs to address. To set this value:

Step 1: Press the **MENU** button to enter the menu structure

Step 2: Use the arrow keys and the **SELECT/SAVE** key to navigate to Configuration, System Setup, then Global Defaults

Step 3: Using the arrow keys, find the menu below:

```
 G L O B A L   D E F A U L T S
 R E M O T   R E L A Y S   O F F
```

Step 4: Press **SELECT/SAVE** until the OFF is blinking, then use the arrow keys or numbers to set it to enter the total number of relays in all remote relay cabinets. If we were only controlling one 24 remote cabinet and one 4 relay remote cabinet, this value would be 28.

```
 G L O B A L   D E F A U L T S
 R E M O T   R E L A Y S   2 8
```

Step 5: Press **SELECT/SAVE** to save the setting

Enabling Remote Discrete Inputs

If you intend to have switches or other inputs (discrete) land at the remote relay panels yet to be configured from the master control panel, you must enable the receipt by the master panel of these messages. To enable remote discrete inputs, please perform the following steps:

NOTE	The use of low voltage control inputs on Remote Relay panels is only available in software release 1.40 and above for both the master and slave cabinets. If you plan to use this feature, please make sure that all cabinets have been upgraded. Additionally, if your cabinet was shipped before 1.40 was released, the firmware may need to be updated. If you suspect this is the case, please contact our technical services department at (800)959-6004.

Step 1: Press the **MENU** button to enter the menu structure

Step 2: Use the arrow keys and the **SELECT/SAVE** key to navigate to Configuration, System Setup, then Global Defaults

Step 3: Using the arrow keys, find the menu below:

```
 G L O B A L   D E F A U L T S
 R M T   D I S C R E T E   O F F
```

Step 4: Press **SELECT/SAVE** until the OFF is blinking, then use the arrow keys or numbers to change it to ON.

```
 G L O B A L   D E F A U L T S
 R M T   D I S C R E T E   O N
```

Step 5: Press **SELECT/SAVE** to save the setting

Communication Verification

Once all setup has been performed, and with the system powered up, verify that the Master & Remote cabinets have successfully "linked" to each other and are in

communication with each other. To perform this validation, open the panels and look at the diagnostic LED's. Depending on the panel type, the location of these LED's may vary. Look for the LED labeled "Master/Slave" or "CAN". The status of this LED could be as follows:

- Blinking - Congratulations, cabinets are communicating successfully
- Off - Communication is not enabled. Check the Remote Node ID setting. (See)
- On Solid - Addressing Conflict or other communication error. Verify configuration of all master and remote panels.

Conclusion

Once power circuits and low voltage inputs have been connected, and communication between the remote panels and their master have been verified, this part of the setup is complete.

The master control panel now has control over all inputs and relays. The relays act as an extension of the master relays and the inputs act as an extension of the master inputs. To complete the functional programming of your system, please reference your Z-MAX User's guide which details the remainder of the required programming.

DMX 512

The digital control panel accepts DMX512 signals, an industry standard signal widely used in the theater and advanced architectural. This protocol offers fast response and guaranteed messaging between the controller and the receiving device(s) allow for a precision not capable with other control protocols. Incorporating DMX direct into your devices adds the opportunity to use theatrical consoles, theatrical station controls, and advanced architectural systems to control some or all of the relays in the Z-MAX relay cabinet.

Topology Requirements

Much like Luma-Net, DMX is wired Daisy Chained from device to device. Figure 7 in the Luma-Net chapter shows a typical daisy-chained network layout.

In the event that daisy chained topology is not realistic or another topology is preferred, multiple home runs of 1 or more devices can be accommodated with the use of a DMX hub. Contact Leviton for additional information if your application has this requirement.

Termination Requirements

Both ends of the control run must be terminated. Nodes not at each end of the run must <u>not</u> be terminated.

Z-MAX Relay cabinets have built in termination jumpers inside the cabinet which can be used to terminate the control run at the cabinet. However, since both ends of the run must be terminated for proper and reliable operation, a termination plug or other device must be installed at the opposite end of the DMX run. in the event that the relay cabinet is located in the middle of the DMX run, the termination jumper should not be installed.

| NOTE | Missing termination, extra termination, or lack of termination can cause sporadic or even non-existent data communication. Carefully plan out where termination must occur and executed. |
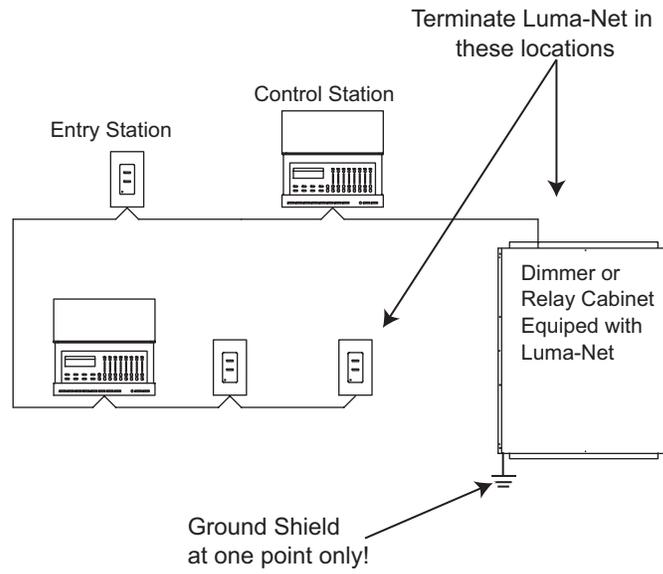
Figure 6: Luma-Net Termination Jumper Locations

Physical Specifications

Specification	Description
Maximum End to End Run Length	3,285 feet
Maximum number of controlled channels per subnet	512
Maximum number of nodes per subnet on the network	32
Network Topology	Daisy-Chain
Interconnection Method	Terminal or XLR (usually 5 pin)
Wiring Specifics	(2) Twisted Data Pairs
Recommended Wire	Belden #9729
Alternate Approved Wire	Belden 9829,8102,9841,89729,88102 Alpha 6222C, 6412
Network Protocol	ANSI DMX512/A
Conflicting or Multiple Control Message Mitigation Strategy	N/A only one controller allowed per network
Termination Requirements	Terminate at both ends of control run Data- to common with 100-120ohm resistor

NOTE The cable should not pass near any source of electrical noise such as fluorescent circuits or motor wiring. Avoid close proximity to any AC wiring.   All control/power wiring must be in conduit.

Wire Recommendations

- See the following table for recommended Wire Types
- Use RS485 compatible cable for the communications. It is recommended that a cable with 2 Twisted Pair, 24 AWG, stranded conductors be used. The spare pair is for future uses.
- Capacitance of wire shall be 15 pF/ft. or less
- Nominal Impedance of wire shall be between 100-120 ohms
- Drain/Shields to be tied together, insulated and grounded (on **one point** only)!
- **We strongly recommend the use of either Belden 9829, Belden 9729 or Belden 8102 for the DMX wire runs.**

NOTE The most effective way to insulate the drain/shield wire is to use a piece of heat shrink tubing!

Manufacturer	Catalog Number	# of Pairs
Belden	9729, 9829, 8102	2
Belden	9841	1
Belden	89729, 88102	2 (Plenum Rated)
Alpha	6222C	1
Alpha	6412	1

Figure 7: DMX Recommended Wire

Wiring the DMX Connector

Step 1: Connect leads per the following wiring diagram.

Step 2: Twist strands of each lead tightly (making sure that there are no stray strands) and push firmly into appropriate plug connector location.

Step 3: Tighten the screws on the plug connector—making sure that no bare conductor is showing.

Step 4: Tie the Drain/Shield wires together and insulate using a small piece of heat shrink tubing.

Step 5: Install termination jumpers as required. Termination can be accomplished on the control board by jumpering the 2 pin header to the left of the DMX connector.

Data 2 +/-

DMX IN   DMX OUT

COM   DATA -   Data +
1   2   3
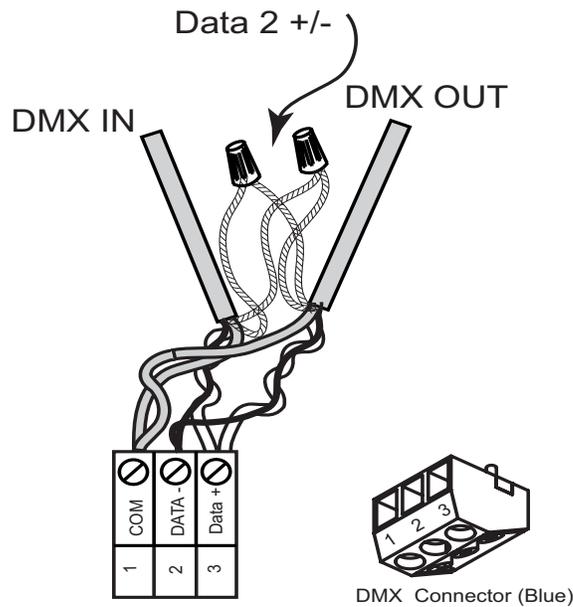
DMX Connector (Blue)

Figure 6: Z-Max DMX connector wiring

Luma-Net III

Luma-Net is Leviton's proprietary digital architectural lighting control protocol. Luma-Net is can be used for the following items:

- Communication and control by Dimensions 8000 control stations and accessories
- Communication and control by Dimensions 4200 control stations and accessories
- Intercommunication between Z-Max relay cabinets
    - Relay Group Control & Response
    - Time Synchronization
    - Advanced network communication

Topology Requirements

Luma-Net is wired Daisy Chained, station to station. See the following figure for the correct ways to wire this system.
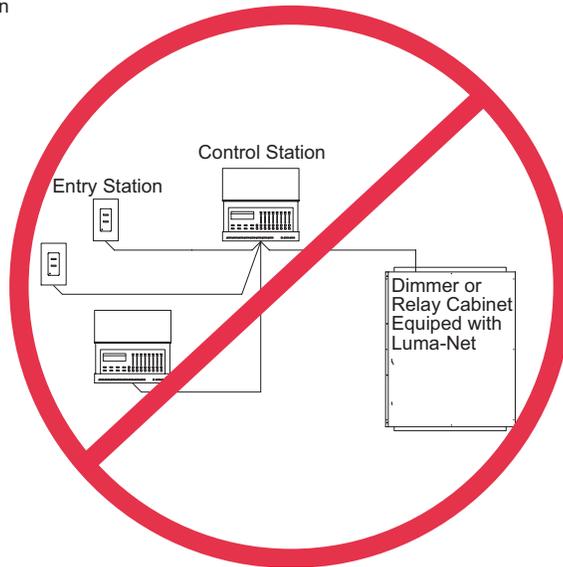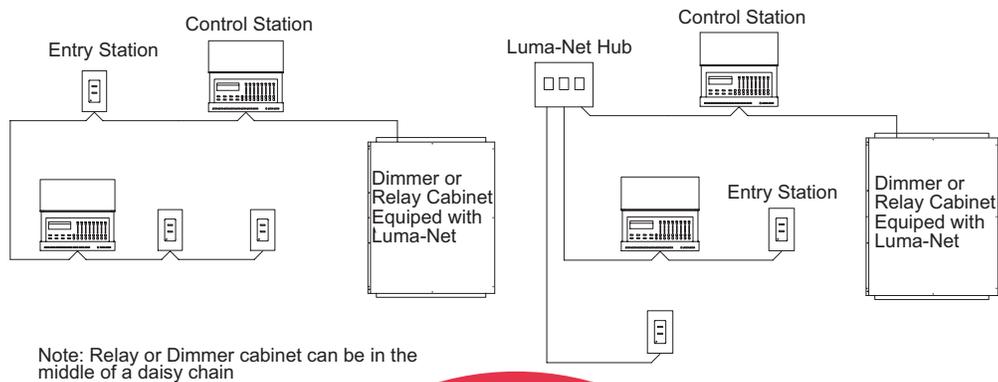
Figure 7: The Right and Wrong Way to Run Luma-Net

In the event that daisy chained wiring is not realistic or another topology is preferred, multiple home runs of 1 or more devices can be accommodated with the use of an 8-port Luma-Net Hub, Leviton part number LHUB8-000.

