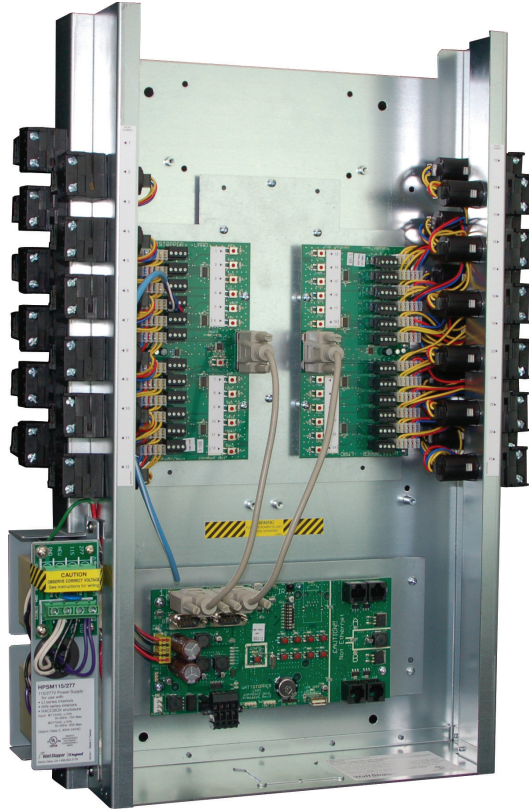


## Catalog Numbers • Les Numéros de Catalogue • Números de Catálogo: LMCP8/LMCP24/LMCP48

Country of Origin: Made in China • Pays d'origine: Fabriqué en Chine • País de origen: Hecho en China



## SPECIFICATIONS

Input voltage ..... 115/277V 60 Hz, 120/347V 60 Hz, 240V 60 Hz

Class 2 connection to two independent DLM local networks 24VDC output, up to 250mA across 2 RJ45 ports per local network (A and B networks, 250 mA each).

Free-topology DLM local network segments may include Digital Lighting Management (DLM) switches, occupancy sensors, daylight sensors and input modules

Category 5e cable, up to 1,000 ft. total per local network

Terminals for connection to DLM segment network (BACnet MS/TP)

Segment network parameters

WattStopper LM-MSTP wire

Linear topology; 4000 ft. maximum per segment

Accessory power (jumper selectable)

LMCP8 ..... N/A

LMCP24 ..... 650 mA @ 15VDC, 400 mA @ 24VDC

LMCP48 ..... 650 mA @ 15VDC, 400 mA @ 24VDC

..... 15VDC to power Segment Manager

..... 24VDC for Class 2 accessory devices

HDR relays:

Coil voltage, 24 VDC, pulse ON and pulse OFF

Mechanically latched contacts

½" K.O. mounting, LV plug-connection, individually replaceable

Contact ratings:

@ 277V ..... 30 A ballast

@ 347V ..... 20 A ballast

@ 120V ..... 20 A tungsten

@ 347V ..... 30 A resistive

@ 120V ..... 1.5 HP

SCCR (short circuit current rating) 14,000 A @ 347VAC with HDR

Heavy Duty Relay

Operating conditions:

for indoor use only ..... 32-140 oF (0 – 60 oC)

..... 5-95% RH, non-condensing

UL and CUL listed

**WARNING:** The DB9 cables cannot be plugged in or unplugged without powering down the panel.

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## INTRODUCTION

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The LMCP series panels provide network-capable lighting control, enabling the automation of lighting functions throughout an entire facility.

With LMCP panels, you can maintain code-compliant control of building exterior lighting as well as larger interior areas. Recommended applications include office building lobbies, corridors, loading docks, school gymnasiums, commons areas and hallways. LMCP panels are also ideal for retrofit scenarios where mounting control equipment near existing branch circuit breakers is beneficial, and digital switches, sensor devices, and load parameter configuration are required to meet complex operational sequences.

The HDR relays in the panel can respond directly to inputs from Digital Lighting Management (DLM) switches, occupancy sensors, daylight sensors, and input modules.

Multiple panels may be networked together for global control operation with or without the use of a Building Automation System (BAS). The LMCP panel provides a native BACnet integration solution via BACnet MS/TP. Relay, group, and control device status, including occupancy sensor status, are available as BACnet objects.

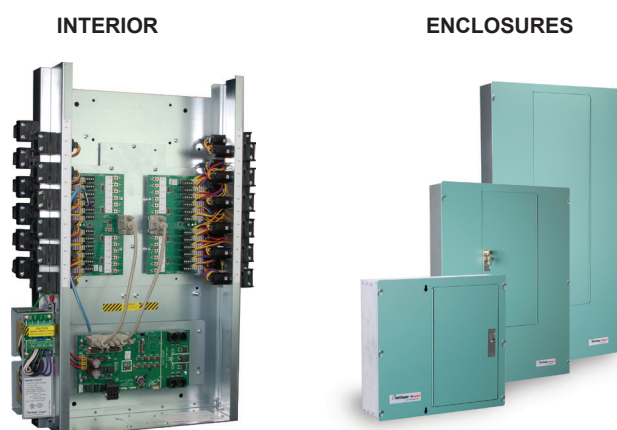


Figure 1: Panel interior and enclosures

### Features and Basic Terminology

#### Groups

A group allows you to control one or more relays in one or more panels. Groups provide an easy way to assign parameters quickly to multiple loads.

Each group has seven parameters that will determine the behavior of the relay. In a typical application each relay in a group will be set to the same parameters, so that lighting in multiple areas, controlled by different panels can all be set to follow the same schedules and behavior. However, it is also possible to program a relay in a group to different behavior, if needed. So, for example, if a relay controls a hallway or corridor that needs a different time delay before turning off, you can change the value for that relay while still having it follow all of the other behaviors of other relays in the group. A panel can store information for up to 99 groups, but when panels are networked together more groups are available. Each relay can belong to one or more of those groups. Groups are discussed in detail in the section [“Groups, Schedules, and Macros” on page 8](#).

**NOTE:** If a relay in a group has been programmed to different behavior, it is possible for the group settings to override the individual relay settings. See [“Group Settings vs. Individual Relay Settings” on page 8](#) for details.

**NOTE:** If using the LMCP in conjunction with an LMSM-3E or LMSM-63 Segment Manager, it is important to understand that groups in the LMCP are separate from Segment Manager groups, which can only be accessed by the Segment Manager itself.

#### Channels

A channel is a label for a BACnet data object. A BAS integrator sends messages to a channel to schedule After Hours (AH) and Normal Hours (NH). Channel is a binary value. Note that a value of “Active” sets the channel to AH while a value of “Inactive” sets it to NH.

Part of what a group does is to respond to scheduled events that determine when Normal Hours and After Hours begin. Because a channel message also determines Normal Hours and After Hours, it is important to understand the difference between groups and channels. As mentioned above, a panel has 99 memory locations for groups. But since panels can be connected, the total number of groups is much larger. Therefore a group number can be higher than 99, but it is still stored in one of the 99 slots. The channel number will correspond to the slot number where the group number is stored.

Groups 1-8 will always correspond to Channels 1-8. Above number 8, the group numbers are stored into the slots in the order they are created. So, for example, if group 52 is the first group that you program on a panel, it will be stored in memory location 9 and therefore, you would send a message on channel 9 to affect Normal Hours or After Hours for group 52.

**NOTE:** Assigning group numbers above 99 requires LMCS-100 software, and in the software, you will view the groups in the order they were created, so are able to determine the channel number.

#### Smartwire

Smartwire provides a quick and easy way to assign loads (relays) to groups, using the buttons on the panel. When programming directly on the panel, Smartwire applies only to groups 1–8. However, if using the LMCT-100 to program the panel, you can use Smartwire with groups 1–99. See [“Load Binding to Groups 1–8 \(Smartwire\)” on page 14](#) for details.

#### Push n’ Learn

Push n’ Learn (PnL) is the method used to bind loads to sensors and switches, via button pushes. See [“Push n’ Learn” on page 14](#) for details.

#### Schedules

Schedules allow you to turn loads on or off at specific times. There are 254 schedules available per panel. A group can also respond to schedules sent from an LMSM Segment Manager or BACnet-enabled BAS. See [“Schedules” on page 9](#) for details.

#### Dark/Light

Dark/Light settings allow you to specify turning a group on or off based the amount of outside light. This can be done either with an astronomical schedule that calculates sunrise and sunset based on your latitude and longitude, or else based on an LMIO-301 photocell sensor. Up to 32 dark/light settings can be stored per panel. For details, see [“Dark/Light Events” on page 11](#).



## PANEL CIRCUIT BOARD LAYOUT AND CONNECTION

The LMCP contains two types of circuit boards:

- The LMPI board is the main controller board and is connects to the Local DLM network and to other panels or other BACnet devices (see Fig. 3a and 3b).
- The LMRD board is the relay control board. (see Fig. 2). A single board can control 12 relays.

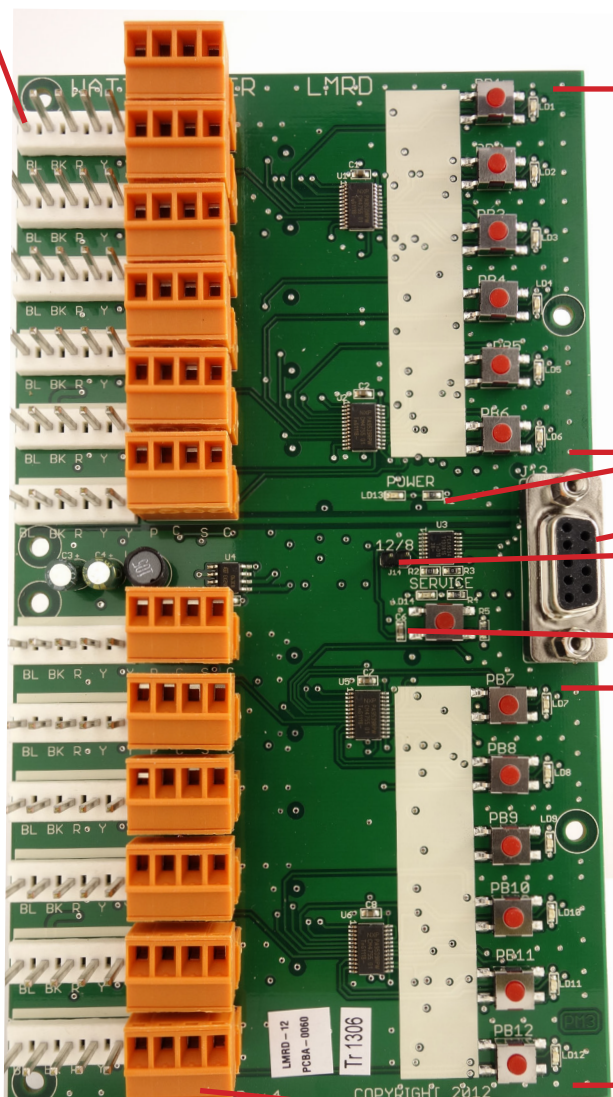
**NOTE:** The LMCP-8 contains a single LMRD board (only 8 of the 12 connections are used). The LMCP-24 contains two LMRD boards. The LMCP-48 has four LMRD boards, with 2 boards placed above and 2 boards placed below the LMPI.

The LMRD boards connect to the LMPI board other with DB9 cables. They must be connected as follows:

- LMCP 8 – Use the top left(#1) DB9 jack.
- LMCP 24 – Use the top left (#1) DB9 jack for the left LMRD board and the top right (#2) jack for the right LMRD board.
- LMCP 48 – Use the top left (#1) DB9 jack for the top left LMRD board, the top right (#2) jack for the top right LMRD board, the bottom left (#3) jack for the bottom left LMRD board, and the bottom right (#4) jack for the bottom right LMRD board.

Power to the relays comes from the transformers through the LMPI and into the LMRD boards.

### Relay Connection Header



**Relay Status LEDs** – The LED will be ON when the relay turns on, and OFF when the relay turns off. It will blink during the transition between Normal Hours and After Hours, for the amount of time specified with the Blink parameter. (If blink time is set to 0, it will not blink.)  
In **Smartwire** mode, the LED will BLINK on and off when relay is included in Group, and OFF when relay is excluded from Group.  
In **PnL** mode, the LED will be ON when relay is selected for binding with buttons, and OFF when not selected.

### Override Buttons and Status LEDs 1-6

#### Power Indication LED

**DB9 Jack** – For connection to LMPI card

**12/8 Jumper** – For configuring whether the card drives 8 or 12 relays (jumped by default in LMCP8 panels)

**Service LED** – Blinks once per second if there is proper communication between LMRD and LMPI boards. If you press and hold the button next to the LED, the LED will remain on instead of blinking.