Termination Requirements

Both ends of the control run must be terminated. Nodes not at each end of the run must <u>not</u> be terminated (see figure 9.)

For most Luma-Net devices, termination can be achieved by connecting a short pieces of wires between the "TERM" and "REM-" terminals (see figure 8.) On other devices, like relay and dimmer cabinets, termination can be achieved by installing the termination jumper located adjacent to the Luma-Net connector inside the relay cabinet or other device. (see figure 10.)

> **NOTE** Missing termination, extra termination, or lack of termination can cause sporadic or even non-existent data communication. Carefully plan out where termination must occur and executed.
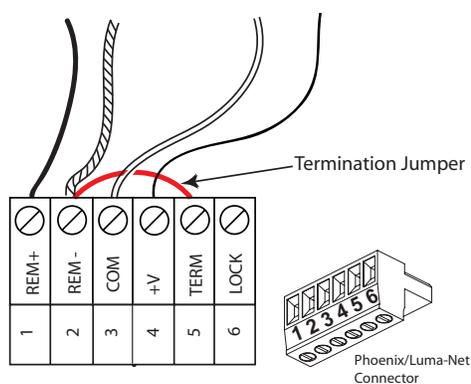
Figure 8: Luma-Net Node Termination Jumper

Terminate Luma-Net in these locations

Control Station

Entry Station

Dimmer or Relay Cabinet Equiped with Luma-Net

Ground Shield at one point only!
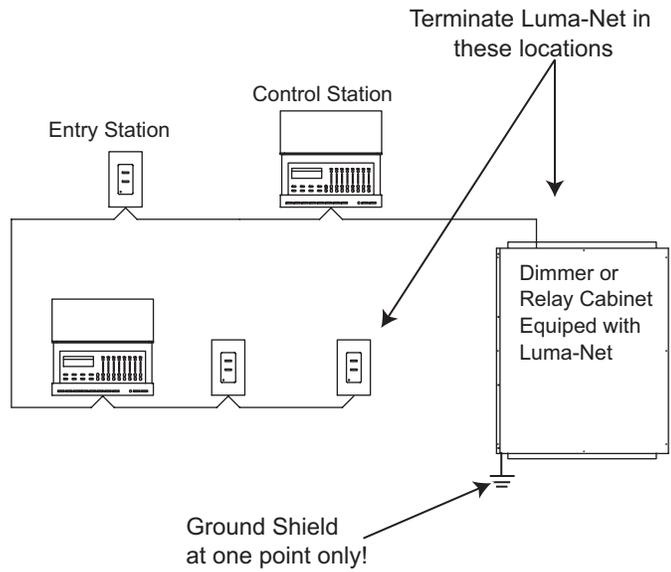
Figure 9: Luma-Net Termination Jumper Locations

Graphic shows a typical layout. Specific jumper designations and layout on your product will vary.

Termination Jumper Location (actual location in your cabinet may vary)

JP30

LUMA-NET TB13**
VOLTAGE INPUT SELECT

JP36

+24V +12V

JP6 TERM

REM+
REM-
COM
+V
TERM
LOCK

COM
D-
D+

DMX 512
TB 14**
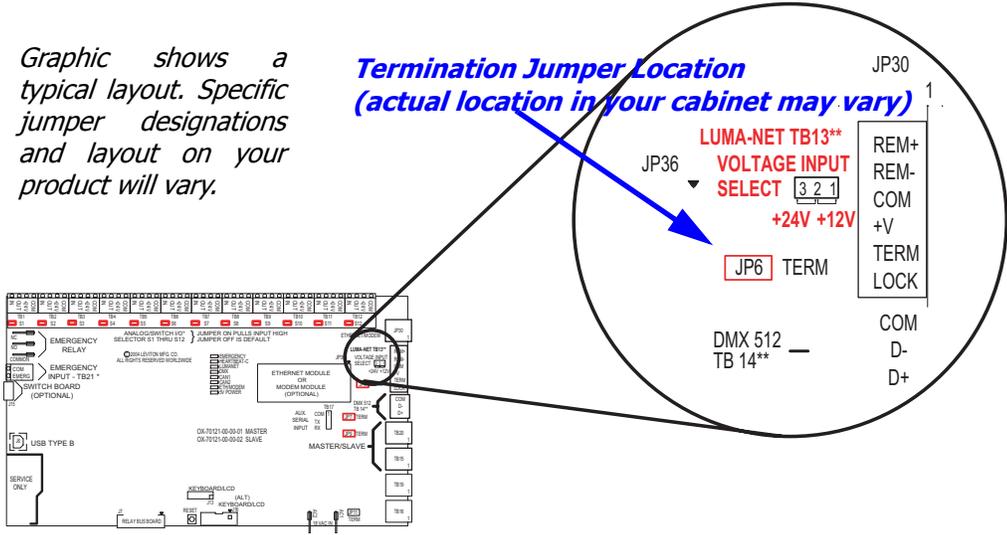
Figure 10: Typical termination jumper location (Large cabinets shown, other cabinets similar)

NOTE

The common (DCC) must be connected to earth ground at only one point in the run. The relay cabinet or a Luma-Net Hub (if used) are the most common locations.

Physical Specifications

Specification	Description
Maximum End to End Run Length	2,000 feet
Maximum number of controlled channels per subnet	2,048
Maximum number of nodes per subnet on the network	255
Network Topology	Daisy-Chain
Interconnection Method	Terminal
Wiring Specifics	(1) Twisted Data Pair plus a common required for digital communication signal Node power requires additional power wiring
Supported Voltage	+12-24Vdc
Minimum voltages for node functionality	varies depending on node type, usually +10Vdc
Recommended Wire (includes data and power pair)	Belden 1502R Belden 1502P (Plenum)
Alternate Approved Wire	Belden 9729,9829,8102,9841, 89729,88102 Alpha 6222C, 6412
Network Protocol	Leviton Luma-Net on RS-485
Conflicting or Multiple Control Message Mitigation Strategy	Last Action Takes Precedence
Termination Requirements	Terminate at both ends of control run Data- to common with 100-120ohm resistor

NOTE Leviton stipulates that all control and power wiring must be in conduit. Additionally and as is common with all digital control signals, the cable should not pass near any source of electrical noise such as fluorescent circuits or motor wiring. Avoid close proximity to any AC wiring.

Wire Recommendations

- Use Belden #1502R or 1502P
- See the table for alternate approved Wire Types
- Use RS485 compatible cable for the communications. It is recommended that a cable with 2 Twisted Pair, 24 AWG, stranded conductors be used. The spare pair is for future uses.
- Capacitance of wire shall be 15 pF/ft. or less
- Nominal Impedance of wire shall be between 100-120 ohms
- Drain/Shields to be tied together, insulated and grounded (on **one point** only)!
- If an alternate approved wire type, like Belden 9829, is used, a second pair (#14 AWG stranded or larger) is required for the power.

| NOTE | The most effective way to insulate the drain/shield wire is to use a piece of heat shrink tubing! |

.

Manufacturer	Catalog Number	# of Pairs
Belden	1502R 1502P (Plenum Rated)	(1) Data Pair (1) 18Awg Power Pair
Belden	9729, 9829, 8102	2
Belden	9841	1
Belden	89729, 88102	2 (Plenum Rated)
Alpha	6222C	1
Alpha	6412	1

Figure 11: Luma-Net Recommended Wire

Wire/Color	No. Pair	Pin/Terminal	Pin/Function
Belden 1502R/1502P			
Blue White	1 (Data)	1 2	REM+ REM-
Drains/Shields		N/C - Not Connected	
Red Black	1 (Power)	3 4	+12V COM
Belden 9729			
Red Black	1	1 2	REM+ REM-
Red White	2	N/C - Not Connected N/C - Not Connected	N/C - Not Connected N/C - Not Connected
Drains/Shields		N/C - Not Connected	
Belden 9829 or 8102			
Blue with white stripe White with blue stripe	1	1 2	REM+ REM-
Orange with white stripe White with orange stripe	2	N/C - Not Connected N/C - Not Connected	N/C - Not Connected N/C - Not Connected
Drain/Shield		N/C - Not Connected	

Figure 12: Color Coding for Belden Wire

Drain, connect to ground at one end only

Blue Wire (Rem +)
White Wire (Rem -)
Black Wire (Common)
Red Wire (+24Vdc)
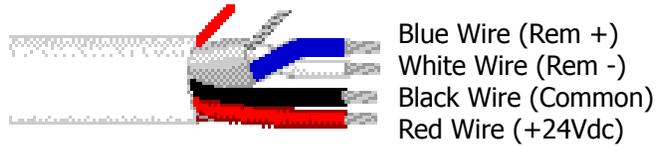
Figure 13: Belden Wire Callouts (#1502R,#1502P)

Drain/Shield

Braid

Foil

Foil

Black
Red
Black
White

Blue w/ White Stripe
White w/ Blue Stripe
Orange w/ White Stripe
White w/ Orange Stripe

Belden 9729

Belden 9829

Drain/Shield

Drain/Shield
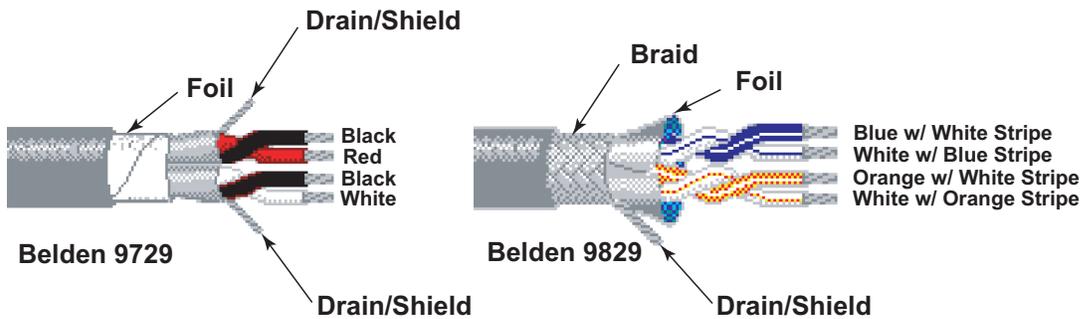
Figure 14: Belden Wire Callouts (#9729, #9829)

NOTE   If a remote DC power supply is used and you have multiple Luma-Net runs, all DC common wires must be joined at the power supply.

A small number of Luma-Net panels can be powered by the Z-MAX panel. Be sure the voltage select jumper on the control board jumpers the pins for +24V
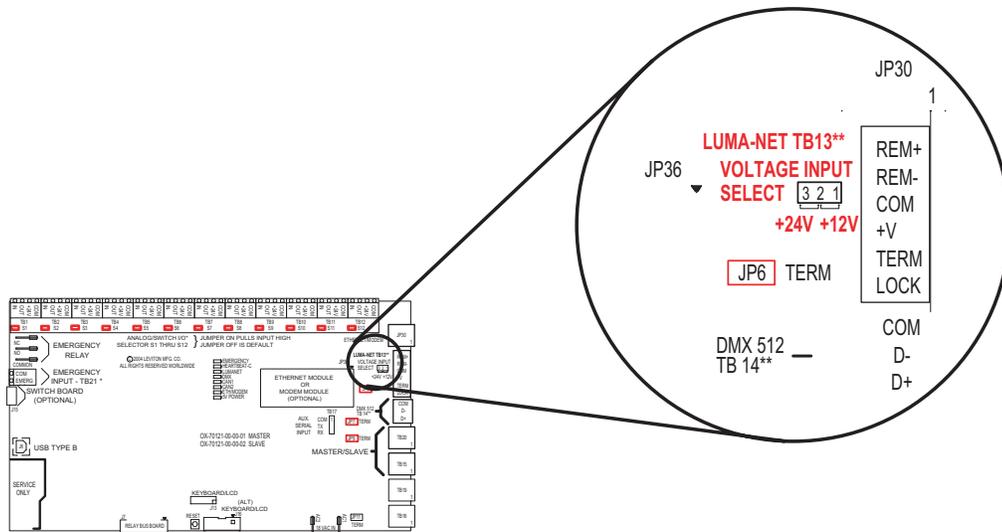
Connection Methods

Wiring the Phoenix Connector

Step 1: Connect leads per the following wiring diagram

Step 2: Twist strands of each lead tightly (making sure that there are no stray strands) and push firmly into appropriate plug connector location.

Step 3: Tighten the screws on the plug connector—making sure that no bare conductor is showing.

Step 4: Tie the Drain/Shield wires together and insulate using a small piece of heat shrink tubing.

Drain/Shield - Insulated and tied together (Ground at one point only- probably an end)

2#12AWG
Black (Common)

Up to 1 #12AWG

Up to 1 #12AWG

2#12AWG
Red (+V)

REM+	REM -	COM	+V	TERM	LOCK
1	2	3	4	5	6

1 2 3 4 5 6

Phoenix/Luma-Net Connector
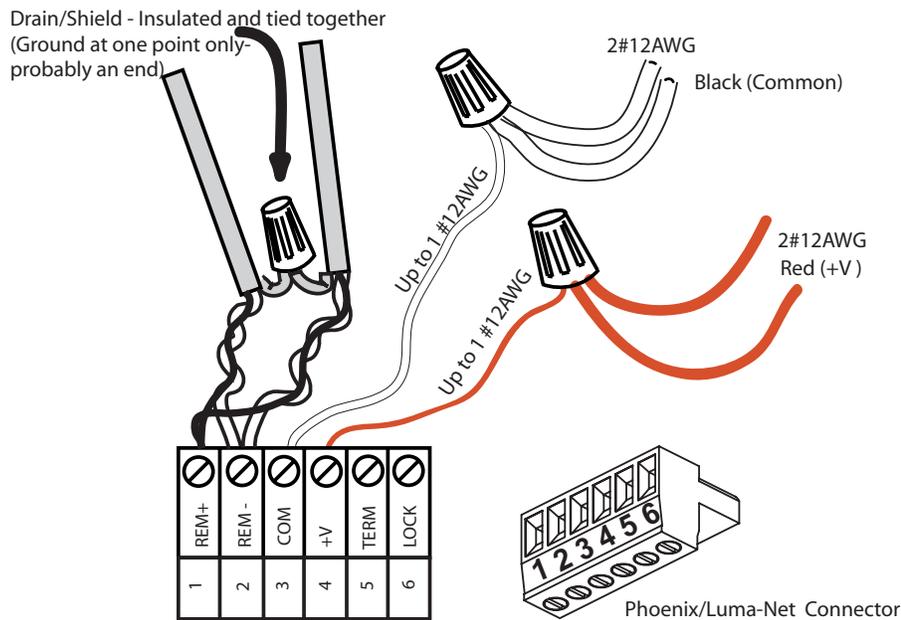
Step 5: Install termination jumpers as required. Termination jumpers are required at the two ends of the Luma-Net run. The termination can be accomplished on the Luma-Net connector with a jumper wire as shown below. Termination can also be accomplished on the control board by jumpering the 2 pin header to the left of the Luma-Net connector.

Testing the Wiring

To assure problem-free start-up, it is important to check the system wiring, prior to hooking up any control stations, for proper connections, shorts and opens.

The following procedure is recommended:

Step 1: Test the following wire pairs for shorts at each station location, using an ohmmeter or other continuity tester.

1-2 Open
2-3 Open
3-4 Open

Step 2: Repair any short circuits before continuing.

Step 3: Install wire jumpers, one pair at a time (not supplied) to the Luma-Net Connector on either end of the cable run between pins 1-2, then 2-3, then 3-4

Step 4: Retest each the following wire pairs at each connector:
> *1-2 Short*
> *2-3 Open*
> *3-4 Short*

Step 5: Make any necessary repairs and remove wire jumpers before continuing.

Low Voltage Control Wiring

NOTE The use of low voltage control inputs on Remote Relay panels is only available in software release 1.40 and above for both the master and slave cabinets. If you plan to use this feature, please make sure that all cabinets have been upgraded. Additionally, if your cabinet was shipped before 1.40 was released, the firmware may need to be updated. If you suspect this is the case, please contact our technical services department at (800)959-6004.

Once the power wiring has been completed, control wiring can be addressed. Control wiring can be divided into two categories: analog and digital. When dealing with remote relay panels, only the analog control inputs can be used.

Control Overview

The Leviton Z-MAX relay products use an intelligent central control card (Digital Main Control Module) and a dedicated system of networking wiring, allowing for control of the relays in the remote cabinet from any control source connected to the master relay cabinet and from any low voltage source connected to the remote relay cabinet.

Control input to a relay cabinet can be any combination of the following:
- Low Voltage momentary or maintained through a discreet input
- Momentary 2-Pole On/Off through a discreet input
- Photocell 0-10VDC or Switched through a discreet input
- Occupancy sensor through a discreet input
- 0-10VDC analog through a discreet input
- Dry Contacts through a discreet input
- Various Network control inputs (covered in the next section, "XXXXXX")

Please reference the chart on page page 3 which shows the quantity and types of inputs available for each cabinet. Excepting only network inputs, all inputs support every type as shown above. However, EZ-Max cabinets have an additional (2) inputs, one dedicated to Photocell and one dedicated to Occupancy Sensors.

Remote relay cabinets can accept control inputs which are directly passed to and processed by the master control panel. To the master, a remote input is treated identical to a local input, it's just coming across the network.

The specific wiring requirements for each input type is discussed on the following pages.

Each product (and in some cases each model of a product) has a slightly different layout at the terminals blocks. The specific functions of each terminal is labeled on the circuit board adjacent to the terminal blocks. When wiring the inputs, verify that you are connecting the correct wire to the correct terminal based on function even if it deviates from that shown in this documentation. Contact our technical services department with any undocumented questions.

Control Wiring Termination

This section gives instructions for terminating all types of low voltage inputs.

- Leviton recommends minimum 18AWG stranded wire for all low voltage wiring
- Terminate all control wiring directly to the terminal blocks on the printed circuit board. Use a small 1/8-in. flat screwdriver on these terminals
- Terminal blocks are 2-part terminals and can be removed for ease of termination. When reinstalling them make sure they are plugged in the correct direction for the way they were wired
- On the 4 relay remote panel, models re4sd-*, inputs #5 & #6, labeled photocell and occupancy sensors can not be used
- All control wiring shall be considered Class 2
- Use control wire type and size as specified below:

Connector Type	Wire Size and type	Torque
Switch Inputs	14-24 AWG, Stranded	2 in-lb.

Figure 6: Control Wire Type and Size

Input Trigger - What determines an "ON"

Each of the low voltage inputs can be triggered by either the supply of voltage or a connection to common. When voltage is supplied to an input indicating a change of state, we call this "pulling up the input" or "active high." When a connection to common triggers the input, causes a change of state, we call this "pulling down the input" or "active low."

By default, all inputs are active high (that is receiving voltage to trigger). Active High inputs must not exceed a nominal +24VDC and must be above +9vdc. Active Low inputs must connect to the same common at the same potential as the cabinet.

To change from an active high input to an active low input, three things must occur. First, the polarity jumper must change position. Second, if you intent to use the output terminals, the polarity IC's must be changed. Finally, the switch input must be configured as an "active low" input. The location of the polarity IC's and the location of the polarity jumper is shown in figures 5-7 which follow. Information on input programing is covered in the following sections.

NOTE For ordering information on the polarity IC's and additional recommendations for active low inputs, please contact technical services at (800)959-6004.

Input Power Requirements

The relay cabinet has a finite amount of power which it can supply to connected devices. This topic is discussed in detail starting on page 125 entitled "Power Considerations for Control Systems."   Please make sure that you do not exceed the amount of available peripheral power, or damage to your relay cabinet or connected devices may occur.

General Requirements for Connecting any Device to Low Voltage Inputs

Step 1: Connect leads per wiring diagram as illustrated in the figures on the following pages

Step 2: Twist strands of each lead tightly (make sure that there are no stray strands) and push firmly into appropriate plug connector location.

Step 3: Tighten the screws on the plug connector—make sure that no bare conductor is showing.

Step 4: Plug the connector back onto the control module with the screws facing the front and the wires coming out of the connector toward the top of the cabinet.

Low-Voltage Input Terminals & Connections

The next several drawings show the location of inputs in the various cabinet types.
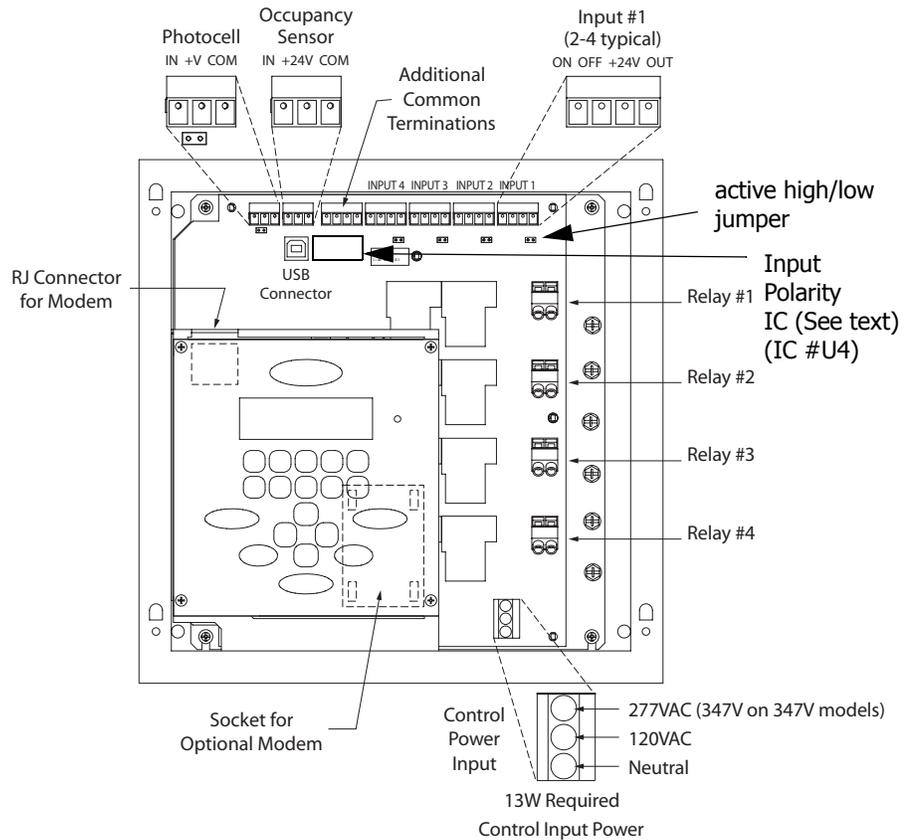
Figure 5: Low Voltage Input Locations, 4 relay remote & EZ-max relay cabinets

Jumper Locations (typical) for changing to +24VDC pull up

USB
LUMA-NET TB9**
DMX 512 TB10*
MASTER/ SLAVE

R+ R- COM +V TRM LCK
J3
TB9
LUMA-NET
COM D- D-D+
TB11 1
TB13 1

EMERGENCY - TB17*
COM.
EMERG.
TB17
JP13 TERM
LUMA-NET
1 3
+12V +24V
LUMA-NET
VOLTAGE
SELECT

RELAY 1

BYPASS SWITCH
COM +24V OUT IN TB1 S1
ON NORMAL OFF
S14

TB15 1   TB16 1

COM +24V OUT IN TB2 S2
COM1 NO1 NC1
EMERGENCY RELAY
JP15 DMX TERM   JP21 CAN 1 TERM   JP35 CAN 2 TERM

RELAY 2

COM +24V OUT IN TB3 S3

D7 EMERGENCY
D2 HEARTBEAT-C
D4 LUMANET
D6 DMX
D3 CAN1
D8 CAN2
D1 ETH/MODEM
D12 5V POWER
D27 HEARTBEAT-R

RELAY 3

COM +24V OUT IN TB4 S4

Switch Inputs

JUMPER ON PULLS INPUT HIGH
JUMPER OFF IS DEFAULT

LEVITON ASSEMBLY
OX-70129-00-00-01 NETWORK
OX-70129-00-00-02 BASIC

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RELAY 4

Input Polarity IC (See text) (IC #U44)