### Override Buttons and Status LEDs 7-12

**Relay Override Buttons** –Toggle relay ON or OFF depending on the state of LED.  
In **Smartwire** mode, selects or deselects relay to be included into a Group.  
In **PnL** mode, selects relay to be bound to a DLM device.

### Remote Override Terminal

- P: Pilot signal
- C: Pilot common
- S: Override signal
- C: Override common

Figure 2: LMRD Circuit Board

The photo below shows the current version of the LMPI board. The previous version of the board is shown on the following page.

**Microcontroller activity indication LEDs (2 blue).** The LEDs toggle every half second while the microcontroller is operating. They will both be on solid when AC power is lost and all power down data has been saved. They will stop blinking when Factory Defaults Request is happening, or when first powered from the factory, until all the data is initialized.

**DIP Switches** (see details below)

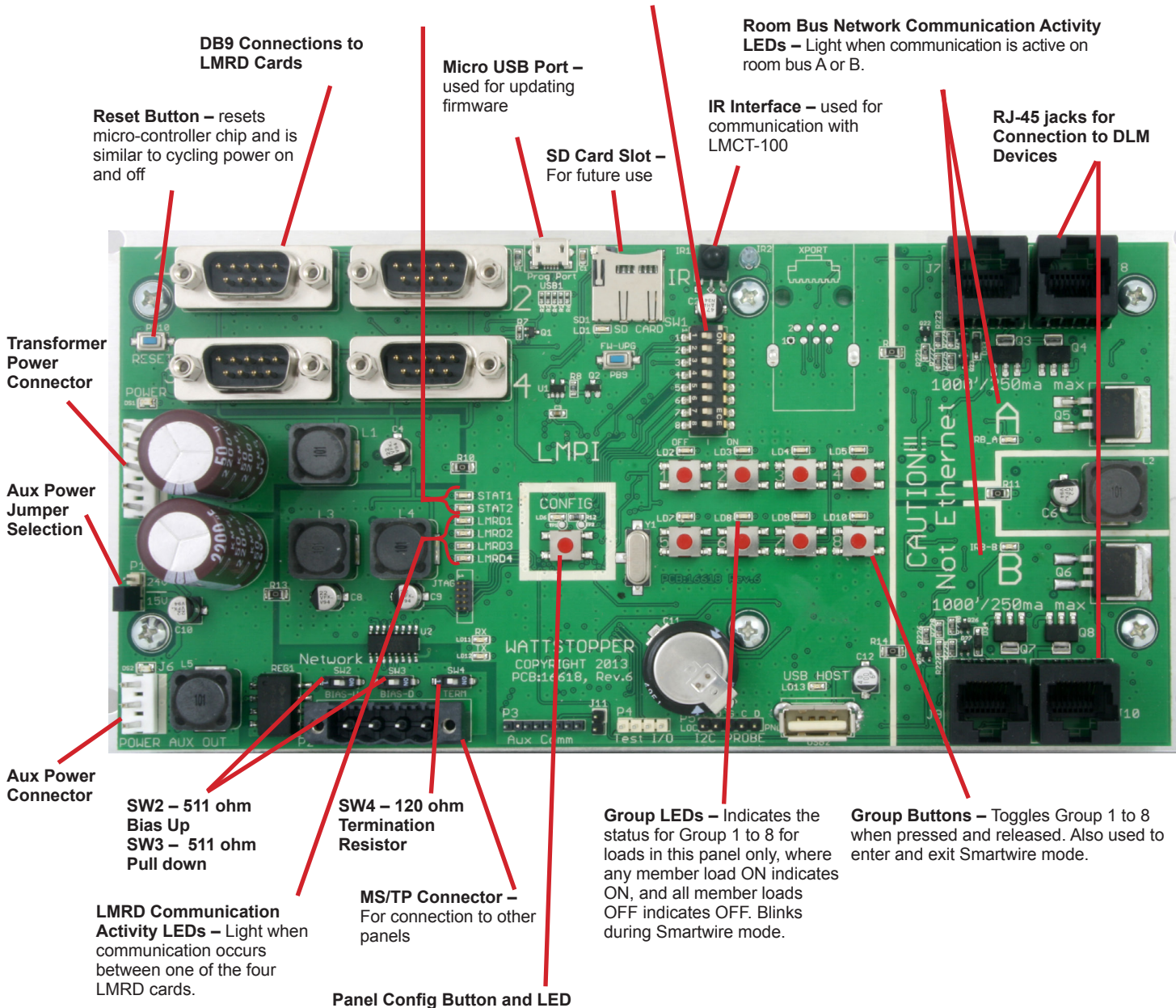


Figure 3: LMPI Circuit Board rev 6

## Dip Switches

The **default** for all dip switches is OFF.

**1-4:** Not currently used

**5:** OFF is used with HDR relays and provides a 20ms pulse. ON is used with RR-7 and RR-9 relays, and provides a 50ms pulse.

**6:** OFF routes unicast DLM Network messages internally. ON routes unicast DLM Network messages out the RJ-45 jacks. Set this to ON only if using an external diagnostic tool to view those messages. This will slow down DLM Network communications.

**7:** OFF turns the relay status LEDs on and off during PnL (but not the relays). ON turns both the relays and status LEDs on and off during PnL.

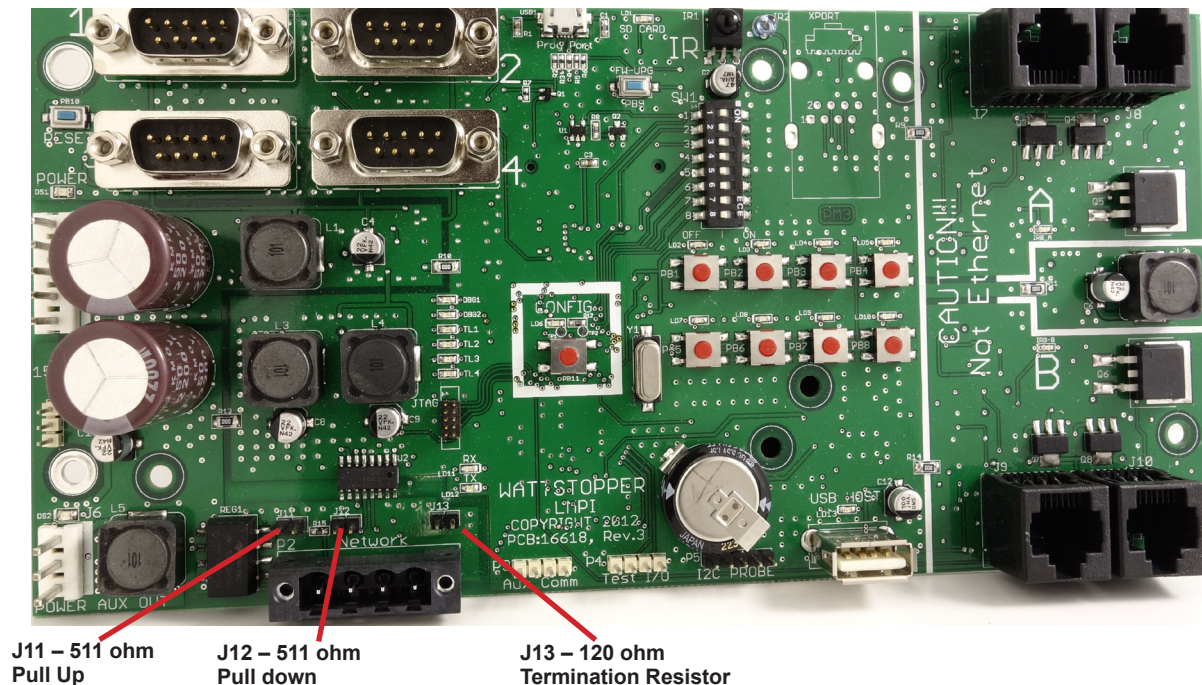
**8:** OFF=Relay status LEDs follow Pilot. ON=Relay status LEDs follow logic (for use with RR-7 relays, which have no pilot wires).



### Differences between the rev 3 LMPI board and the rev 6 LMPI board:

- The Pull Down, Pull, Up, and Termination Resistor are jumper plugs instead of dip switches.
- There is no SD Card Slot (not currently used)
- Microcontroller and LMRD Status LEDs silk screen labeling changed on rev 6 board
- Group button silk screen labeling simplified on rev 6 board

Figure 3: LMPI Circuit Board rev3



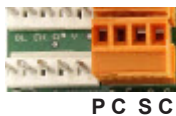
### Connecting Panels to Other DLM Devices, and Panels to Panels

There are two DLM local networks (labeled A & B) used to connect DLM devices such as switches, sensors, photocell input modules, and room controllers. The networks are labeled A and B. Each network has two RJ-45 jacks, for connecting Cat5 cable. Only LMRJ cable should be used. It is not important which jacks are used. For more details, see [“Connecting Switches, Sensors, Photocells, and Other DLM Accessory Devices” on page 11.](#)

Panels can also be connected to each other, using the MS/TP connectors and LM-MSTP wire.

### Connecting Override Switches Directly to a Panel

Non-DLM switches can be connected directly to the LMCP, using the Remote Override Terminals next to the Relay Connection Headers. Only a 2 wire momentary switch, with or without a pilot light, can be connected. If both the pilot light and the momentary switch are part of the same device, then it is likely that there will be a single “common” or “ground” signal; it can be wired to either of the terminals labeled C.



### Load Numbering

Load IDs are assigned on the panel based on the LMRD cards. Loads are numbered on a single card from top to bottom. With multiple cards, numbering continues from left to right, top, then bottom. So on an LMCP-48, loads are numbered as follows:

- Top Left Card – Loads 1–12
- Top Right Card – Loads 13–24
- Bottom Left Card – Loads 25–36
- Bottom Right Card – Loads 37–48

## GROUPS, SCHEDULES, AND MACROS

A group allows you to control one or more relays in one or more panels. Each group has seven parameters that will determine the normal hours/after hours behavior of the relay(s):

Parameter	Definition
<b>Blink</b>	Amount of minutes load stays ON, when a scheduled event occurs that switches the load OFF when transitioning from Normal Hours to After Hours. The relay will turn off and on once, then the Override LED for that relay will blink continuously for the time period. The LEDs for all switches bound to that group will also blink continuously. Pressing the button will keep the load ON and the time delay countdown will start. When the countdown reaches 0, the blink function re-occurs. <b>NOTE:</b> <b>Blink</b> does not apply when transitioning from After Hours to Normal Hours.
<b>Time Delay NH</b>	If a load is commanded to turn ON when the schedule switches to Normal Hours, the load will automatically turn OFF after the time delay expires. If the load is turned on manually by a switch after the schedule switches to Normal Hours, the load will again automatically turn OFF after the time delay expires.
<b>Time Delay AH</b>	Identical to <b>Time Delay NH</b> , but the behavior occurs when the schedule switches to After Hours. Works in conjunction with <b>Blink</b> .
<b>Transition AH &gt; NH</b>	Behavior of the relay when Normal Hours begins (turn ON, turn OFF, or do nothing)
<b>Transition NH &gt; AH</b>	Behavior of the relay when After Hours begins (turn ON, turn OFF, or do nothing)
<b>Sensor NH</b>	Determines how the relay responds to sensor input during Normal Hours. Possible values are: <ul style="list-style-type: none"> <li>• Manual On/Auto Off – Responds to sensor input when vacancy is detected but not when occupancy is detected</li> <li>• Auto On/Manual Off – Responds to sensor input when occupancy is detected but not when vacancy is detected</li> <li>• Auto On/Off – Responds to sensor input for both occupancy and vacancy detection</li> <li>• Do Nothing</li> </ul> <b>NOTE:</b> Keep in mind that this determines whether the loads assigned to the group will <b>respond</b> to sensor input. It does <b>not</b> determine whether the loads will turn on or off. That is set within the sensor programming (either on the sensor itself, or by using the LMCT-100 remote or LMCS-100 software).
<b>Sensor AH</b>	Determines how the relay responds to sensor input during After Hours. Possible values same as above

**NOTE:** The start times for normal hours and after hours are determined by a Schedule. For details on Schedules, see [“Schedules” on page 9](#).

A group can be set to one of six macros, which contain pre-defined values for each of the seven parameters. Or, you can customize the setting for your own specific needs. For details, see [“Macros” on page 10](#).

### Group Settings vs. Individual Relay Settings

As was mentioned in the introduction, it is possible to assign different parameter values to one or more relays that are part of a group.