COM +24V OUT IN TB5 S5
ANALOG/SW SELECTOR S1

COM +24V OUT IN TB6 S6

ETHERNET/MODEM

RELAY 5

COM +24V OUT IN TB7 S7
JP41

COM +24V OUT IN TB8 S8
JP9 1
ETHERNET MODULE OR MODEM MODULE (OPTIONAL)

S1 RESET

LCD INTER-FACE J1
SERVICE ONLY

RELAY 6

RELAY 7

Luma-Net Connector
Wire Range #12 - #24 AWG
Torque 5 LB-IN

Switch Inputs and DMX Connector-
Wire Range #14 - #24 AWG
Torque2 LB-IN

18 VAC IN AC1 AC2

RELAY 8

Figure 6: Z-Max 8 Basic & Master Control Module

Jumper Locations (typical) for changing active high/active low

Input
Polarity
ICs (See text)
(IC #U59 & U51)

ANALOG/SWITCH INPUT/OUTPUTS TB 1-12*

TB1 TB2 TB3 TB4 TB5 TB6 TB7 TB8 TB9 TB10 TB11 TB12
S1   S2   S3   S4   S5   S6   S7   S8   S9   S10   S11   S12

ANALOG/SWITCH I/O*   JUMPER ON PULLS INPUT HIGH
SELECTOR S1 THRU S12   JUMPER OFF IS DEFAULT

ETHERNET/MODEM

NC
NO   EMERGENCY
              RELAY
COMMON

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EMERGENCY
HEARTBEAT-C
LUMANET
DMX
CAN1
CAN2
ETH/MODEM
5V POWER

COM   EMERGENCY
EMERG   INPUT - TB21 *

SWITCH BOARD
(OPTIONAL)

J15

JP7 TERM

JP9 TERM

TB20
1

J6   USB TYPE B

OX-70121-00-00-01 MASTER
OX-70121-00-00-02 SLAVE

MASTER/SLAVE

TB15
1

AC2   AC1   JP11
              TERM
18 VAC IN

ALL OFF   NORMAL   ALL ON

Figure 7: Low Voltage Input Locations, 24 & 48 remote relay cabinets

Connecting Low Voltage Switches

Z-MAX relay panels support a variety of low voltage switch types such as:

- Momentary - provides momentary contacts, triggering alternating on/off actions
- Maintained - triggers On action when connection is made, Off action when removed
- Momentary On/Off with On & Off terminals provided - provides momentary connection to the "On" terminal to trigger an on action, momentary connection to the "Off". Used with single pole double throw center off (SPDT-CO) switches
- Momentary On/Off with only "IN" or "ON" terminal - used with momentary on, momentary off, center off switches and must be used in conjunction with either the part number #rac00-2sc or #rac00-2sb switch input kits to convert from a 1 terminal to a 2 terminal input
- Traditional Sentry Switches and WattStopper AS-100 style switches.

Each Input has a multi-position screw terminal with various positions. The terminal can be pulled off its base for ease of wiring. Two possible pinouts are shown.

Please remember to verify the function of each pin as labeled on the product with the device being wired to ensure that it is wired correctly.
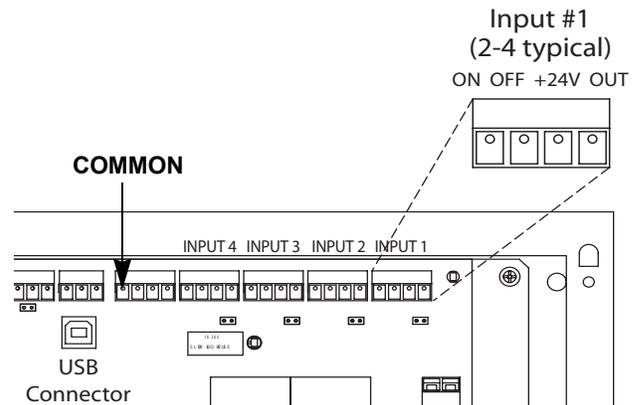
Figure 8: Terminal layout common to 4 relay cabinets (above). Terminal layout common to 24&48 relay cabinets (below)
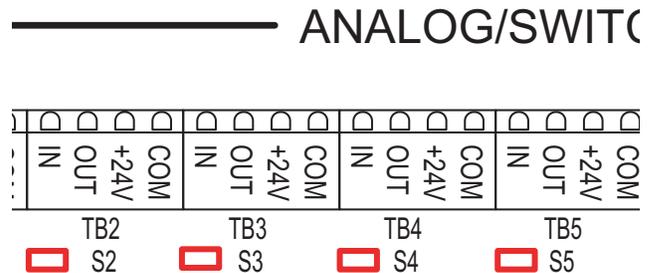
Regardless of the pinout of your particular product, the common designations for terminals are as follows:

Pin Label	Function
+24V	Supplies +24Vdc power to devices, usually unregulated
COM	Connection to DC Common of the cabinet
IN	Switch Input or signal from device. Usually expecting +V to trigger.
OUT	Used for connection to device LED indicating on/off state of that input. Connects to common when on, floats when off. (Max 0.04A)
LED	Used for connection to device LED indicating on/off state of that input. Connects to common when on, "floats" when off. (Max 0.04A)
ON	Usually can be configured identically to the IN terminal but can be configured as Momentary ON input only
OFF	Momentary OFF input only

Figure 9: Discreet input terminal labels and their meaning

By default the "IN" or the "ON" terminal is expecting +V to trigger as would be typical with many styles of low voltage switches. If a connection to common is required, it requires some jumper and software re-configuration. For more information on this topic, please reference the discussion on input triggers found on page 164.

Connecting Low Voltage Switch

Step 10: Strip each wire from your device and tightly twist the wires together

Step 11: Insert the wires from the device into the connector on the relay cabinet in the appropriate location

Step 12: Tighten the terminal screw, and repeat for all wires from the device

Step 13: Plug the terminal block back into the cabinet with the screws facing towards you and the wires exiting towards the side or top of the cabinet. Alternatively, the connector can be inserted with the screws parallel to the circuit board and the wires exiting towards you

Step 14: Verify that the wires land on the correct terminals

Modem Module Installation/Phone Line Connection

Many relay cabinet models have an optional modem which can be installed. The part number for this modem is rac00-mod and generally is ordered separately from the cabinet. When the modem module is installed, the additional functionality is available:

- Touch-Tone Remote Control from a telephone (TIM) - In this mode, you dial in to the relay cabinet from a touch-tone telephone and activate/deactivate relays by using different combinations of button presses on your telephone

- Remote Programing via computer Modem - In remote programming mode, you can dial in to your relay panel from a computer which operates our Z-MAX configuration software. Once connected, the configuration software can be used to configure your cabinet remotely.

Installation of a modem is a two step process,

Step 1: Install the Modem Module

Step 2: Connect the Telephone Line

Modem Module Installation on EZ-Max Panels

NOTE Prior to touching any part of any electronics, make sure that you first touch any grounded metal surfaces so that you can discharge any build up of static electricity.

Step 1: Loosen approximately 2 turns the right two screws of the keypad/control module

Step 2: Remove the left two screws of the keypad/control module

Step 3: Carefully lift up and turn around the control module, exposing the modem socket.

Step 4: Remove the modem module from it's packaging, and install into the modem socket by aligning the gold dot with the location shown in the illustrations, aligning the pins into the socket, and then gently but firmly pressing the modem into place. Reference the drawing below which shows the correct orientating of the modem.

Step 5: Re-Install the control module following the reverse of the above steps

Step 6: Re-install the control module following in reverse the steps followed for

Modem Pin 1
(Gold Dot)

RJ Connector
for Modem

USB
Connector

Modem

Looking at CM from Back

Socket for
Optional Modem
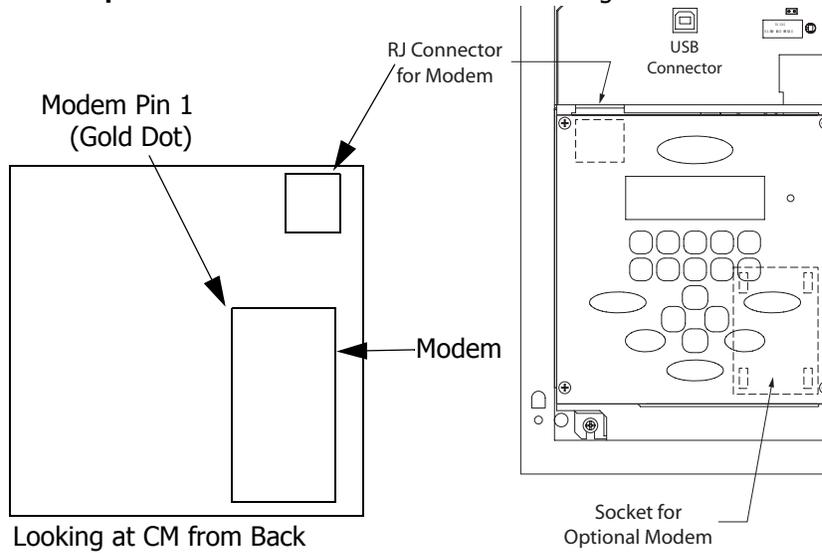
removal.

Modem Module Installation on Z-Max relay Panels

NOTE   Prior to touching any part of any electronics, make sure that you first touch any grounded metal surfaces so that you can discharge any build up of static electricity.