**Example:** You want to assign all offices on a floor to a single channel, so you can schedule all lights to be manual on and off at 7:00 pm, with a one hour override. However, the owners want to have a two hour override for their own offices.

So a group of all relays can be set up and scheduled to have a 1 hour override, but then the two individual relays for the owners office can be set to 2 hours. Without this feature, you would need two groups—one for the owners’ office and a second for the rest of the offices—and would have to schedule each group separately.

### Programming Individual Relays and Overriding Them

LMCS-100 software is required to program the individual loads (relays) separate from the group. (The LMCT-100 remote provides access to the **Blink** parameter but not the others).

Under certain circumstances, the group settings will override the previously programmed settings for an individual load:

- LMCS-100 provides an option when loading group settings into the panel to override the individual settings. If you don’t select this option, the individual load settings remain.
- When using an LMCT-100 to send group information to the LMCP, the group settings will **override** the individual load settings. Therefore, you should not use the LMCT-100 to send group information if you have previously programmed individual settings.

If using the Smartwire functionality to add a load after groups have been programmed, the group parameters will be applied to the new load as follows:

- If all of the loads currently assigned to the group have the same parameter values, those values will be applied to the new load.
- If one or more loads currently assigned to the group have different parameter values than the other loads in the group, no parameter values will be applied to the new load. So if that load had been previously programmed, its values will remain. If no values were previously programmed, the default values will be applied.

## Group Functionality

### Group Numbers and Memory Locations

Each panel has 99 memory locations for storing group parameters. Groups 1–8 can be set up and controlled by buttons on the LMPI board. Groups 1–99 can be accessed from the LMCT-100 wireless configuration tool or LMCS-100 software.

If multiple panels are networked together, all loads from different panels that are assigned to the same group will respond to commands sent to that group. So, for example, you might have panels on three different floors and assign the relays controlling the corridors on each floor to the same group number. You can then control all corridors on those floors together.

Even though each panel has only 99 memory locations for storing group information, it is possible to “rename” a group to a different number. There are a total of 65,534 group numbers available. In this way multiple panels can be networked together and allow both coordinated relay behavior (when the group numbers match between panels) and independent behavior (when the group numbers are unique to a panel).

**NOTE:** LMCS-100 software or control via a BAS is required in order to set up and use group numbers higher than 99.

### Group Status Indicators

The LMCP provides an easy visual indication of the status of the group. For Groups 1–8, If **any** relay assigned to a specific group is ON, then the Group LED for that group will also be ON. So for example, if a group is controlling several different rooms, and an occupancy sensor in one room has turned on the lights for that room, the associated group button LED will be ON.

Additionally, if a DLM switch is connected to a panel and programmed to control a group, then the LED for the button controlling the group will be ON, if any group member relay in any networked panel is ON.

### BACnet Control

Groups also allow BACnet control of relays in multiple panels, as well as all DLM devices connected to those panels.

The only panel-specific BACnet objects are Binary Value (BV) 201–299, for Channel Occupancy Control. Sending a value of TRUE to a channel BV will set the Group to Unoccupied, also referred to as After Hours operation. Sending a value of FALSE to a channel BV will set Group to Occupied, also referred to as Normal Hours operation. The reason that After Hours corresponds to True instead of False is that Normal Hours operation is the default state for a given channel. Therefore setting a group to After Hours requires activation (in essence, turning After Hours “on”).

Since a panel only has 99 group memory locations, only 99 Channels are available. But as mentioned previously, groups can be renamed, so you have the ability to control up to 65,534 possible groups.

**NOTE:** Object support for accessory devices connected to panels is described in Technical Bulletin TB-175, available at <http://www.wattstopper.com/resources/download-center/tech-bulletins-whitepapers.aspx>.

A group action (button press, etc.) will always broadcast across the network. Every panel that has a group configured with the target group number responds to the action. Group set up is a local function that is conducted at each panel location.

For more details about BACnet, see [“Connecting Multiple LMCP Panels in a Network” on page <?>](#).

### Scenes

The LMCP also has the ability to control Scenes. Scenes are similar to Groups in that they control group of loads but are typically used with loads that have dimming capability, to control light level of various loads within a given space. They also provide the ability to fade between one value and another when the scene is changed. If assigning relays within the LMCP to a scene, it will switch relays on or off, since no dimming is possible.

There are sixteen possible scenes per “room” (or in this case a panel). When a scene is activated (typically by assigning it to a switch), all loads assigned to that scene will respond—you can’t select only certain loads in a scene to respond. However, you can select which loads are included in the scene.

Scene programming within the LMCP is only available using the LMCS-100 software. Scenes are then assigned to a button switch (the LMSW-105 5-Button Switch is commonly used for this).

### Schedules

You can schedule up to 254 date and time based events per panel. Each event is assigned to a group, and determines one action for the group. For each event, you specify the time the event occurs. You also specify the days of the week in which the event will occur. Additionally, you specify whether the event will occur on any day designated as a holiday.

The possible actions sent to the group include:

Schedule Type	Action Description
After Hours	Transitions Groups to After Hours (unoccupied) state
Normal Hours	Transitions Groups to Normal Hours (occupied) state
On	Turns group loads ON without changing the current occupancy status
Off	Turns group loads OFF without changing the current occupancy status
Do Nothing	No action

If panels are networked and multiple panels use the same group number to control relays in those panels, then any events scheduled in one panel will affect the other panels (since events are always assigned to a group number). By using different group numbers in different panels, you can limit which panels will respond to those scheduled events.



## Assigning a Panel to be the Master Clock

Every LMCP has a clock in it, which allows you to set time and date for controlling schedule events and calculating sunrise and sunset for Dark/Light events. To set the clock, use the LMCT-100 hand held remote, LMCS-100 software, or BACnet Time Synchronization via a BAS.

Additionally, if you have more than one panel networked together, any panel can be set to be the master clock. It will periodically send out clock information to the other panels so that they remain synchronized. You can set how often the master sends the clock message. The advantage of having any panel act as a master is that if the master panel is taken offline for any reason, any other panel can be easily set to be master and all panels will still remain in sync. (Note that if the original panel is put back online, you will want to revert the replacement master or the original panel to back to being a slave, so that you don't have two master clocks on the network.)

To assign a panel as the master, you need LMCS-100 software. For more information on LMCS-100, see ["Programming the LMCP" on page 13](#).

## Macros

A macro is a set of pre-defined values for the seven parameters that are part of a group. Each group can be set to a specific macro, or to use no macro and instead use a customized set of values. There are six macros in the LMCP. Following is a description of the intended use for each macro, followed by a list of all parameter values:

**NOTE:** If you want to set up custom parameters that are similar to one of the macros, select that macro first, then go into Custom mode and change only the value that different from the macro default.

- **Manual** – This macro should be used when there are no occupancy sensors or switches associated with the Group and only on/off actions from schedules or dark/light are intended. Since On/Off changes are based only on schedules and dark/light sensors, the only parameter in the macro that has any effect is Blink, which will provide a warning to occupants by momentarily shutting the load off and then back on.
- **Override Time AH** – This macro is designed for situations where only switches are used (no occupancy sensors). An override time delay is set so that if a switch is used to keep the light on during after hours, the load turns off after two hours. The load is set to turn ON when entering Normal Hours. If you instead want to require that the load be manually turned on, start with this macro when creating the group, select CUSTOM, and modify the **Transition AH > NH** action to a value of "Do Nothing." Additionally, adjust **Time Delay AH** if you want a different amount of time before the load turns off.

**NOTE:** The settings in this macro are used for Groups 1–8, when you use Smartwire to assign relays to a group.

- **Sensor Day Disable** – For use with occupancy sensors, this macro turns all loads ON during Normal Hours; they can be turned off or back on manually, with no override time delay. When After Hours begins, loads are turned OFF and sensor functionality is set to Auto On/Off. A two hour time delay is set for cases in which some loads in the group are not bound to sensors, but only to switches.
- **Sensor Man-On NH** – In this macro, relays are left OFF when Normal Hours begins. Occupancy sensors trigger loads on occupant arrival, but do not time out until after hours. When After Hours begins, loads turn OFF and sensors switch to Auto On/Off. As with the Sensor Day Disable macro, a two hour time delay is set for cases in which some loads in the group are not bound to sensors, but only to switches.
- **Sensor Auto** – This macro sets sensors to Auto On/Off for both Normal Hours and After Hours operation, so loads turn ON only based on sensor or switch input. A 120 minute override time delay is used during the After Hours period. This allows for consistent functionality in response to sensors at all times, while accommodating the inclusion of relays not bound to sensors that share the same operational time window.
- **Auto Switch-1xx** – This macro is designed to work with the AS-100 Automatic Control Switch. The AS-100 is a switch that controls the line voltage (instead of sending a low voltage control message to the panel or other room controller). Instead, the AS-100 responds to timed power interrupt signals coming from a relay in the panel, providing automatic shutoff with a blink warning when transitioning between normal hours and after hours. Other timed interrupt signals can turn the power on or off. You assign a relay to "AS-100" mode using LMCS-100 software or on the Load Config (PnL) menu in the LMCT-100. All relays in "AS-100 mode" remain closed except for the timed interrupts. If this macro is assigned to a group, you should only assign relays in "AS-100" mode to that group. When using this Macro, none of the seven group parameters apply. (Although Blink is set to 5 minutes, the blink time is actually controlled by the AS-100, not the LMCP.)

**NOTE:** Since selecting this mode puts all relay in the associated group into "AS-100" mode, you should not assign those relays to another group set to a different macro.

**NOTE:** Keep in mind that Macros only affect the behavior during the transitions to Normal Hours and After Hours, plus the response to occupancy sensors. Any scheduled events and input from photocell sensors will still affect the loads.

**NOTE:** The values for the seven parameters are only applied to the Group when the Macro (or custom) information is **sent** to the LMCP from the LMCT-100 remote or LMCS-100 software. If a subsequent message is sent to the LMCP with a different value for a parameter, the original value is overwritten, and will only change back to the original value if the Macro is sent again to the group. So for example, if a relay is assigned to two different groups, and each group has been assigned a different Macro, the last macro sent to the LMCP will determine the behavior of that relay.

Macro	Macro Values						
	General Settings			Transition Settings		Sensor Behavior	
	Blink	Time Delay NH	Time Delay AH	NH>AH	AH>NH	NH	AH
Manual	5 min	None	None	Do nothing	Do nothing	Off Only	Off Only
Override Time AH	5 min	None	120 min	Turn off	Turn on	Off Only	Off Only
Sensor Disable Day	5 min	None	120 min	Turn off	Turn on	Follow On Only	Auto
Sensor Man-On NH	None	None	120 min	Turn off	Do nothing	Off Only	Auto
Sensor Auto	5 min	None	120 min	Do nothing	Do nothing	Auto	Auto
Auto Switch-1xx	5 min	None	None	Do nothing	Do nothing	Do nothing	Do nothing



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## DARK/LIGHT EVENTS

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The LMCP can be programmed to turn relays on or off based on when it becomes dark outside (night) or light (day). You can program up to 32 separate dark/light events, and each event is assigned to a group. For each event, you can select whether to base the change from dark to light and light to dark on either an astronomical calculation of sunrise and sunset, or from a photocell connected to an LMIO-301. You can have multiple LMIO-301s connected to the network and assign different groups to different LMIO-301s, or you can have a single LMIO-301 but assign different light thresholds to different groups.

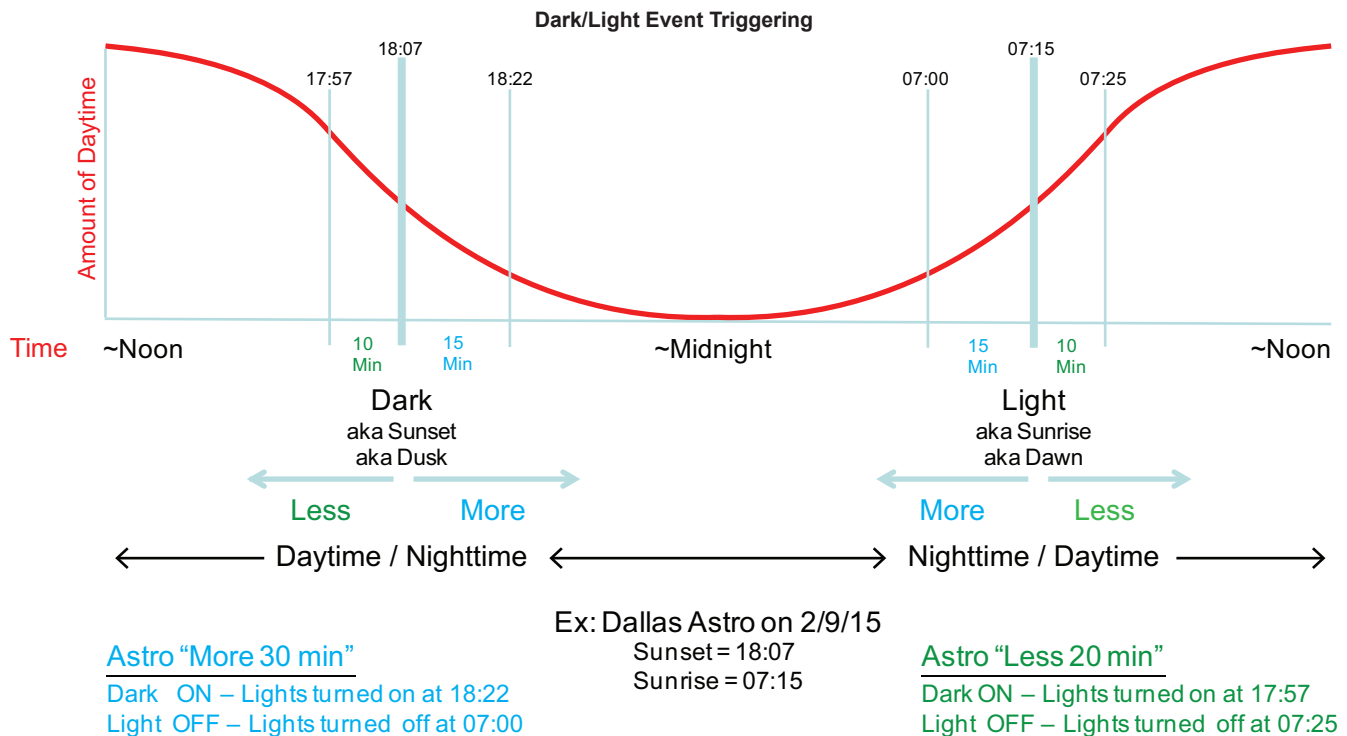
**NOTE:** You can only select a single LMIO-301 if programming with the LMCT-100. To use multiple LMIO-301s, you must program with the LMCS-100 software.

Each Dark/Light event has a **Dark** parameter and **Light** parameter. For each parameter you can select whether the relays belonging to the group will turn “On”, turn “Off”, or “Do Nothing”. So, while a typical application would be to turn lights on when it gets dark outside, you could also choose to have a specific group of lights turn off when it gets dark.

### Astronomical Dark/Light Switching

When you use astronomical control, of dark/light events, Dark is triggered by sunset and Light is triggered by sunrise, based on your location.

Additionally, you have the ability to select **More Light** or **Less Light**. This parameter, in conjunction with a **Time** parameter, determines when the event will be triggered in relation to the actual sunrise and sunset time. More/Less light refers to the amount of “daytime”/“nighttime”. The time parameter can be selected in two minutes increments, and is equally divided between before and after the actual sunrise/sunset time. The **More Light** parameter acts as if the time between sunrise and sunset was longer (more daytime), and **Less Light** acts as if there were less time between sunrise and sunset (less daytime). So if you select Less Light with a time value of 20 minutes, the Dark event will trigger 10 minutes **before** sunset and the Light event will trigger 10 minutes **after** sunrise. The diagram below shows the exact time the events will be triggered based more or less light with different time values.



### Switching Based on Input From an LMIO-301 and Photocell

If you control dark/light events from an LMIO-301, you can select the amount of light, in footcandles that will trigger the events. If the light rises above the footcandle amount, a light event will trigger, and if it drops to the exact footcandle amount, a dark event will trigger.

A **Time Delay** feature allows you to set the number of minutes after the specified footcandle amount is reached before triggering the event. This helps prevent unwanted event triggering, for example, when the light temporarily gets darker because of a cloud passing over the sun.

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## CONNECTING SWITCHES, SENSORS, PHOTOCELLS, AND OTHER DLM ACCESSORY DEVICES

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### Accessory Device Support

Each Cat5 Local DLM Network port, labeled A and B, supports a maximum of 48 communicating devices. Note that the panel itself counts as one device in each network, so this allows for a maximum of 94 possible accessory devices per panel.

The maximum cable run for a network depends on the number of devices. 150' of cable is allowed per device; a two device network is allowed 300', 3 devices 450' etc., up to 1,000' maximum. For example a network that has 6 devices supports a maximum of 900' of total CAT5e cabling with no minimum or maximum spacing between devices. The first five 5 devices could be separated by a 10' LMRJ (4 total) and the first switch could then be 860' from the first panel. Since the maximum length is 1000' for the network, adding additional accessory devices beyond 6 total will increase the length by 100' more, no matter how many devices are added.

**NOTE:** Although the two networks are independent for wiring length purposes, all devices on both networks have the ability to communicate with each other. This provides the end result of a total of 2000' of cable between all DLM devices connected to the panel via CAT5e cables. Additionally, if connecting two or more panels via MS/TP, each of those panels has 4000' feet of connection possible.

Additionally, each network can draw a maximum of 250A, so the number of devices on a network will be determined by the amount the devices draw. However, if you add room controllers or plug load controllers to the network, they provide additional amperage for the other connected devices, up to a maximum of 800A.

## Switches

The panel's local DLM network supports all models of DLM switches. Switch buttons may be bound to a group or to an individual relay in the panel. If a switch is bound to a group and any load assigned to that group is ON, the LED on that switch will indicate ON.

There are several advantages to binding a switch to a group:

- If you add a load to a group, that switch will immediately control that load without having to re-program the switch.
- You can assign a switch to the same set of loads controlled by a schedule or dark/light event
- If you have multiple panels connected, and the same group number assigned to loads in those panels, the switch will control the loads from those other panels in addition to the panel in its local network. This allows you to program a single switch that can be used as a master, to turn all lights on or off in the case of an emergency or other special circumstance.

## Occupancy Sensors

The panel's local network supports all models of DLM occupancy sensors. Using Push n' Learn, any number of occupancy sensors can control the same relay(s) in the local panel. In this case, all sensors must be in the unoccupied state before the relay(s) turn off.

A maximum of 32 sensors can control an individual load. (The total number of sensors controlling various loads is limited only by the network limitations described above.)

## Daylight Sensors

The LMLS-400, LMLS-500, and LMLS-600 daylight sensors are capable of controlling relays in the panel as switching loads, or dimming loads if a dimming capable room controller is connected to the local DLM network.

## Analog Photocells

As described in the previous section on Dark/Light Events, the panel's local network supports the LMIO-301 Analog Photocell Module. This module supplies the "light" and "dark" trigger. The panel has user settings for foot candle levels and time delay. The time delay is used before triggering "light" and "dark" events to establish a dead band and prevent nuisance switching. Only one LMIO-301 per panel can be programmed via the LMCT-100; more can be connected if using LMCS-100 software.

Two types of photocell sensor heads can be used. The LMPO-200 is intended for outdoor use, while the LMPS-6000 is intended for indoor use where there is direct exposure to high light levels, as would be present adjacent to the glass in an atrium, skylight, or clearstory.

## Interface with Third Party Devices

Several devices are available that allow the LMCP and other DLM devices in the local network to respond to or send signals to third party devices. The LMIO-101 Digital Input/Output Interface provides isolated relays for up to two control devices. A typical application is to provide control of HVAC based on occupancy detection. The LMIO-102 Digital Partition Interface provides the ability to control partitions in multi-use spaces that are frequently reconfigured. Applications include hotel and conference center ballrooms and meeting rooms, school multi-use rooms, and other spaces with movable walls. The LMDI-100 Serial Data Interface provides control of A/V, shade control, and specialized lighting control in venues such as auditoriums, theaters, conference rooms, and training centers.

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## USING AN LMCP WITH ROOM CONTROLLERS AND PLUG LOAD CONTROLLERS

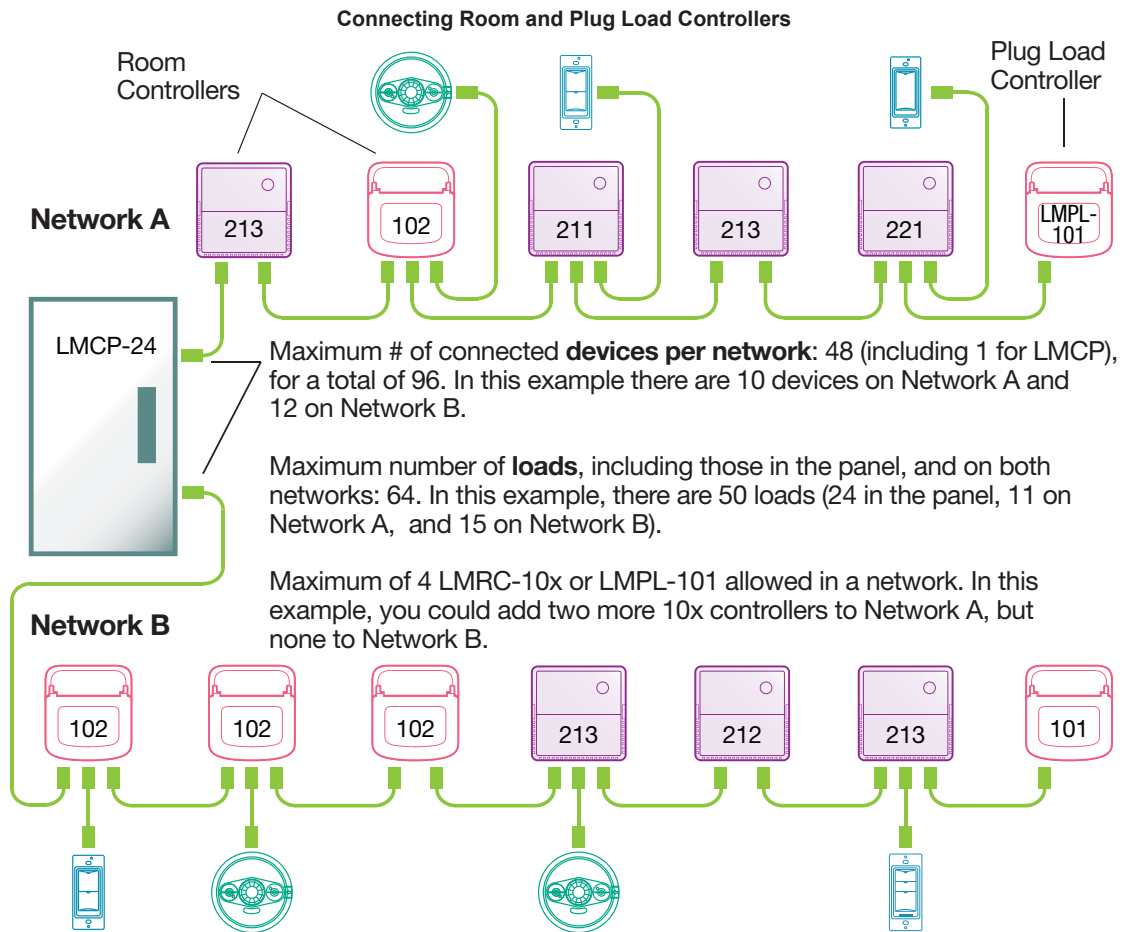
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By connecting room controllers and plug load controllers to the DLM local network, you can increase the number of loads in the network. The maximum number of loads, including all the loads within the panel, is 64. Since the maximum number of devices on a single network is 48, the total number of additional controllers possible will also be dependent on the number of other DLM devices on that network. The same cable length requirements apply as with other DLM devices.

Connecting additional controllers to the panel provides several advantages:

- The loads connected to those controllers can be assigned to groups, the same as the relays in the panel. This allows for scheduling of those loads and all other group features.
- Dimming loads can be added to the network, provided you have a room controller with dimming capability.
- Current monitoring of plug loads and dimming loads is possible as part of the network control.

**NOTE:** There is a maximum of 4 LMRC-10x room controllers and/or LMPL-101 plug load controllers allowed **per network** (A or B), for a maximum total of 8. This applies only to the 10x series and not the 2xx series.



## Load Control Arbitration

After the room or plug load controllers are connected to the DLM Local Network and powered up, they automatically negotiate to determine which controller becomes the **Master**. This is referred to as load arbitration. The controllers also determine the load numbers for each relay on the DLM Local Network. By design, the Master is the controller powering the bus with the highest serial number. The panel will have the highest serial number and therefore be the Master. As a general rule, controllers with more loads have a higher serial number than lower ones, and room controller have higher numbers than plug load controllers.