Step 1: Disconnect Power from the cabinet

Step 1: Locate the modem socket on your control module

Step 2: Remove the modem module from it's packaging, and install into the modem socket by aligning the gold dot with the location shown in the illustrations, aligning the pins into the socket, and then gently but firmly pressing the modem into place. Reference the drawing below which shows the correct orientating of the modem.
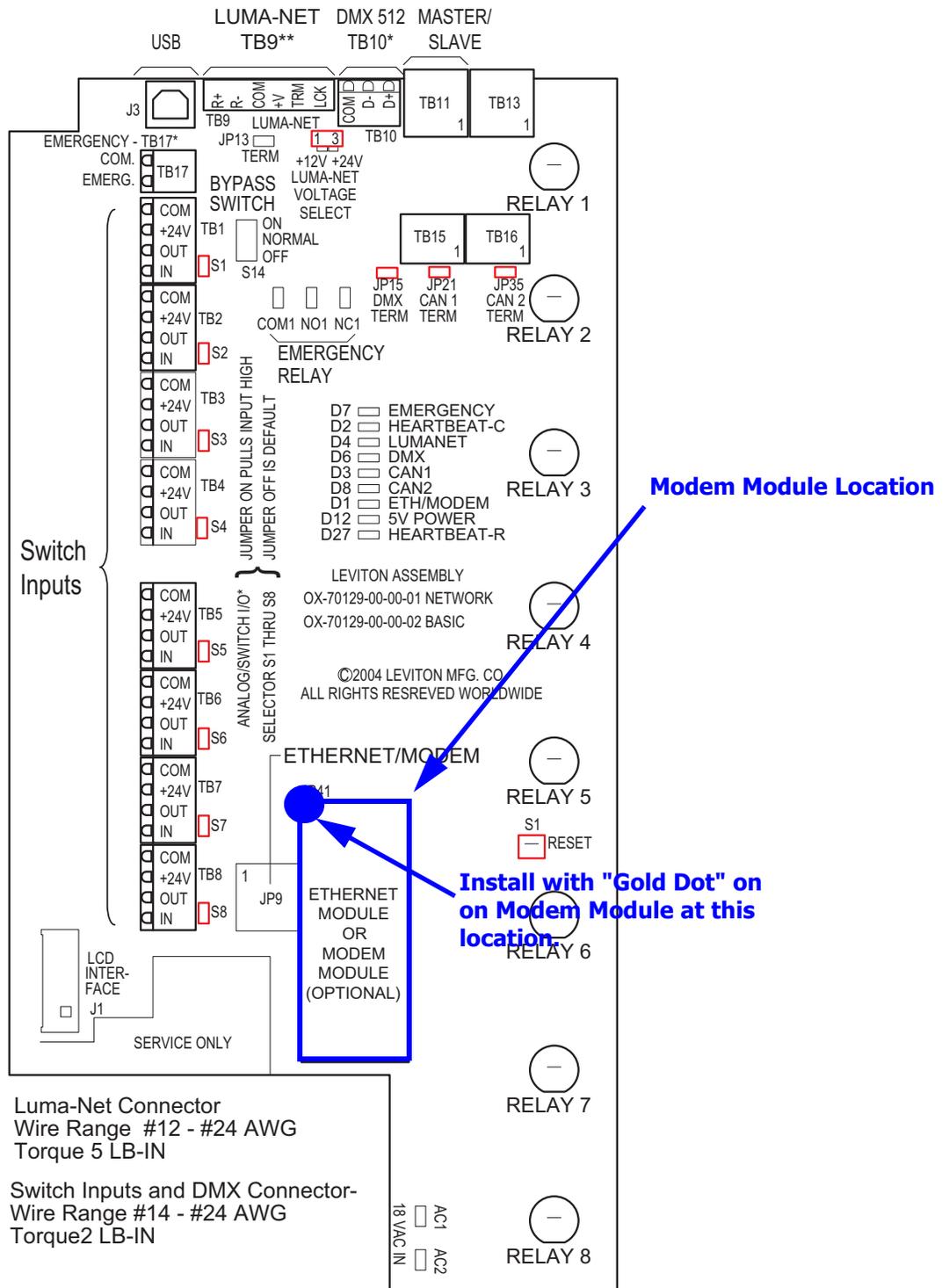
Figure 3: Modem Module for Z-Max 8 Basic & Master Control Module
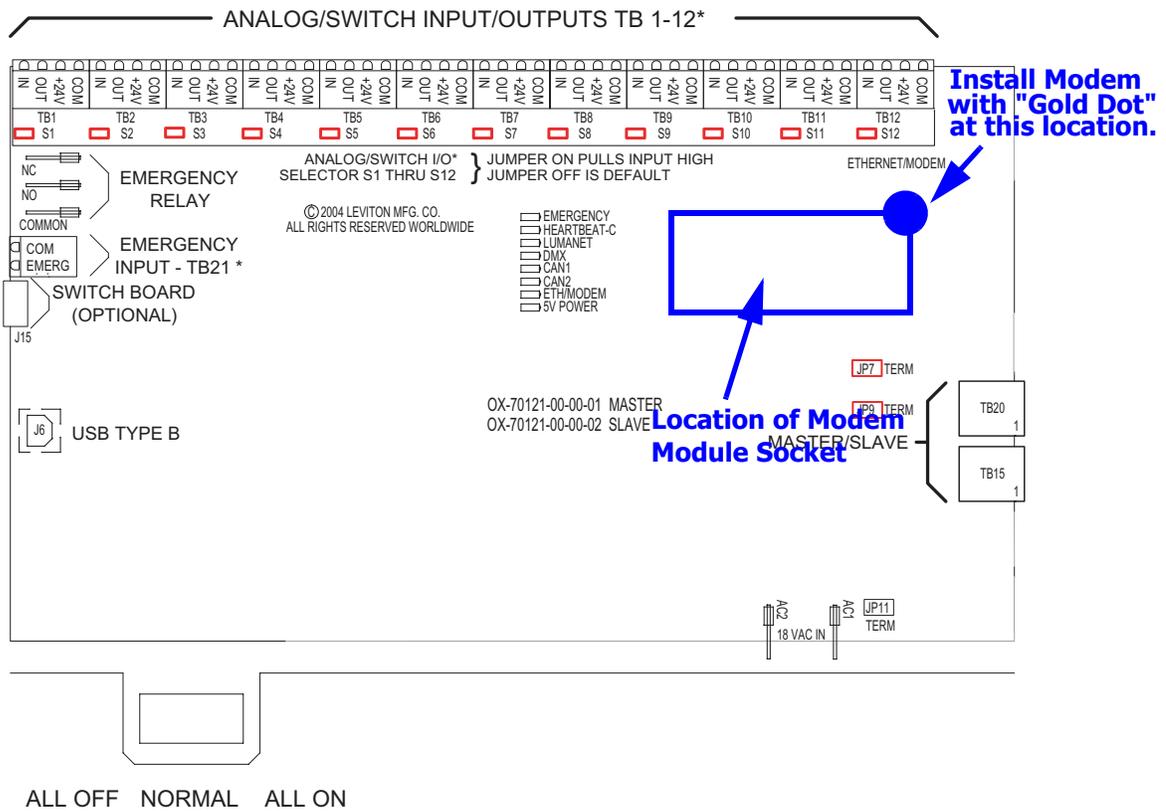
Figure 4: Modem Module Installation, 24 & 48 relay cabinets

Ethernet Network Module Installation

Many relay cabinet models have an optional ethernet module which can be installed. The part number for this module is rac00-eth and is generally ordered separately from the cabinet. When the ethernet module is installed, the following additional functionality is available:

- Upload/Download of Relay cabinet software
- Remote terminal based console access for diagnostics and control
- Upload/Download of relay configuration data.

Installation of an ethernet module is a two step process,

> **Step 1:** Install the Ethernet Module
>
> **Step 2:** Connect the Ethernet Line

Ethernet Module Installation on Z-Max 8, 24, & 48 Relay Panels

NOTE	Prior to touching any part of any electronics, make sure that you first touch any grounded metal surfaces so that you can discharge any build up of static electricity.

Step 1: Disconnect Power from the cabinet

Step 2: Locate the ethernet socket on your control module

Step 3: Remove the ethernet module from it's packaging, and install into the socket by aligning the gold dot with the location shown in the illustrations, aligning the pins into the socket, and then gently but firmly pressing the ethernet module into place. Reference the drawing below which shows the correct orientating of the ethernet module.
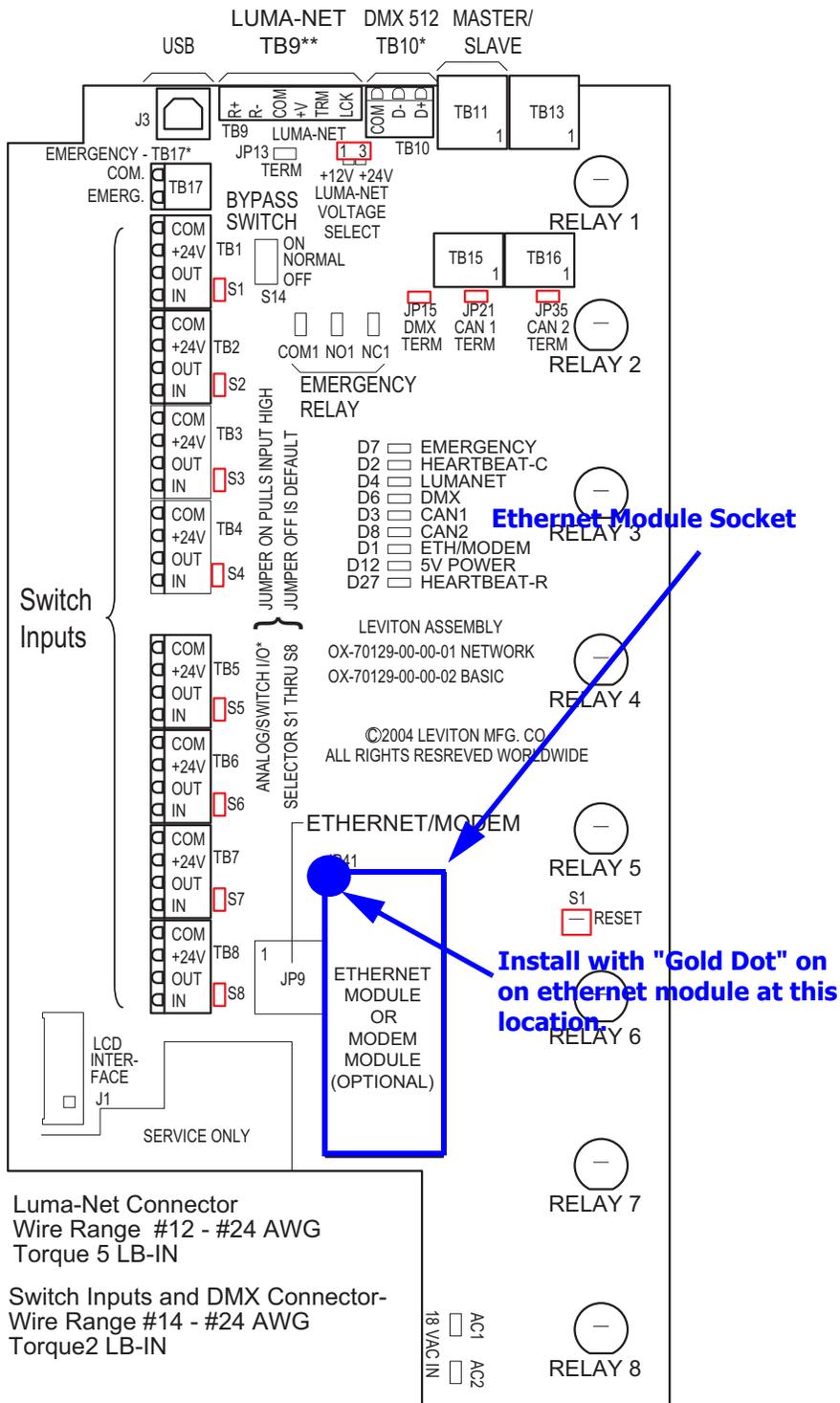
Figure 4: Ethernet Module for Z-Max 8 Basic & Master Control Module

ANALOG/SWITCH INPUT/OUTPUTS TB 1-12*

| TB1 | TB2 | TB3 | TB4 | TB5 | TB6 | TB7 | TB8 | TB9 | TB10 | TB11 | TB12 |
| S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |

ANALOG/SWITCH I/O*   JUMPER ON PULLS INPUT HIGH
SELECTOR S1 THRU S12 } JUMPER OFF IS DEFAULT

ETHERNET/MODEM

NC
NO   EMERGENCY
                    RELAY
COMMON

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EMERGENCY
HEARTBEAT-C
LUMANET
DMX
CAN1
CAN2
ETH/MODEM
5V POWER

**Install module
with "Gold Dot"
at this location.**

COM
EMERG   EMERGENCY
         INPUT - TB21 *

SWITCH BOARD
(OPTIONAL)

J15

**Location of Ethernet
Module Socket**

JP7 TERM

J6 USB TYPE B

OX-70121-00-00-01 MASTER
OX-70121-00-00-02 SLAVE

JP9 TERM   TB20
MASTER/SLAVE   1

TB15
1

AC2 AC1 JP11
          TERM
18 VAC IN

ALL OFF   NORMAL   ALL ON

Figure 5: Ethernet Module Installation, 24 & 48 relay cabinets

Topology

The topology for a 10/100 Base T Ethernet network is a "star" configuration, with only one node permitted at any one location. All nodes must be interconnected via a Hub, Switch, or other such device.