Example: The LMCP-24 is connected to an LMRC-101, LMRC-212, and LMPL-201. The panel uses load IDs 1–24, the LMRC-212 uses IDs 25 and 26, the LMRC-101 uses ID 27, and the LMPL-201 uses ID 28.

**NOTE:** The panel will reserve IDs based on the number of slots on the LMRD card, not the number of relays installed. So an LMCP-24 with only 16 relays installed will still reserve IDs 1-24.

## PROGRAMMING THE LMCP

There are five methods for programming the behavior of the relays in the LMCP. All programming is stored in the memory of the LMCP.

- Directly on the LMCP, using Smartwire, to bind loads to groups 1–8
- Directly on the LMCP and connected switches and sensors, using Push n' Learn, to bind loads to individual switches and sensors
- Using the LMCT-100 hand-held remote. This provides all the functionality as Smartwire, but allows you to program all 99 groups in a panel, instead of just groups 1–8. It also provides the ability to program connected switches and sensors to groups. Additionally, you can use the LMCT-100 to bind switches and sensors to individual loads, the same as using Push n' Learn.
- Using the LMCS-100 software. You can connect a PC running LMCS-100 to the panel directly, using an LMCI (USB to LMRJ adapter), or via BACnet. LMCS-100 provides the largest amount of control. If using multiple panels networked together, this is the recommended method. Programming using LMCS-100 is not described in this guide, but instead in the LMCS-100 User Guide. For the latest version, go to <http://www.wattstopper.com/products/digital-lighting-management/configuration-tools/dlm-computer-interface-tools-and-software.aspx> and click on the Resources tab.
- Using an LMSM-3E or LMSM-6E Segment Manager or other BAS application through BACnet. A limited number of parameters are exposed directly through BACnet. For details, see [“Appendix A” on page 32](#). Also see the Segment Manager User's Guide.

**NOTE:** It is **strongly** recommended that if you are using LMCS-100 software, you do not use the LMCT-100 to program the panels or any connected devices. In a distributed network situation where groups might be assigned across more than one panel, LMCS-100 will determine which panel's memory will store the schedules. Sending information to the panels via the LMCT can create conflicting messages between panels.

## Load Binding to Groups 1–8 (Smartwire)

Smartwire provides a quick and easy way to assign loads (relays) to groups, using the buttons on the panel. If programming from the panel, Smartwire applies only to groups 1–8. Once assigned to the group, pressing the group button to turn that group ON or OFF will turn the associated loads ON or OFF.

**NOTE:** If using the LMCT-100 to program the panel, you can use Smartwire with groups 1–99.

Keep in mind that if panels are networked together, then once a load is assigned to a group, turning ON that group in any panel will turn ON the associated loads for that group number, even if it is a different panel.

To program using Smartwire:

1. Press and hold a group button for at least five seconds, until the LED next to the group button begins blinking. At this point, all of the Relay Override LEDs will turn OFF (unless the relay is already bound to the group you are programming, in which case it will blink).
2. Press the buttons for each load that you want bound to that group, so that their LEDs blink. If a load is currently bound to the group and you do not want it part of the group, press the button to turn the LED OFF.
3. Press and release the Group button to exit Smartwire mode. At this point, any Relay Override LEDs that were ON previous to entering Smartwire mode will turn back ON.
4. To test your programming, press the group button to turn it ON. The relays associated with that group will turn ON. You can turn the group back OFF, by pressing the button again.

## Push n' Learn

You can bind a load to specific controllers such as switches or sensors using Push n' Learn (PnL). The important distinction between PnL and Smartwire is that with Smartwire, you are connecting individual loads to a group rather than binding individual loads to controllers..

### PnL vs. Groups

It is possible to assign a controller to more than one load using PnL. In this manner, using PnL is similar to using groups because you can control multiple loads at the same time. The important **difference** between using PnL and assigning groups is that groups offer more functionality, such as schedules and dark/light, whereas PnL can only assign controllers to loads.

### Programming the LMCP Using PnL

1. There are three different methods you can use to enter PnL mode:
  - Press and hold the Config button on any remote DLM device for at least three seconds, until the red LED on the unit begins to blink. The location of this button will vary, depending on the device. On many devices (such as switches and occupancy sensors), you will need a small pointed tool to push the button.
  - Press and hold the Panel Config button on the LMPI board of the LMCP for at least three seconds, until the red LED on the unit begins to blink.
  - Use the LMCT-100. Select the LOAD CONFIG (PnL) menu, to enter PnL mode.

No matter which method you use, once you enter PnL mode, the red LED on **all** DLM devices connected in the network will blink, and you can assign any DLM controller to a load on the panel.

2. When you first enter PnL mode, the Status LEDs for all loads except Load 1 will turn off. The Load 1 LED remains active, indicating it is the currently programmable load. At this point, the method of programming depends on whether you are using the LMCT-100.
  - a. If you are **not** using the LMCT-100, press the Config button on the LMCP or any connected DLM device. Each time you press the Config button, the panel will cycle to the next load. The Status LED for a load turns ON when that load is selected (only one load LED will be on at a time). When you reach the highest number load, it will cycle back to load 1. You can also jump directly to a specific load by pressing the Override button for that load on the LMCP, LMRC, LMPL, or LMRC. Once you select the desired load, you can bind the specific controller to that load. For a switch, you do this by pressing the desired button on that switch to turn it on. For an occupancy sensor, you use the display and navigation buttons on the sensor to bind that load to the sensor.
  - b. If you are using the LMCT-100 then you select the load on the LMCT. It starts by default on load 1. To choose another load, select NEXT, use the left and right arrow buttons to select the desired load, then point the LMCT at the IR sensor and press Select. The screen for that load's settings opens. On this screen, you can bind a specific controller to that load. For a switch, you do this by pressing the desired button on that switch to turn it on. For an occupancy sensor, you point the LMCT-100 at the sensor and select BIND. For more details on programming PnL from the LMCT-100, see the [LMCT-100 User Guide](#).
3. To exit PnL, hold the Config button for 3 seconds, until the LED stops blinking. Or if using the LMCT-100, select EXIT.

If you have one or more DLM Room controllers connected to the LMCP, then as when you cycle through the loads by pressing the Config button, once the last relay is reached on the LMCP, the sequence advances to the Room Controller with the highest serial number and cycles through the loads on that controller in order.

A primary difference in operation of the LMCP compared to a DLM Room Controller is that by default, while in load configuration mode, the panel relays do not turn on and off in sequence as the Config button is pressed. Only the LED associated with the relay turns on. On a DLM Room Controller, the load itself will turn on and off.

**NOTE:** It is possible to change the LMCP so that the relays turn on and off in PnL, just like a room controller. This is done by setting Dip switch #7 on the LMPI board to the ON position.

## PROGRAMMING USING THE LMCT-100

**NOTE:** In addition to programming the LMCP, the LMCT-100 is used for programming many different DLM devices, including switches, occupancy sensors, and other devices. This user guide only describes the screens specific to panel programming, and assigning of groups. Use of the LMCT-100 to bind switches and sensors to individual loads (even when those loads exist in a panel) is detailed in the [LMCT-100 User Guide](#).

### LMCT-100 Basics

The LMCT-100 provides an easy to read display and a simple user interface that makes it easy to navigate through programmable features. It both sends information to and receives information from the LMCP and other DLM devices.

It is important to understand that **all information is stored in the LMCP or accessory devices**, and not the LMCT-100. Therefore, if you change any values on the LMCT-100, you must select the **Send** option in order to save your changes. If you press the **Home** button, **Back** button, or select **Done** without first sending the data to the LMCP, that data is not saved.

### User Interface Navigation



You navigate from one field to another using ▲ (up) or ▼ (down) arrow keys. The active field flashes between yellow text on black background and black text on yellow background. Navigation “wraps” around, so if the active field is the top field and you need to get to the field at the bottom of the screen, pressing ▲ will bring you to the bottom in a single key press.

**NOTE:** The up and down arrow keys are always used to move between fields. So even when fields are placed on the same horizontal line, which is often found with the Action options at the bottom of the screen, you still use the Up/Down arrows to move left/right between fields.

Once a menu field is active, press the Select  button to open that menu.

Value fields are used to adjust parameter settings. They are shown within “less than/greater than” symbols: <value>. Change the value using ◀ and ▶ arrow keys. In general the ▶ key increments and the ◀ key decrements a value. Selections wrap-around if you continue to press the key beyond maximum or minimum values. Move between value fields using ▲ or ▼ arrow keys.

The  button takes you to the main menu.

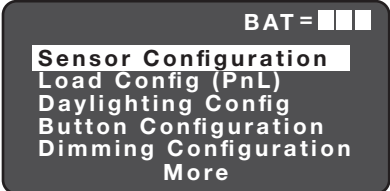



The  (Back) button can be thought of as an undo function. It takes you back one screen. Changes that were in process prior to pressing the  key are lost.

At the bottom of any screen that includes programmable fields, you will see **Send** and **Done** (and sometimes additional choices). As mentioned previously, you must press **Send** to save your data to the LMCP before pressing **Done**, if you want to save the values you set on that screen.


On some screens, one of the options at the bottom of the screen will take you to a secondary, related screen. For example, at the bottom of the **Program Schedules** screen is an **Active Days** option, where you choose which days the schedule will be active. In the case, the **Schedule Active On** screen has only a **Done** option at the bottom—you must return to the **Program Schedules** screen before you can send the schedule information to the LMCP.

### Accessing Panel Setup

As mentioned previously, this user guide describes the screens specific to Panel Setup. The following screens show how to navigate into this screen. To avoid repeating the same steps for every function described in the following pages, all sections after this one assume you have already navigated to the **Panel Setup** screen.

Display	Description	Press
	Scroll Down or Up to Highlight <b>More</b> , then press <b>Select</b> . <b>Hint:</b> Navigation “wraps” around, so if you scroll “up”, you can reach <b>More</b> with a single button press.	▼ or ▲ then Select 
	Scroll Down or Up to Highlight <b>Panel Select</b> , then press <b>Select</b> .	▼ or ▲ then Select 











Display	Description	Press
<div>Point to the desired Panel IR Sensor and press 'Select'</div>	Point the LMCT-100 at the infrared sensor on the LMRD board and press Select.	Select 
<div> <div>Panel Setup</div> <div>Location Settings</div> <div>Date and Time</div> <div>Network</div> <div>Button Binding</div> <div>Panel Programming</div> <div>Status</div> </div>	This screen is the starting point for all following instructions.	

Setting the Panel Location



Setting the panel location provides sunrise/sunset information to the panel, for use when you set a schedule according to an astronomical clock.

**NOTE:** The LMCT-100 has a limited number of locations to choose from. For a much more extensive list, use the LMCT-100 software to access this feature.

Display	Description	Press
<div> <div>Panel Setup</div> <div>Location Settings</div> <div>Date and Time</div> <div>Network</div> <div>Button Binding</div> <div>Panel Programming</div> <div>Status</div> </div>	When you first enter the <b>Panel Setup</b> screen, <b>Location Settings</b> is already highlighted. Press Select.	Select 
<div>Point to the desired Panel IR Sensor and press 'Select'</div>	Point the LMCT-100 at the infrared sensor on the LMRD board and press Select.	Select 
<div> <div>Location Setup</div> <div>State: Rhode Island</div> <div>City: Newport</div> <div>Latitude: 41N</div> <div>Longitude: 71W</div> <div>Hours Behind GMT 5</div> <div>DONE SEND</div> </div>	<p>Select the desired <b>State</b>, and <b>City</b>. The Latitude/Longitude/Behind/Ahead Hours are fixed values. Then highlight <b>SEND</b> and press Select.</p> <p>Once again, point the LMCT-100 at the infrared sensor on the LMRD board and press Select. You return to the <b>Location Setup</b> screen.</p> <p>Highlight <b>DONE</b> and press Select, or press  to return to the <b>Panel Setup</b> screen</p>	<div>  or  to move to each parameter   or  to change the value of the parameter  then choose <b>SEND</b> and press Select  </div>

Setting the Date and Time

The date and time are used for schedules, including both manually set events and sunrise/sunset determination (in conjunction with the location settings).

Display	Description	Press
<div> <div>Panel Setup</div> <div>Location Settings</div> <div>Date and Time</div> <div>Network</div> <div>Button Binding</div> <div>Panel Programming</div> <div>Status</div> </div>	From <b>Panel Setup</b> , scroll to <b>Date and Time</b> . Press Select.	 then Select 



## Display

## Description

## Press



Point the LMCT-100 at the infrared sensor on the LMRD board and press Select.

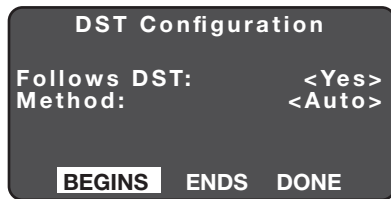
Select



Scroll to each field and set the value. An illegal date (for example, February 30) cannot be entered. After selecting all values, scroll to **DSTSTD** and press Select.

**NOTE:** There is no clock in the LMCT-100, so the time values will not change if you remain on this screen longer than a minute.

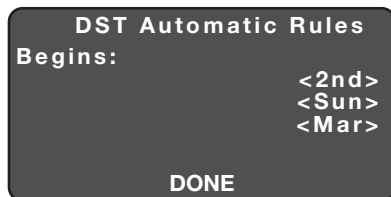
to move to each parameter  
or  
to change the value of the parameter  
then choose **DSTSTD** and press Select



This screen determines if the panel will follow Daylight Savings Time. If you set **Follows DST** to "Yes", you can choose a value of "Auto" or "Manual" for **Method**. Select **BEGINS**.

**NOTE:** If you set **Follows DST** to "No", the **Method** field disappears. Highlight **DONE** and press Select, or press to return to the **Date and Time Set** screen

to move to each parameter  
or  
to change the value of the parameter  
then choose **BEGINS** and press Select



Depending on whether you choose a value of Auto or Manual, the screen changes. For Auto, you select the week, the day of the week, and the month. For Manual, you select a specific date (for example, March 20th). Select **DONE** to return to the **DST Configuration** window. Repeat the process for the end of DST by pressing **ENDS**. Then select **DONE** to return to the **Date and Time Set** screen.

to move to each parameter  
or  
to change the value of the parameter  
then choose **DONE** and press Select



Highlight **SEND** and press Select.

Once again, point the LMCT-100 at the infrared sensor on the LMRD board and press Select. You return to the **Date and Time Set** screen.

Highlight **DONE** and press Select, or press to return to the **Panel Setup** screen

to move to each parameter  
or  
to change the value of the parameter  
then choose **SEND** and press Select

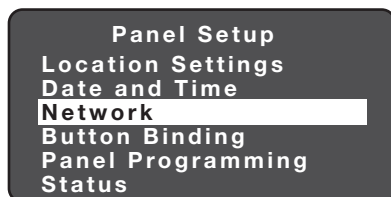
## Configuring the Network Settings

The Network Settings screen allows you to customize settings related to communication over a BACnet network.

## Display

## Description

## Press















From **Panel Setup**, scroll to **Network**. Press Select.

then Select






Point the LMCT-100 at the infrared sensor on the LMRD board and press Select.




Select

Display	Description	Press
<div>Panel Network</div> <div> <b>Network Settings</b>  Network Status </div>	<p>The <b>Panel Network</b> screen opens, with <b>Network Settings</b> selected. Press Select</p>	Select 
<div> LM Panel 0603981210  Name: <b>603981210</b>  Device ID: 0981210  AutoSet MSTPMAC: &lt;Yes&gt;  Auto MSTP MAC: 051  Baud Rate: &lt;38400&gt;  Max Master: &lt;127&gt;  DONE SEND </div>	<p>The top line of the screen shows the serial number of the panel. The <b>Name</b> defaults to the serial number, but can be changed. Highlight the value and press Select to open a new screen, as shown below.</p> <p>The <b>Device ID</b> must be a unique number within the BACnet network. By default, it is set to the last six digits of the serial number, but like <b>Name</b> can be changed by highlighting the value and pressing Select.</p> <p>The MS/TP MAC address is another ID used to identify a device. If you select a value of “Yes” for <b>AutoSet MSTP MAC</b>, the LMCP will select a value itself, displayed as the <b>Auto MSTP MAC</b>. If you change the auto set value to “No” and scroll down, the parameter changes to <b>Manual MSTP MAC</b> and you can change the value.</p> <p>The default <b>Baud Rate</b> is 38400, but can be changed. The <b>Max Master</b> is the highest number the LMCP will try when polling for a master.</p> <p>Highlight <b>SEND</b> and press Select.</p> <p>Once again, point the LMCT-100 at the infrared sensor on the LMRD board and press Select. You return to the <b>Panel Network</b> screen.</p> <p>Highlight <b>DONE</b> and press Select, or press  to return to the <b>Panel Setup</b> screen.</p> <p>For a detailed explanation of these parameters, see <a href="#">“Connecting Multiple LMCP Panels in a Network” on page 30</a>.</p>	<p>  or  to move to each parameter   or  to change the value of the parameter  then choose <b>SEND</b> and press Select  </p>
<div> <b>[603981210 ]</b>  Move to any character with left/right keys.  Change the character with the up/down keys.  DONE ERASE COPY PASTE </div>	<p>If you press Select with the <b>Name</b> or <b>Device ID</b> field highlighted, this screen opens. You can change the name using numerals or letters, and change the ID with numerals only.</p> <p>Select <b>ERASE</b> to clear all characters before entering new data.</p> <p>When finished editing, select <b>DONE</b> to return to the <b>Network Settings</b> screen.</p>	<p>  or  to move to each character   or  to change the value of the character  then choose <b>DONE</b> and press Select  </p>

Viewing the Network Status






The **Network Status** shows the communication “health” of the network and the number of devices currently found on the network.

Display	Description	Press
<div>Panel Setup</div> <div> Location Settings  Date and Time  <b>Network</b>  Button Binding  Panel Programming  Status </div>	<p>From <b>Panel Setup</b>, scroll to <b>Network</b>. Press Select.</p>	 then Select 
<div>Point to the desired Panel IR Sensor and press ‘Select’</div>	<p>Point the LMCT-100 at the infrared sensor on the LMRD board and press Select.</p>	Select 

Display	Description	Press
<div>Panel Network</div> <div> <div>Network Settings</div> <div>Network Status</div> </div>	<p>The <b>Panel Network</b> screen opens, with <b>Network Settings</b> selected. Scroll down to <b>Network Status</b>. Press Select</p>	Select 
<div>Network Status</div> <div>LM 0603981210</div> <div>Net Status: Unhealthy</div> <div>Net Device Count: &lt;0&gt;</div> <div>DONE</div>	<p>The <b>Network Status</b> will display as “Unhealthy” if it can’t find the BACnet network, or if devices on network drop off and then reappear while the LMCP is polling the network (indicating connection problems). If devices show up consistently, or if they disappear and do not show up again (which would indicate the device was disabled or disconnected), the status will display as “Healthy”.</p> <p>The <b>Net Device Count</b> displays the number of devices on the BACnet network.</p> <p>Select <b>DONE</b> to return to the <b>Panel Network</b> screen. Highlight <b>DONE</b> and press Select, or press  to return to the <b>Panel Setup</b> screen</p>	Select <b>DONE</b> 

Binding Buttons to Loads or Groups





You can bind any switch button to a specific load (relay) in the panel, or to a group. If you assign to loads, you can bind as many loads as you want to a single button. If you assign to a group, you can only select one group.

Display	Description	Press
<div>Panel Setup</div> <div> <div>Location Settings</div> <div>Date and Time</div> <div>Network</div> <div>Button Binding</div> <div>Panel Programming</div> <div>Status</div> </div>	<p>From <b>Panel Setup</b>, scroll to <b>Button Binding</b>. Press Select.</p>	 then Select 
<div>Point at switch, and press 'Select'</div> <div>Continue pointing to the switch, then press the button you wish to assign</div>	<p>Point the LMCT-100 at the infrared sensor on the switch that you want to bind and press Select. The blue LED on each button on that switch will be blinking. While the LMCT-100 is still pointed at the switch, press the button that you want to bind.</p>	Select 
<div>Button Assignment (004316987)</div> <div> <div>Type &lt;Loads&gt;</div> <div>Load: &lt;1&gt;</div> <div>Member: &lt;Yes&gt;</div> <div>SEND</div> </div>	<p>The <b>Button Assignment</b> screen opens. For the <b>Type</b> parameter, you choose between “Loads” and “Group”.</p> <p>If you select “Loads”, then you can select each load individually using the <b>Load</b> parameter. With a specific load selected, choose whether the button will be bound to that load by setting the value of the <b>Member</b> parameter. (“Yes” or “No”).</p> <p>If you select “Group”, the <b>Load</b> parameter changes to <b>Group</b>, and you select the group number to bind the button to.</p> <p>Highlight <b>SEND</b> and press Select. Once again, point the LMCT-100 at the switch and press Select. You return to the <b>Panel Setup</b> screen. At this point, you can test the button turning it on and off. Repeat the process to bind another button.</p>	 then Select 

Panel Programming

The majority of programming functions for panels are found under the **Panel Programming** menu. This includes:





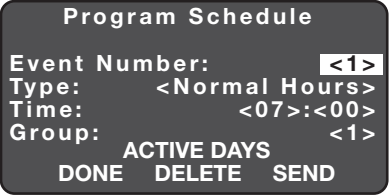





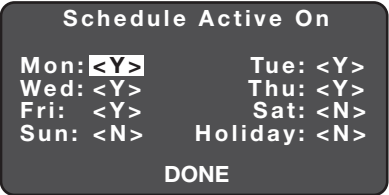





- Schedules – Allows you to specify an event and assign it to a group
- Holidays – Allows you to specify a specific date as a holiday. Used in conjunction with schedules.
- Dark/Light –
- Groups – Allows you to specify groups and assign loads to the groups
- Occupancy Sensors – Allows you to configure how loads respond to triggers from occupancy sensors.

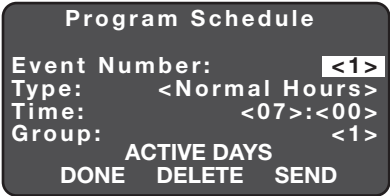


Display	Description	Press
	From <b>Panel Setup</b> , scroll to <b>Panel Programming</b> . Press Select.	 then 
	The <b>Panel Programming</b> screen is displayed	

To avoid repeating the same steps for every function described in the following pages, the Panel Programming Sections assume you have already navigated to the **Panel Programming** screen.

Schedules












On this set of screens, you assign an event to a group, and set one action for that event. For each event, you specify the time the event occurs. You also specify whether the event will occur on a per day basis. Additionally, you specify whether the event will occur on any day designated as a holiday.

Display	Description	Press
	From the <b>Panel Programming</b> screen, highlight <b>Schedules</b> and press Select	Select 
	Point the LMCT-100 at the infrared sensor on the LMRD board and press Select to open the <b>Program Schedule</b> screen.	Select 
	Select the <b>Event Number</b> in which to store the schedule information. The <b>Type</b> determines the action for the event. For details on the actions, see the <b>Schedules</b> on page 7. Set the <b>Time</b> for the event to occur and assign the event to a <b>Group</b> . Then, highlight <b>ACTIVE DAYS</b> and press Select.	 or  to move to each parameter  or  to change the value of the parameter then choose <b>ACTIVE DAYS</b> and press Select 
	For each day of the week, select whether the event will be active (Yes or No). Additionally, select whether the event will be active on holidays. (You determine which days are holidays in the <b>Holidays</b> screen.) Highlight <b>DONE</b> and press Select to return to the <b>Program Schedule</b> screen.	 or  to move to each parameter  or  to change the value of the parameter then choose <b>DONE</b> and press Select 

Display	Description	Press
	<p>Highlight <b>SEND</b> and press Select.</p> <p>Once again, point the LMCT-100 at the infrared sensor on the LMRD board and press Select. You return to the <b>Program Schedule</b> screen, where you can program the next event</p> <p>When finished, highlight <b>DONE</b> and press Select to return to the <b>Panel Programming</b> screen.</p>	 then Select 

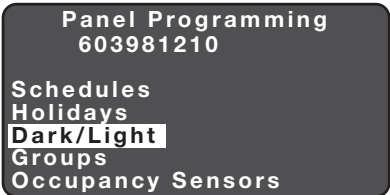




## Holidays

On this screen, you determine which days are designated as holidays.

Display	Description	Press
	<p>From the <b>Panel Programming</b> screen, highlight <b>Holidays</b> and press Select</p>	 then Select 
	<p>Point the LMCT-100 at the infrared sensor on the LMRD board and press Select to open the <b>Holiday Setup</b> screen.</p>	<p>Select </p>
	<p>For the <b>Holiday</b> parameter, select the memory location to store the information. Then select the date for the holiday and <b>Duration</b>.</p> <p>Highlight <b>SEND</b> and press Select.</p> <p>Once again, point the LMCT-100 at the infrared sensor on the LMRD board and press Select. You return to the <b>Holiday Setup</b> screen, where you can program the next event</p> <p>When finished, highlight <b>DONE</b> and press Select to return to the <b>Panel Programming</b> screen.</p>	<p>  or  to move to each parameter   or  to change the value of the parameter  then choose <b>SEND</b> and press Select  </p>

## Dark/Light

On this set of screens, you assign individual dark/light events.