> **NOTE** In the event that conversion to another media type is necessary, for example from 10/100 Base T Ethernet to Fiber, the media converter can be connected directly to the Z-Max cabinet without the traditional use of a hub. Please note that in some instances a "crossover" cable must be used instead of the traditional straight through cable.

Physical Specifications

Specification	Description
Maximum End to End Run Length	100 Meters (~328 feet)
Maximum number of controlled channels per subnet	no practical limit, in excess of 65,000 channels
Maximum number of nodes per subnet on the network	depends upon Ethernet configuration
Network Topology	Star
Wiring Specifics	Category 5e or better cable, RJ-45 connector
Recommended Wire (includes data and power pair)	Belden #1700A
Alternate Approved Wire	Any certified category 5e or better cable
Network Protocol	TCP/IP Ethernet
Conflicting or Multiple Control Message Mitigation Strategy	Depends on network hardware and desired functionary. Many options available

Connection Methods

Termination to a Z-Max relay cabinet is via an RJ-45 connector. The connector is located directly adjacent to the ethernet module. To make the connection to an Ethernet network, crimp a connector onto the end of your ethernet cable taking into consideration the notes given in the section below, "RJ-45 Plug Connection," and plug the cable into the RJ-45 connector on the panel.

RJ-45 Plug Connection

There are two major standards for the pinout of RJ-45 connectors. These two standards are often referenced as TIA-568A & TIA-568B. Although either is acceptable so long as it is consistent throughout a project, Leviton recommends the use of only the TIA-568B standard. The only difference between the standards is what color wires terminate to each of the (8) RJ-45 pins. Per the TIA-568B standard, the pinout for your RJ-45 connectors are as follows:

TIA-568B Wiring Standard Chart		
Pin	Pair #	Color
1	2	Orange/White
2		Orange
3	3	Blue/white
4	1	Green
5		Green/white
6	3	Blue
7	4	Brown/White
8		Brown

NOTE	Unlike some other wiring systems, Category 5 networking wiring requires that the connectors at both ends of the cable be wired the same.

NOTE RJ-45 connectors must be "crimped" onto the end of your Category-5e cable in order to successfully make your connections. This requires a special tool made specifically for this purpose called an "RJ-45 Crimper" or other similar terminology. <u>Always</u> use one of these crimpers when making these connections. Read and understand the instructions by the crimpers manufacturer prior to use. Leviton offers a crimper as Leviton part number 47613-EZC.

Power-Up & Installation Verification Checklist

Prior to the application of power to your relay cabinet, all of the following steps must have been successfully executed.

❑ Inspect each relay load wiring for incomplete termination

❑ Inspect each relay's load wiring for terminals not completely tightened

❑ With each relay in the off position, check for voltage between the Line & Load terminals, there should be 0V.

❑ Inspect all low voltage wiring and ensure that it is complete

❑ Inspect control power wiring, ensure that it is complete

❑ Confirm that any unused supply wires on the control power transformer have been suitably capped

❑ Confirm that all connected load wiring between the relay panel and it's load has been completed

❑ Confirm that wiring between the cabinet and all low voltage devices has been completed

❑ Apply power to the cabinet

❑ Confirm that the cabinet boots properly and return to the status "normal" screen

❑ Set the Time & Date from the menu

❑ Update system software with the latest available software from the website if appropriate

❑ Proceed to panel programming

STATE/CITY	Lat	Long	STATE/CITY	Lat	Long
			Hot Springs	34° N	93° W
			Jonesboro	36° N	91° W
ALABAMA			Little Rock AP (S)	5° N	92° W
Alexander City	33° N	86° W	Pine Bluff AP	34° N	92° W
Anniston AP	34° N	86° W	Texarkana AP	33° N	94° W
Auburn	33° N	85° W			
Birmingham AP	34° N	87° W			
Decatur	35° N	87° W	**CALIFORNIA**		
Dothan AP	31° N	85° W	Bakersfield AP	35° N	119° W
Florence AP	35° N	88° W	Barstow AP	35° N	117° W
Gadsden	34° N	86° W	Blythe AP	34° N	115° W
Huntsville AP	35° N	87° W	Burbank AP	34° N	118° W
Mobile AP	31° N	88° W	Chico	40° N	122° W
Mobile Co	31° N	88° W	Concord	38° N	122° W
Montgomery AP	32° N	86° W	Covina	34° N	118° W
Selma-Craig AFB	02° N	88° W	Crescent City AP	42° N	125° W
Talladega	33° N	86° W	Downey	34° N	118° W
Tuscaloosa AP	33° N	88° W	El Cajon	33° N	117° W
			El Cerrito AP (S)	33° N	116° W
			Escondido	33° N	117° W
ALASKA			Eureka/Arcata AP	41° N	124° W
Anchorage AP	61° N	150° W	Fairfield-Travis AFB	38° N	122° W
Barrow (S)	71° N	157° W	Fresno AP (S)	37° N	120° W
Fairbanks AP(S)	65° N	148° W	Hamilton AFB	38° N	122° W
Juneau AP	58° N	135° W	Laguna Beach	34° N	118° W
Kodiak	58° N	152° W	Livermore	38° N	122° W
Nome AP	64° N	165° W	Lompoc, Vandenberg AFB	35° N	121° W
			Long Beach AP	34° N	118° W
			Los Angeles AP (S)	34° N	118° W
ARIZONA			Los Angeles CO (S)	34° N	118° W
Douglas AP	31° N	110° W	Merced-Castle AFB	37° N	121° W
Flagstaff AP	35° N	112° W	Modesto	38° N	121° W
Fort Huachuca AP (S)	32° N	110° W	Monterey	37° N	122° W
Kingman AP	35° N	114° W	Napa	38° N	122° W
Nogales	31° N	111° W	Needles AP	35° N	115° W
Phoenix AP (S)	33° N	112° W	Oakland AP	38° N	122° W
Prescott AP	35° N	112° W	Oceanside	33° N	117° W
Tucson AP (S)	32° N	111° W	Ontario	34° N	118° W
Winslow AP	35° N	111° W	Oxnard	34° N	119° W
Yuma AP	33° N	115° W	Palmdale AP	35° N	118° W
			Palm Springs	34° N	117° W
			Pasadena	34° N	118° W
ARKANSAS			Petaluma	38° N	123° W
Blytheville AFB	36° N	90° W	Pomona Co	34° N	118° W
Camden	34° N	93° W	Redding AP	41° N	122° W
El Dorado AP	33° N	93° W			
Fayetteville AP	36° N	94° W			
Fort Smith AP	35° N	94° W			

STATE/CITY	Lat	Long
Redlands	34° N	117° W
Richmond	38° N	122° W
Riverside-March AFB (S)	34° N	117° W
Sacramento AP	39° N	121° W
Salinas AP	37° N	122° W
San Bernadino, Norton AFB	34° N	117° W
San Diego AP	33° N	117° W
San Fernando	34° N	118° W
San Francisco AP	38° N	122° W
San Francisco Co	38° N	122° W
San Jose AP	37° N	122° W
San Louis Obispo	35° N	121° W
Santa Ana AP	34° N	118° W
Santa Barbara MAP	34° N	120° W
Santa Cruz	37° N	122° W
Santa Maria AP (S)	35° N	120° W
Santa Monica CIC	34° N	118° W
Santa Paula	34° N	119° W
Santa Rosa	39° N	123° W
Stockton AP	38° N	121° W
Ukiah	39° N	123° W
Visalia	36° N	119° W
Yreka	42° N	123° W
Yuba City	39° N	122° W

COLORADO

STATE/CITY	Lat	Long
Alamosa AP	37° N	106° W
Boulder	40° N	105° W
Colorado Springs AP	39° N	105° W
Denver AP	40° N	105° W
Durango	37° N	108° W
Fort Collins	41° N	105° W
Grand Junction AP (S)	39° N	109° W
Greeley	40° N	105° W
Lajunta AP	38° N	103° W
Leadville	39° N	106° W
Pueblo AP	38° N	104° W
Sterling	48° N	103° W
Trinidad	37° N	104° W

CONNECTICUT

STATE/CITY	Lat	Long
Bridgeport AP	41° N	73° W
Hartford, Brainard Field	42° N	73° W
New Haven AP	41° N	74° W
New London	41° N	72° W
Norwalk	41° N	73° W
Norwick	42° N	72° W
Waterbury	42° N	73° W
Widsor Locks, Bradley Fl	42° N	73° W

DELAWARE

STATE/CITY	Lat	Long
Dover AFB	39° N	75° W
Wilmington AP	40° N	76° W

DISTRICT OF COLUMBIA

STATE/CITY	Lat	Long
Andrews AFB	38° N	76° W
Washington, National AP	39° N	77° W

FLORIDA

STATE/CITY	Lat	Long
Belle Glade	27° N	81° W
Cape Kennedy AP	28° N	81° W
Daytona Beach AP	29° N	81° W
E Fort Lauderdale	26° N	80° W
Fort Myers AP	27° N	82° W
Fort Pierce	27° N	80° W
Gainesville AP (S)	30° N	82° W
Jacksonville AP	30° N	82° W
Key West AP	25° N	82° W
Lakeland Co (S)	28° N	82° W
Miami AP (S)	26° N	80° W
Miami Beach Co	26° N	80° W
Ocala	29° N	82° W
Orlando AP	29° N	81° W
Panama City, Tyndall AFB	30° N	86° W
Pensacola Co	30° N	87° W
St. Augustine	30° N	81° W
St. Petersburg	28° N	83° W
Stanford	29° N	81° W
Sarasota	27° N	83° W
Tallahassee AP (S)	30° N	84° W
Tampa AP (S)	28° N	83° W
West Palm Beach AP	27° N	80° W

STATE/CITY	Lat	Long	STATE/CITY	Lat	Long
			Carbondale	38° N	89° W
GEORGIA			Champaign/Urbana	40° N	88° W
Albany, Turner AFB	32° N	84° W	Chicago, Midway AP	42° N	88° W
Americus	32° N	84° W	Chicago, O'Hare AP	42° N	88° W
Athens	33° N	83° W	Chicago Co	42° N	88° W
Atlanta AP (S)	34° N	84° W	Danville	40° N	88° W
Augusta AP	33° N	82° W	Decatur	40° N	89° W
Brunswick	31° N	81° W	Dixon	42° N	89° W
Columbus, Lawson AFB	33° N	85° W	Elgin	42° N	88° W
Dalton	35° N	85° W	Freeport	42° N	90° W
Dublin	32° N	83° W	Galesburg	41° N	90° W
Gainesville	34° N	84° W	Greenville	39° N	89° W
Griffin	33° N	84° W	Joliet	42° N	88° W
LaGrange	33° N	85° W	Kankakee	41° N	88° W
Macon AP	33° N	84° W	La Salle/Peru	41° N	89° W
Marietta, Dobbins AFB	34° N	85° W	Macomb	40° N	91° W
Savannah	32° N	81° W	Moline AP	41° N	91° W
Valdosta-Moody AFB	31° N	83° W	Mt Vernon	38° N	89° W
Waycross	31° N	82° W	Peoria AP	41° N	90° W
			Quincy AP	40° N	91° W
HAWAII			Rantoul, Chanute AFB	40° N	88° W
Hilo AP (S)	20° N	155° W	Rockford	42° N	89° W
Honolulu AP	21° N	158° W	Springfield AP	40° N	90° W
Kaneohe Bay MCAS	21° N	158° W	Waukegan	42° N	88° W
Wahiawa	21° N	158° W			
			INDIANA		
IDAHO			Anderson	40° N	86° W
Boise AP (S)	44° N	116° W	Bedford	39° N	86° W
Burley	43° N	114° W	Bloomington	39° N	87° W
Coeur D'Alene AP	48° N	117° W	Columbus, Bakalar AFB	39° N	86° W
Idaho Falls AP	44° N	112° W	Crawfordsville	40° N	87° W
Lewiston AP	46° N	117° W	Evansville AP	38° N	88° W
Moscow	47° N	117° W	Fort Wayne AP	41° N	85° W
Mountain Home AFB	43° N	116° W	Goshen AP	42° N	86° W
Pocatello AP	43° N	113° W	Hobar	42° N	87° W
Twin Falls AP (S)	42° N	114° W	Huntington	41° N	85° W
			Indianapolis AP	40° N	86° W
ILLINOIS			Jeffersonville	38° N	86° W
Aurora	42° N	88° W	Kokomo	40° N	86° W
Belleville, Scott AFB	39° N	90° W	Lafayette	40° N	86° W
Bloomington	40° N	89° W	La Porte	42° N	87° W
			Marion	40° N	86° W
			Muncie	40° N	85° W
			Peru, Grissom AFB	41° N	86° W

STATE/CITY	Lat	Long	STATE/CITY	Lat	Long
Richmond AP	40° N	85° W			
Shelbyville	40° N	86° W	**KENTUCKY**		
South Bend AP	42° N	86° W	Ashland	39° N	83° W
Terre Haute AP	39° N	87° W	Bowling Green AP	36° N	86° W
Valparaiso	42° N	87° W	Corbin AP	37° N	84° W
Vincennes	39° N	88° W	Covington AP	39° N	85° W
			Hopkinsville, Ft Campbell	37° N	88° W
IOWA			Lexington AP (S)	38° N	85° W
Ames (S)	42° N	94° W	Louisville AP	38° N	86° W
Burlington AP	41° N	91° W	Madisonville	37° N	87° W
Cedar Rapids AP	42° N	92° W	Owensboro	38° N	87° W
Clinton	42° N	90° W	Paducah AP	37° N	89° W
Council Bluffs	41° N	96° W			
Des Moines AP	42° N	94° W	**LOUISIANA**		
Dubuque	42° N	91° W	Alexandria AP	31° N	92° W
Fort Dodge	43° N	95° W	Baton Rouge AP	31° N	91° W
Iowa City	42° N	92° W	Bogalusa	31° N	90° W
Keokuk	40° N	91° W	Houma	30° N	91° W
Marshalltown	42° N	93° W	Lafayette AP	30° N	92° W
Mason City AP	43° N	93° W	Lake Charles AP (S)	30° N	93° W
Newton	42° N	93° W	Minden	33° N	93° W
Ottumwa AP	41° N	92° W	Monroe AP	33° N	92° W
Sioux City AP	42° N	96° W	Natchitoches	32° N	93° W
Waterloo	43° N	92° W	New Orleans AP	30° N	90° W
			Shreveport AP (S)	32° N	94° W
KANSAS					
Atchison	40° N	95° W	**MAINE**		
Chanute AP	38° N	95° W	Augusta AP	44° N	70° W
Dodge City AP (S)	38° N	100° W	Bangor, Dow AFB	45° N	69° W
El Dorado	38° N	97°W	Caribou AP (S)	47° N	68° W
Emporia	38° N	96° W	Lewiston	44° N	70° W
Garden City AP	38° N	101° W	Millinocket AP	46° N	69° W
Goodland AP	39° N	102°W	Portland (S)	44° N	70° W
Great Bend	38° N	99° W	Waterville	45° N	70° W
Hutchinson AP	38° N	98° W			
Libera	37° N	101° W	**MARYLAND**		
Manhattan, Ft Riley (S)	39° N	97° W	Baltimore AP	39° N	77° W
Parsons	37° N	96° W	Baltimore Co	39° N	76° W
Russell AP	39° N	99° W	Cumberland	40° N	79° W
Salina	39° N	98° W	Frederick AP	40° N	78° W
Topeka AP	39° N	96° W	Hagerstown	40° N	78° W
Wichita AP	38° N	97° W	Salisbury (S)	38° N	75° W

STATE/CITY	Lat	Long	STATE/CITY	Lat	Long
			Duluth AP	47° N	92° W
MASSACHUSETTS			Faribault	44° N	93° W
Boston AP	42° N	71° W	Fergus Falls	46° N	96° W
Clinton	42° N	72° W	International Falls AP	49° N	93° W
Fall River	42° N	71° W	Mankato	44° N	93° W
Framingham	42° N	71° W	Minneapolis/St. Paul AP	45° N	94° W
Gloucester	43° N	71° W	Rochester AP	44° N	92° W
Greenfield	42° N	72° W	St. Cloud AP (S)	46° N	94° W
Lawrence	43° N	71° W	Virginia	47° N	92° W
Lowell	43° N	71° W	Willmar	45° N	93° W
New Bedford	42° N	71° W	Winona	44° N	92° W
Pittsfield AP	42° N	73° W			
Springfield, Westover AFB	42° N	73° W			
Taunton	42° N	71° W	**MISSISSIPPI**		
Worcester AP	42° N	72° W	Biloxi—Keesler AFB	30° N	89° W
			Clarksdale	34° N	91° W
			Columbus AFB	33° N	88° W
MICHIGAN			Greenville AFB	34° N	91° W
Adrian	42° N	84° W	Greenwood	33° N	90° W
Alpena AP	45° N	83° W	Hattiesburg	31° N	89° W
Battle Creek AP	42° N	85° W	Jackson AP	32° N	90° W
Benton Harbor AP	42° N	86° W	Laurel	31° N	89° W
Detroit	42° N	83° W	Mccomb AP	32° N	90° W
Escanaba	46° N	87° W	Meridian AP	32° N	89° W
Flint AP	43° N	84° W	Natchez	32° N	91° W
Grand Rapids AP	43° N	86° W	Tupelo	34° N	89° W
Holland	43° N	86° W	Vicksburg Co	32° N	91° W
Jackson AP	42° N	84° W			
Kalamazoo	42° N	86° W			
Lansing AP	43° N	85° W	**MISSOURI**		
Marquette Co	47° N	87° W	Cape Girardeau	37° N	90° W
Mt Pleasant	44° N	85° W	Columbia AP (S)	39° N	92° W
Muskegon AP	43° N	86° W	Farmington AP	38° N	90° W
Pontiac	43° N	83° W	Hannibal	40° N	91° W
Port Huron	43° N	82° W	Jefferson City	39° N	92° W
Saginaw AP	44° N	84° W	Joplin AP	37° N	94° W
Sault Ste. Marie AP (S)	46° N	84° W	Kansas City AP	39° N	95° W
Traverse City AP	45° N	86° W	Kirksville AP	40° N	93° W
Ypsilanti	42° N	84° W	Mexico	39° N	92° W
			Moberly	39° N	92° W
			Poplar Bluff	37° N	90° W
MINNESOTA			Rolla	38° N	92° W
Albert Lea	44° N	93° W	St. Joseph AP	40° N	95° W
Alexandria AP	46° N	95° W	St. Louis AP	39° N	90° W
Bemidji AP	48° N	95° W	St. Louis CO	39° N	91° W
Brainerd	47° N	94° W			

STATE/CITY	Lat	Long	STATE/CITY	Lat	Long
Sikeston	37° N	90° W	Reno AP (S)	39° N	120° W
Sedalia—Whiteman AFB	39° N	94° W	Reno Co	39° N	120° W
Sikeston	37° N	90° W	Tonopah AP	38° N	117° W
Springfield AP	37° N	93° W	Winnemucca AP	41° N	118° W

MONTANA

NEW HAMPSHIRE

Billings AP	46° N	109° W	Berlin	44° N	71° W
Bozeman	46° N	111° W	Claremont	43° N	72° W
Butte AP	46° N	112° W	Concord AP	43° N	71° W
Cut Bank AP	49° N	112° W	Keene	43° N	72° W
Glasgow AP (S)	48° N	107° W	Laconia	43° N	71° W
Glendive	47° N	105° W	Manchester, Grenier AFB	43° N	71° W
Great Falls AP (S)	47° N	111° W	Portsmouth, Pease AFB	43° N	71° W
Havre	49° N	110° W			
Helena AP	47° N	112° W	**NEW JERSEY**		
Kalispell AP	48° N	114° W	Atlantic City CO	39° N	74° W
Lewiston AP	47° N	109° W	Long Branch	40° N	74° W
Livingstown AP	46° N	110° W	Newark AP	41° N	74° W
Miles City AP	46° N	106° W	New Brunswick	40° N	74° W
Missoula AP	47° N	114° W	Paterson	41° N	74° W
			Phillipsburg	41° N	75° W
NEBRASKA			Trenton Co	40° N	75° W
Beatrice	40° N	97° W	Vineland	39° N	75° W
Chadron AP	43° N	103° W			
Columbus	41° N	97° W	**NEW MEXICO**		
Fremont	41° N	96° W	Holloman AFB	33° N	106° W
Grand Island AP	41° N	98° W	Albuquerque AP (S)	35° N	107° W
Hastings	41° N	98° W	Artesia	33° N	104° W
Kearney	41° N	99° W	Carlsbad AP	32° N	104° W
Lincoln Co (S)	41° N	97° W	Clovis AP	34° N	103° W
McCook	40° N	101° W	Farmington AP	37° N	108° W
Norfolk	42° N	97° W	Gallup	36° N	109° W
North Platte AP (S)	41° N	101° W	Grants	35° N	108° W
Omaha AP	41° N	96° W	Hobbs AP	33° N	103° W
Scottsbluff AP	42° N	104° W	Las Cruces	32° N	107° W
Sidney AP	41° N	103° W	Los Alamos	36° N	106° W
			Raton AP	37° N	104° W
NEVADA			Roswell, Walker AFB	33° N	105° W
Carson City	39° N	120° W	Santa Fe CO	36° N	106° W
Elko AP	41° N	116° W	Silver City AP	33° N	108° W
Ely AP (S)	39° N	115° W	Socorro AP	34° N	107° W
Las Vegas AP (S)	36° N	115° W	Tucumcari AP	35° N	104° W
Lovelock AP	40° N	119° W			

STATE/CITY	Lat	Long	STATE/CITY	Lat	Long
			Elizabeth City AP	36° N	76° W
NEW YORK			Fayetteville, Pope AFB	35° N	79° W
Albany AP (S)	43° N	74° W	Goldsboro,Seymour-Johnson	35° N	78° W
Albany Co	43° N	74° W	Greensboro AP (S)	36° N	80° W
Auburn	43° N	77° W	Greenville	36° N	77° W
Batavia	43° N	78° W	Henderson	36° N	78° W
Binghamton AP	42° N	76° W	Hickory	06° N	81° W
Buffalo AP	43° N	79° W	Jacksonville	35° N	78° W
Cortland	43° N	76° W	Lumberton	35° N	79° W
Dunkirk	42° N	79° W	New Bern AP	35° N	77° W
Elmira AP	42° N	77° W	Raleigh/Durham AP (S)	36° N	79° W
Geneva (S)	43° N	77° W	Rocky Mount	36° N	78° W
Glens Falls	43° N	74° W	Wilmington AP	34° N	78° W
Gloversville	43° N	74° W	Winston-Salem AP	36° N	80° W
Hornell	42° N	78° W			
Ithaca (S)	42° N	76° W			
Jamestown	42° N	79° W	**NORTH DAKOTA**		
Kingston	42° N	74° W	Bismarck AP (S)	47° N	101° W
Lockport	43° N	79° W	Devils Lake	48° N	99° W
Massena AP	45° N	75° W	Dickinson AP	47° N	103° W
Newburgh, Stewart AFB	41° N	74° W	Fargo AP	47° N	97° W
NYC-Central Park (S)	41° N	74° W	Grand Forks AP	48° N	97° W
NYC-Kennedy AP	41° N	74° W	Jamestown AP	47° N	99° W
NYC-La Guardia AP	41° N	74° W	Minot AP	48° N	101° W
Niagara Falls AP	43° N	80° W	Williston	48° N	104° W
Olean	42° N	79° W			
Oneonta	43° N	75° W			
Oswego Co	43° N	77° W	**OHIO**		
Plattsburg AFB	45° N	73° W	Akron-Canton AP	41° N	81° W
Poughkeepsie	42° N	74° W	Ashtabula	42° N	81° W
Rochester AP	43° N	78° W	Athens	39° N	82° W
Rome, Griffiss AFB	43° N	75° W	Bowling Green	41° N	84° W
Schenectady (S)	43° N	74° W	Cambridge	40° N	82° W
Suffolk County AFB	41° N	73° W	Chillicothe	39° N	83° W
Syracuse AP	43° N	76° W	Cincinnati Co	39° N	85° W
Utica	43° N	75° W	Cleveland AP (S)	41° N	82° W
Watertown	44° N	76° W	Columbus AP (S)	40° N	83° W
			Dayton AP	40° N	84° W
			Defiance	41° N	84° W
NORTH CAROLINA			Findlay AP	41° N	84° W
Asheville AP	35° N	83° W	Fremont	41° N	83° W
Charlotte AP	35° N	81° W	Hamilton	39° N	85° W
Durham	36° N	79° W	Lancaster	40° N	83° W
			Lima	41° N	84° W
			Mansfield AP	41° N	83° W