Display	Description	Press
	<p>From the <b>Panel Programming</b> screen, highlight <b>Dark/Light</b> and press Select.</p>	 then Select 
	<p>Point the LMCT-100 at the infrared sensor on the LMRD board and press Select to open the <b>Dark/Light Events</b> screen.</p>	<p>Select </p>

Dark/Light Events

Event: <1>

NEXT DONE DELETE SEND

Select the **Event** number in which to store the dark/light event. Then highlight **NEXT** and press Select to open the **Dark/Light Event x** screen.

◀ or ▶ to change the value of the parameter  
then choose **NEXT** and press Select 

This screen changes depending on the value of the **Controller** parameter. By default, this is set to "Astro". In this case, the dark and light events are determined by sunrise and sunset, which is dependent on the values you set on the **Location Setup** screen.

For the **Dark** and **Light** parameters, you set whether the relays belonging to the group will turn "On", turn "Off", or "Do Nothing".

The next parameter can be set to "**More Light**" or "**Less Light**". This parameter, in conjunction with the following Time parameter, determines when the event will be triggered in relation to the actual sunrise and sunset time. More/Less light refers to the amount of "daytime"/"nighttime". The time parameter can be selected in two minutes increments, and is equally divided between before and after the actual sunrise/sunset time. The **More Light** parameter acts as if the time between sunrise and sunset was longer (more daytime), and **Less Light** acts as if there were less time between sunrise and sunset (less daytime). So if you select Less Light with a time value of 20 minutes, the Dark event will trigger 10 minutes **before** sunset and the Light event will trigger 10 minutes **after** sunrise. See the chart on [page 11](#) for more details of this example.


Finally, you assign a **Group** for this event, to control the relays belonging to that group.

If you change the **Controller** parameter to one of the "LMIO-301" values, dark light events are instead triggered by photocell sensor input. Although multiple LMIO-301s may be connected to the network, only a single one can be programmed using the LMCT. Select the number of the LMIO-301 you wish to assign. The LMIO-301 with the highest serial number will have the lowest ID, and so on.

Once you select a value and scroll down to the next parameter, the screen changes. Two new parameters are displayed below **Dark** and **Light**.

The **Setpoint** is the amount of foot candles that will determine when the Dark and Light events are triggered. (When the light becomes brighter than the Setpoint, it triggers the Light event, and when it becomes darker, it triggers the Dark event.)

The **Delay** parameter sets the amount of time after the Setpoint is reached that the event is actually triggered. This helps prevent unwanted event triggering, for example, when the light temporarily gets darker because of a cloud passing over the sun.

◀ or ▶ to move to each parameter  
◀ or ▶ to change the value of the parameter  
then choose **ACTIVE DAYS** and press Select 

Dark/Light Event 1

Controller: <Astro>

Dark: <None>

Light: <None>

<Less Light> <20min>

Group: <9>

ACTIVE DAYS DONE

Dark/Light Event 1

Controller: <LMIO-301 1>

Dark: <None>


Light: <None>

Setpoint: <50fc>

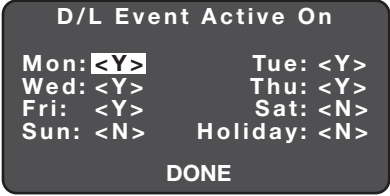





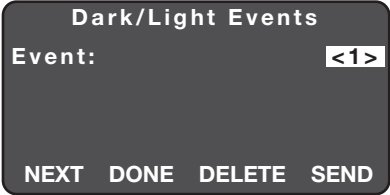



Delay: <2min>

Group: <9>

ACTIVE DAYS DONE

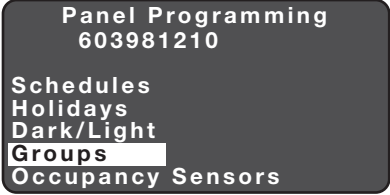




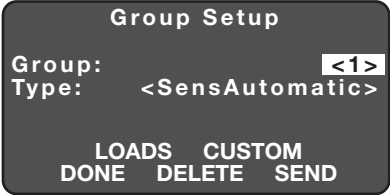





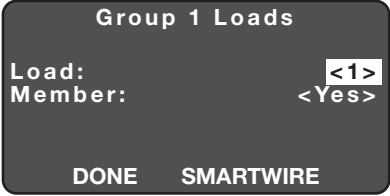







◀ or ▶ to move to each parameter  
◀ or ▶ to change the value of the parameter  
then choose **ACTIVE DAYS** and press Select 



















Display	Description	Press
	<p>Once you have set the parameters on the <b>Dark/Light Event x</b> screen, highlight <b>ACTIVE DAYS</b> and press Select.</p> <p>For each day of the week, select whether the dark/light event will be active (Yes or No). Additionally, select whether the event will be active on holidays. (You determine which days are holidays in the <b>Holidays</b> screen.)</p> <p>Highlight <b>DONE</b> and press Select to return to the <b>Dark/Light Event x</b> screen. Then select <b>DONE</b> again to return to the <b>Dark/Light Events</b> screen.</p>	<p>  or  to move to each parameter   or  to change the value of the parameter  then choose <b>DONE</b> and press Select  </p>
	<p>Highlight <b>SEND</b> and press Select.</p> <p>Once again, point the LMCT-100 at the infrared sensor on the LMRD board and press Select. You return to the <b>Dark/Light Events</b> screen, where you can program the next event</p> <p>When finished, highlight <b>DONE</b> and press Select to return to the <b>Panel Programming</b> screen.</p>	<p>  or  to choose <b>SEND</b> and press Select  </p>

## Groups

On this set of screens, you assign loads to groups and customize the behavior of those groups.







Display	Description	Press
	<p>From the <b>Panel Programming</b> screen, highlight <b>Groups</b> and press Select.</p>	<p>  then Select  </p>
	<p>Point the LMCT-100 at the infrared sensor on the LMRD board and press Select to open the <b>Group Setup</b> screen.</p>	<p>Select </p>
	<p>Select the <b>Group</b> number. In the <b>Type</b> field, select one of the predefined macros or select "Custom" to define the group behavior parameters. For details, see Macros on page 7. Next, highlight <b>LOADS</b> and press Select.</p> <p>Once again, point the LMCT-100 at the infrared sensor on the LMRD board and press Select to open the <b>Group x Loads</b> screen.</p>	<p>  or  to move to each parameter   or  to change the value of the parameter  then choose <b>LOADS</b> and press Select  </p>
	<p>To assign various loads to the group, scroll through each <b>Load</b> number and select whether that load is a <b>Member</b> of that group. When complete, select <b>DONE</b> to return to the <b>Group Setup</b> screen.</p> <p>You also select have the option of using the Smartwire function instead of manually scrolling through the loads. To do this, select <b>SMARTWIRE</b></p>	<p>  or  to move to each parameter   or  to change the value of the parameter  then choose <b>DONE</b> and press Select   <b>OR</b>  Select <b>SMARTWIRE</b> </p>
	<p>Point the LMCT-100 at the infrared sensor on the LMRD board and press Select</p>	<p>Select </p>

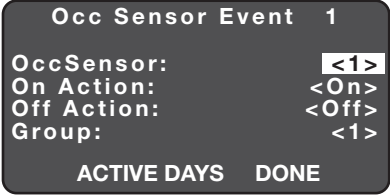

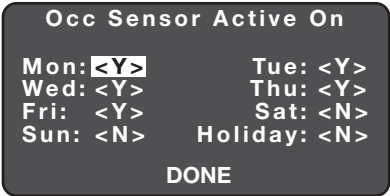

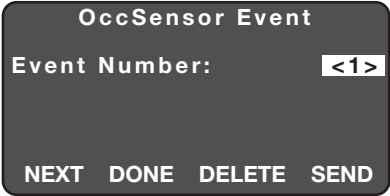

Display	Description	Press
<div> Add or Remove loads by using the push button next to each relay. When finished, point to the IR device and select either <b>DONE</b> <b>CANCEL</b> </div>	Once you enter Smart wire mode, you can use the Load buttons on the panel to assign the loads to the group. See the Smartwire section on page 10 for details. Note that using this method, you can program groups higher than #8 (up to group #99) with Smartwire. Once finished, select <b>DONE</b> to return to the <b>Group Setup</b> screen.	Select <b>DONE</b> 
<div> Group 1 Custom Parm's  Blink: &lt;5 min&gt;  Time Delay NH: &lt;None&gt;  Time Delay AH: &lt;120 min&gt;  NH &gt; AH: &lt;Do Nothing&gt;  AH &gt; NH: &lt;Do Nothing&gt;  <b>NEXT</b> <b>DONE</b> </div>	If you select a value of "Custom" for <b>Type</b> on the <b>Group Setup</b> screen, then you must select the <b>CUSTOM</b> option on that screen, which opens the <b>Group x Custom Parm's</b> screen, which contains the first five of the seven programmable parameters. For definitions of these fields see "Groups, Schedules, and Macros" on page 8. Select <b>NEXT</b> to access the remaining two parameters.	 or  to move to each parameter  or  to change the value of the parameter then choose <b>NEXT</b> and press Select 
<div> Group 1 Custom Parm's  Sensor Behavior  AH: &lt;Auto On/Off&gt;  NH: &lt;Auto On/Off&gt;  <b>PRIOR</b> <b>DONE</b> </div>	After setting the last two parameters, select <b>DONE</b> to return to the <b>Group Setup</b> screen.	 or  to move to each parameter  or  to change the value of the parameter then choose <b>DONE</b> and press Select 
<div> Group Setup  Group: &lt;1&gt;  Type: &lt;SensAutomatic&gt;  <b>LOADS</b> <b>CUSTOM</b>  <b>DONE</b> <b>DELETE</b> <b>SEND</b> </div>	Highlight <b>SEND</b> and press Select. Once again, point the LMCT-100 at the infrared sensor on the LMRD board and press Select. You return to the <b>Group Setup</b> screen, where you can program the next group. When finished, highlight <b>DONE</b> and press Select to return to the <b>Panel Programming</b> screen.	 or  to move to each parameter  or  to change the value of the parameter then choose <b>LOADS</b> and press Select 

## Occupancy Sensors

On this set of screens, you assign individual events that determine whether loads assigned to a group will turn on or off, based on input from an occupancy sensor.



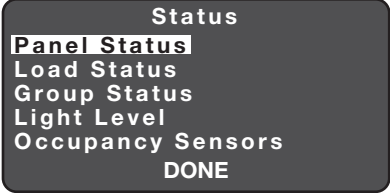

**NOTE:** If using multiple occupancy sensors, when programming with the LMCT-100, you should only assign ONE sensor input to a group. Assigning more than one sensor to a group will lead to inconsistent response (but you can assign different sensors to different groups). If you need to assign multiple sensors to a group, use the LMCS software to program the actions. The LMCS software has additional capabilities for programming input from multiple sensors.