STATE/CITY	Lat	Long
Marion	41° N	83° W
Middletown	40° N	84° W
Newark	40° N	82° W
Norwalk	41° N	83° W
Portsmouth	39° N	83° W
Sandusky Co	41° N	83° W
Springfield	40° N	84° W
Steubenville	40° N	81° W
Toledo AP	42° N	84° W
Warren	41° N	81° W
Wooster	41° N	82° W
Youngstown AP	41° N	81° W
Zanesville AP	40° N	82° W

OKLAHOMA

STATE/CITY	Lat	Long
Ada	35° N	97° W
Altus AFB	35° N	99° W
Ardmore	34° N	97° W
Bartlesville	37° N	96° W
Chickasha	35° N	98° W
Enid, Vance AFB	36° N	98° W
Lawton AP	35° N	98° W
McAlester	35° N	96° W
Muskogee AP	36° N	95° W
Norman	35° N	97° W
Oklahoma City AP (S)	35° N	98° W
Ponca City	37° N	97° W
Seminole	35° N	97° W
Stillwater (S)	36° N	97° W
Tulsa AP	36° N	96° W
Woodward	37° N	100° W

OREGON

STATE/CITY	Lat	Long
Albany	45° N	123° W
Astoria AP (S)	46° N	124° W
Baker AP	45° N	118° W
Bend	44° N	121° W
Corvallis (S)	44° N	123° W
Eugene AP	44° N	123° W
Grants Pass	42° N	123° W
Klamath Falls AP	42° N	122° W
Medford AP (S)	42° N	123° W
Pendleton AP	46° N	119° W

STATE/CITY	Lat	Long
Portland AP	46° N	123° W
Portland Co	46° N	123° W
Roseburg AP	43° N	123° W
Salem AP	45° N	123° W
The Dalles	46° N	121° W

PENNSYLVANIA

STATE/CITY	Lat	Long
Allentown AP	41° N	75° W
Altoona Co	40° N	78° W
Butler	41° N	80° W
Chambersburg	40° N	78° W
Erie AP	42° N	80° W
Harrisburg AP	40° N	77° W
Johnstown	40° N	79° W
Lancaster	40° N	76° W
Meadville	42° N	80° W
New Castle	41° N	80° W
Philadelphia AP	40° N	75° W
Pittsburgh AP	40° N	80° W
Pittsburgh Co	40° N	80° W
Reading Co	40° N	76° W
Scranton/Wilkes-Barre	41° N	76° W
State College (S)	41° N	78° W
Sunbury	41° N	77° W
Uniontown	40° N	80° W
Warren	42° N	79° W
West Chester	40° N	76° W
Williamsport AP	41° N	77° W
York	40° N	77° W

RHODE ISLAND

STATE/CITY	Lat	Long
Newport (S)	41° N	71° W
Providence AP	42° N	71° W

SOUTH CAROLINA

STATE/CITY	Lat	Long
Anderson	34° N	83° W
Charleston AFB (S)	33° N	80° W
Charleston Co	33° N	80° W
Columbia AP	34° N	81° W
Florence AP	35° N	80° W
Georgetown	33° N	79° W
Greenville AP	35° N	82° W
Greenwood	35° N	82° W

STATE/CITY	Lat	Long	STATE/CITY	Lat	Long
Orangeburg	33° N	81° W	Corpus Christi AP	28° N	97° W
Rock Hil	35° N	81° W	Corsicana	32° N	96° W
Spartanburg AP	35° N	82° W	Dallas AP	33° N	97° W
Sumter, Shaw AFB	34° N	80° W	Del Rio, Laughlin AFB	29° N	101° W
			Denton	33° N	97° W
SOUTH DAKOTA			Eagle Pass	29° N	101° W
Aberdeen AP	45° N	98° W	El Paso AP (S)	32° N	106° W
Brookings	44° N	97° W	Fort Worth AP (S)	33° N	97° W
Huron AP	44° N	98° W	Galveston AP	29° N	95° W
Mitchell	44° N	98° W	Greenville	33° N	96° W
Pierre AP	44° N	100° W	Harlingen	26° N	98° W
Rapid City AP (S)	44° N	103° W	Houston AP	30° N	95° W
Sioux Falls AP	44° N	97° W	Houston Co	30° N	95° W
Watertown AP	45° N	97° W	Huntsville	31° N	96° W
Yankton	43° N	97° W	Killeen, Robert Gray AAF	31° N	98° W
			Lamesa	33° N	102° W
TENNESSEE			Laredo AFB	28° N	99° W
Athens	35° N	85° W	Longview	32° N	95° W
Bristol-Tri City AP	36° N	82° W	Lubbock AP	34° N	102° W
Chattanooga AP	35° N	85° W	Lufkin AP	31° N	95° W
Clarksville	37° N	87° W	McAllen	26° N	98° W
Columbia	36° N	87° W	Midland AP (S)	32° N	102° W
Dyersburg	36° N	89° W	Mineral Wells AP	33° N	98° W
Greenville	36° N	83° W	Palestine Co	32° N	96° W
Jackson AP	36° N	89° W	Pampa	36° N	101° W
Knoxville AP	36° N	84° W	Pecos	31° N	103° W
Memphis AP	35° N	90° W	Plainview	30° N	94° W
Murfreesboro	35° N	86° W	Goodfellow AFB	31° N	100° W
Nashville AP (S)	36° N	87° W	San Antonio AP (S)	30° N	98° W
Tullahoma	35° N	86° W	Sherman, Perrin AFB	34° N	97° W
			Snyder	33° N	101° W
TEXAS			Temple	31° N	97° W
Abilene AP	32° N	100° W	Tyler AP	32° N	95° W
Alice AP	28° N	98° W	Vernon	34° N	99° W
Amarillo AP	35° N	101° W	Victoria AP	29° N	97° W
Austin AP	30° N	98° W	Waco AP	32° N	97° W
Bay City	29° N	96° W	Wichita Falls AP	34° N	98° W
Beaumont	30° N	94° W			
Beeville	28° N	98° W	**UTAH**		
Big Spring AP (S)	32° N	101° W	Cedar City AP	38° N	113° W
Brownsville AP (S)	26° N	97° W	Logan	42° N	112° W
Brownwood	32° N	99° W	Moab	39° N	110° W
Bryan AP	31° N	97° W	Ogden AP	41° N	112° W
			Price	40° N	111° W

STATE/CITY	Lat	Long	STATE/CITY	Lat	Long
Provo	40° N	112° W			
Richfield	39° N	112° W	**WEST VIRGINIA**		
St George Co	37° N	114° W	Beckley	38° N	81° W
Salt Lake City AP (S)	41° N	112° W	Bluefield AP	37° N	81° W
Vernal AP	40° N	110° W	Charleston AP	38° N	82° W
			Clarksburg	39° N	80° W
			Elkins AP	39° N	80° W
VERMONT			Huntington Co	38° N	82° W
Barre	44° N	73° W	Martinsburg AP	39° N	78° W
Burlington AP (S)	44° N	73° W	Morgantown AP	40° N	80° W
Rutland	44° N	73° W	Parkersburg Co	39° N	82° W
			Wheeling	40° N	81° W
VIRGINIA					
Charlottesville	38° N	79° W	**WISCONSIN**		
Danville AP	37° N	79° W	Appleton	44° N	88° W
Fredericksburg	38° N	77° W	Ashland	47° N	91° W
Harrisonburg	38° N	79° W	Beloit	42° N	89° W
Lynchburg AP	37° N	79° W	Eau Claire AP	45° N	91° W
Norfolk AP	37° N	76° W	Fond Du Lac	44° N	88° W
Petersburg	37° N	78° W	Green Bay AP	44° N	88° W
Richmond AP	37° N	77° W	La Crosse AP	44° N	91° W
Roanoke AP	37° N	80° W	Madison AP (S)	43° N	89° W
Staunton	38° N	79° W	Manitowoc	44° N	87° W
Winchester	39° N	78° W	Marinette	45° N	88° W
			Milwaukee AP	43° N	88° W
WASHINGTON			Racine	43° N	88° W
Aberdeen	47° N	124° W	Sheboygan	44° N	88° W
Bellingham AP	49° N	123° W	Stevens Point	44° N	90° W
Bremerton	48° N	123° W	Waukesha	43° N	88° W
Ellensburg AP	47° N	121° W	Wausau AP	45° N	90° W
Everett, Paine AFB	48° N	122° W			
Kennewick	46° N	119° W	**WYOMING**		
Longview	46° N	123° W	Casper AP	43° N	106° W
Moses Lake, Larson AFB	47° N	119° W	Cheyenne	41° N	105° W
Olympia AP	47° N	123° W	Cody AP	45° N	109° W
Port Angeles	48° N	123° W	Evanston	41° N	111° W
Seattle-Boeing Field	48° N	122° W	Lander AP (S)	43° N	109° W
Seattle Co (S)	48° N	122° W	Laramie AP (S)	41° N	106° W
Seattle-Tacoma AP (S)	47° N	122° W	Newcastle	44° N	104° W
Spokane AP (S)	48° N	118° W	Rawlins	42° N	107° W
Tacoma, McChord AFB	47° N	122° W	Rock Springs AP	42° N	109° W
Walla Walla AP	46° N	118° W	Sheridan AP	45° N	107° W
Wenatchee	47° N	120° W	Torrington	42° N	104° W
Yakima AP	47° N	121° W			

Warranty Information

Limited Warranty

Leviton Manufacturing Co Inc. warrants the products represented in this manual to be free of material and workmanship defects for a period of Two years after system acceptance or Two years after shipment from Leviton, whichever comes first.

Leviton Manufacturing Co Inc. warrants the **Relay Modules** represented in this manual to be free of material and workmanship defects for a period of Ten years after system acceptance or Ten years after shipment from Leviton, whichever comes first.

This Warranty is limited to repair or replacement of defective equipment returned Freight Pre-Paid to Leviton Manufacturing at 20497 SW Teton Ave., Tualatin, Oregon 97062, USA. User shall call 1-800-959-6004 and request a return authorization number to mark on the outside of the returning carton, to assure that the returned material will be properly received at Leviton.
All equipment shipped back to Leviton must be carefully and properly packed to avoid shipping damage. Replacements or repaired equipment will be returned to sender freight prepaid, F.O.B. factory. Leviton is not responsible for removing or replacing equipment on the job site, and will not honor charges for such work. Leviton will not be responsible for any loss of use time or subsequent damages should any of the equipment fail during the warranty period, but agree only to repair or replace defective equipment returned to its plant in Tualatin, Oregon. This Warranty is void on any product that has been improperly installed, overloaded, short circuited, abused, or altered in any manner. Neither the seller nor Leviton shall be liable for any injury, loss or damage, direct or consequential arising out of the use of or inability to use the equipment. This Warranty does not cover lamps, ballasts, and other equipment which is supplied or warranted directly to the user by their manufacturer. Leviton makes no warranty as to the Fitness for Purpose or other implied Warranties.

LEVITON®

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