Display	Description	Press
<div> Panel Programming  603981210  Schedules  Holidays  Dark/Light  Groups  <b>Occupancy Sensors</b> </div>	From the <b>Panel Programming</b> screen, highlight <b>Occupancy Sensors</b> and press Select.	 then Select 
<div> Point to the desired Panel IR Sensor and press 'Select' </div>	Point the LMCT-100 at the infrared sensor on the LMRD board and press Select to open the <b>OccSensor Event</b> screen.	Select 
<div> OccSensor Event  Event Number: &lt;1&gt;  <b>NEXT</b> <b>DONE</b> <b>DELETE</b> <b>SEND</b> </div>	Select the <b>Event</b> number in which to store the occupancy sensor event. Then highlight <b>NEXT</b> and press Select.	 or  to change the value of the parameter then choose <b>NEXT</b> and press Select 

Display	Description	Press
	<p>Select the number of the <b>OccSensor</b> assigned to the event. Sensor numbers are automatically assigned based on serial number with the highest number set to 1, next highest set to 2, etc.</p> <p>Set the <b>On Action</b> (sensor detects occupancy) and <b>Off Action</b> (sensor detects vacancy). For each action, the loads in the group can be set to turn ON, turn OFF, or do nothing).</p> <p><b>NOTE:</b> Whether the load responds to the sensor message is determined by the two sensor related parameters that are part of the group. So, for example, if Sensor NH is set to Manual On/Auto Off, the load will respond to the <b>Off Action</b> but not the <b>On Action</b> during Normal Hours.</p>	<p>▼ or ▲ to move to each parameter</p> <p>◀ or ▶ to change the value of the parameter</p> <p>then choose <b>ACTIVE DAYS</b> and press Select </p>
	<p>Set the <b>Group</b> that the event is assigned to. Then, highlight <b>ACTIVE DAYS</b> and press Select</p> <p>For each day of the week, select whether response to sensor input will be active (Yes or No). Additionally, select whether the event will be active on holidays. (You determine which days are holidays in the <b>Holidays</b> screen.)</p>	<p>▼ or ▲ to move to each parameter</p> <p>◀ or ▶ to change the value of the parameter</p> <p>then choose <b>DONE</b> and press Select </p>
	<p>Highlight <b>DONE</b> and press Select to return to the <b>Occ Sensor Event x</b> screen. Then select <b>DONE</b> again to return to the <b>OccSensor Event</b> screen.</p> <p>Highlight <b>SEND</b> and press Select.</p> <p>Once again, point the LMCT-100 at the infrared sensor on the LMRD board and press Select. You return to the <b>Group Setup</b> screen, where you can program the next group.</p> <p>When finished, highlight <b>DONE</b> and press Select to return to the <b>OccSensor Event</b> screen.</p>	<p>▼ or ▲ to choose <b>SEND</b> and press Select </p>

Status

- The Status option includes several different screens which provide information about the panel and networked devices:
- Panel Status – Displays the date and time, based on the panel settings, along with additional information.
  - Load Status – Displays details about each load in the panel, as well as any loads in connected room controllers.
  - Group Status – Displays which loads are assigned to each group, programming details for the group, and differences for loads that may have different settings from the group settings..
  - Light Level – Displays the current light level of any photo sensors connected to the network.
  - Occupancy Sensors – Displays the current state of any occupancy sensors connected to the network.

Display	Description	Press
	<p>From <b>Panel Setup</b>, scroll to <b>Status</b>. Press Select .</p>	<p>▼ then Select </p>
	<p>Highlight the Status option you want to view and press Select.</p> <p>When finished, highlight <b>DONE</b> and press Select to return to the <b>Panel Setup</b> screen.</p>	<p>▼ then Select </p>

## Display

## Description

## Press

Point to the desired  
Panel IR Sensor and  
press 'Select'

Point the LMCT-100 at the infrared sensor on the LMRD board and press Select.  
One of the following screens will display, depending on the Status option you selected.

Select



## Panel Status

This screen displays the date and time, based on the panel settings, sunrise/sunset times based on date and location settings, whether the current date is a holiday, and the current settings of the dip switches. Additionally, it will display an error message for certain problems.

## Display

## Description

## Press

```
Panel Status
Nov 10, 2014 Mon
15:19 STD Non-Holiday
Sunrise: 06:14
Sunset: 16:47
Con LEDs: 00000000
Dip Switch: 00000000
DONE
```

Most fields on this screen are self explanatory. A value of "STD" indicates standard time and a value of "DST" indicates daylight savings time  
For the Dip Switch field, a value of 1 indicates that particular dip switch is set to ON. For details on what each dip switch controls, see ["Dip Switches" on page <?>](#).

The Con LEDs field indicates errors, and will show "1" in individual digits when the Config LED is lit solid and not blinking. From left to right, the error categories are as follows:

- 1st and 2nd digits – not used
- 3rd digit – RTCLOCK
- 4th digit – EEPROM
- 5th digit – Bootload
- 6th digit – Power
- 7th digit – DLM Local Network
- 8th digit – Relay

Press Select to return to the **Status** screen.

Select **DONE**



## Load Status

This set of screens displays details about each load in the panel, as well as any loads in connected room controllers.

## Display

## Description

## Press

```
Load 1 Status
Load On: Select More
01 11111111 10
11 11011010 20
21 11101... 30
31 ..... 40
41 ..... 50
51 ..... 60
```

The "1" indicates  
a priority of 8.

```
Load 1 Online
1 2 3 4 5 6
7 8 9 10 11 12
13 14 15 16
PROPERTIES DONE
```

The first screen indicates the on/off status of each load. A value of "1" indicates it is ON. A value of "0" indicates it is OFF. A value of "." indicates no load exists for that number.

The loads within the panel display first followed by loads from connected room controllers. In the example to the left, loads 1–24 are within the panel and load 25 is from an LMRC-101.

For additional details about the load, highlight that load and press Select to open the **Load x Online screen**. (If you try and select a number for which there is no load, nothing happens.)

To return to the **Status** screen, scroll down past the bottom row (51–60). A second screen displays showing loads 21–64. Highlight **DONE** and press Select.




This screen displays the BACnet priority of the load  
DLM devices will typically have a priority of 8.  
Highlight **PROPERTIES** and press Select.

or  
to select the  
desired load  
then press  
Select





Select








Display	Description	Press
<div> <div> Load 2 Properties 1 </div> <div> Output Level: 100% Load Type: NonDim Grace Timer: None Mode: Normal Hours Blink: 5 min </div> <div> NEXT DONE </div> </div>	<p>This screen indicates the current output of the load, whether the load is a dimming or non-dimming load. <b>Mode</b> indicates whether the load is currently in Normal Hours or After Hours. <b>Grace Timer</b> indicates whether the load is currently counting down between Normal Hours and After Hours, during the <b>Blink</b> period.</p> <p>Highlight NEXT and press Select to see more properties or select DONE to return to the <b>Panel Setup</b> screen.</p>	Select 
<div> <div> Load 2 Properties 2 </div> <div> TDelay NH: None TDelay AH: 120 min NH-&gt;AH: Turn Off AH-&gt;NH: Do Nothing </div> <div> NEXT PRIOR DONE </div> </div>	<p>This screen displays parameters related to the transitions between Normal Hours and After Hours.</p> <p>Highlight NEXT and press Select to see more properties or select DONE to return to the <b>Panel Setup</b> screen.</p>	Select 
<div> <div> Load 2 Properties 3 </div> <div> Sensor Behavior AH: Man On/Auto Off NH: Auto On/Off </div> <div> PRIOR DONE </div> </div>	<p>This screen displays the sensor behavior for this load.</p> <p>Highlight DONE and press Select to return to the <b>Status</b> screen.</p>	Select <b>DONE</b> 

Group Status

This set of screens displays the loads that are assigned to the group, along with their current on/off state. Additionally, you can view the settings for the group. Finally, in cases where the setting of an individual load are different from the group settings, you can view the differences. This can be extremely helpful when trying to diagnose a situation in which a load is not responding as expected. Keep in mind that individual loads can be programmed with different values from the group but still be a member of the group.

Display	Description	Press
<div> <div> Group Status </div> <div> Group: &lt;1&gt; </div> <div> NEXT DONE </div> </div>	<p>Select the <b>Group</b> number that you want to display, highlight <b>NEXT</b>, and press Select.</p>	<div> <div> ◀ or ▶ </div> <div> to change the value of the parameter then choose <b>NEXT</b> and press Select </div> </div> 
<div> <div> Point to the desired Panel IR Sensor and press 'Select' </div> </div>	<p>Point the LMCT-100 at the infrared sensor on the LMRD board and press Select.</p> <p>One of the following screens will display, depending on the Status option you selected.</p>	Select 

Display	Description	Press
<div> Group 1 Status Mixed  Load 5 Parms Not Same  01 11.01 . . . . 10  11 11. . . . . 20  21 . 101. . . . 30  31 . . . . . 40  41 . . . . . 50  51 . . . . . 60 </div>	<p>This screen indicates which loads are assigned to the group, along with the on/off status of each load. A value of “1” indicates it is ON. A value of “0” indicates it is OFF. A value of “.” indicates the load is not assigned to the group.</p> <p>On the top line, the <b>Status</b> will display “Off” if all assigned loads are off, “100%” if all loads are on and there is no dimming, and “Mixed” if some loads are on and others are off. If all loads in the group dim and are set to the same dimming amount, it will display that amount.</p> <p>Move the cursor to highlight a specific load. If you scroll down below the line for 51–60, you will see loads 61–64.</p> <p>The load number will display in the second line. The <b>Parms</b> parameter will say either “Same” if the load parameters match the group parameters, or “Not Same” if there is a difference. To view the difference, press Select to open the <b>Actual Load x Parms 1</b> screen</p>	<div> <div> or </div> <div> to select the desired load then press Select </div> </div> 
<div> Actual Load 5 Parms1  Blink: 5 min  TDelay NH: None  TDelay AH: 120 min  NH-&gt;AH: Turn Off  AH-&gt;NH: Turn On  MORE GROUP PARMS DONE </div>	<p>The screen displays the values of the first five parameters assigned to the individual load.</p> <p>To view the sensor parameters, highlight <b>MORE</b> and press Select.</p> <p>To compare the values on this screen with the values for the group, highlight <b>GROUP PARMS</b> and press Select.</p>	<div> <div> or </div> <div> to choose the option then press Select </div> </div> 
<div> Actual Load 5 Parms2  Sensor Behavior  AH: Man On/Auto Off  NH: Auto On/Off  MORE GROUP PARMS DONE </div>	<p>The screen displays the values of the sensor parameters assigned to the individual load.</p> <p>To return to the original 5 parameters, highlight <b>MORE</b> and press Select.</p> <p>To compare the values on this screen with the values for the group, highlight <b>GROUP PARMS</b> and press Select.</p>	<div> <div> or </div> <div> to choose the option then press Select </div> </div> 
<div> Group Load 5 Parms1  Blink: 10 min  TDelay NH: None  TDelay AH: 120 min  NH-&gt;AH: Turn Off  AH-&gt;NH: Turn On  MORE LOAD PARMS DONE </div>	<p>The screen displays the values of the first five parameters assigned to the group.</p> <p>In this example, if you compare the Blink parameter to the one on the Actual Load screen, you will see the group value is 10 minutes, while the individual load is 5 minutes.</p> <p>To view the sensor parameters, highlight <b>MORE</b> and press Select.</p> <p>To compare the values on this screen with the values for the individual load, highlight <b>LOAD PARMS</b> and press Select.</p>	<div> <div> or </div> <div> to choose the option then press Select </div> </div> 
<div> Group Load 5 Parms2  Sensor Behavior  AH: Man On/Auto Off  NH: Auto On/Off  MORE LOAD PARMS DONE </div>	<p>The screen displays the values of the sensor parameters assigned to the individual load.</p> <p>To return to the original 5 parameters, highlight <b>MORE</b> and press Select.</p> <p>To compare the values on this screen with the values for the group, highlight <b>GROUP PARMS</b> and press Select.</p> <p>Once you finish comparing the values, highlight <b>DONE</b> and press Select to return to the <b>Status</b> screen</p>	<div> <div> or </div> <div> to choose the option then press Select </div> </div> 



Light Level

This screen displays the current light level, in foot candles, registered by an LMIO-301 with an attached photosensor.

Display	Description	Press
<div><div>3011 of 2 Level MAC:0373303229  Light Level:1 fc  NEXT PRIOR DONE</div></div>	<p>The top line of the display shows the number of LMIO-301s connected to the network. The display shows the light level of a single device. The second line shows the serial number (<b>MAC</b> address) of the currently displayed device.</p> <p>Highlight <b>NEXT</b> and press Select to view the light level of another photosensor. Or select <b>DONE</b> to return to the <b>Status</b> screen.</p>	<div>Select NEXT<div></div> Select OR DONE<div></div></div>

Occupancy Sensor Status

This screen display current values of occupancy sensors attached to the network.

Display	Description	Press
<div><div>OccSen1 of 4 Stat MAC:0209715204  Status:Online State:Occupied Load Tracking:Yes  NEXT PRIOR DONE</div></div>	<p>The top line of the display shows the number of occupancy sensors connected to the network. The display shows the values for a single occupancy sensor. The second line shows the serial number (<b>MAC</b> address) of the currently displayed device.</p> <p><b>Status</b> indicates whether the sensor is currently found on the network. (When a sensor is connected, it is stored in memory until the panel is reset. So, if the sensor is disconnected and the panel has not been reset, the status will display "Offline".)</p> <p><b>State</b> indicates whether the sensor currently is set as occupied or unoccupied.</p> <p>If <b>Load Tracking</b> is "Yes", loads bound to the sensor will respond, based on the programming settings for the sensor and group. If it is set to "no", then the loads will not respond to the sensor. This is used in situations where the panel is connected to a BAS or other BACnet device and you want to use the sensor to monitor occupancy/vacancy for purposes other than turning loads on or off.</p> <p>Highlight <b>NEXT</b> and press select to view the values of additional photosensors. Or select <b>DONE</b> to return to the <b>Status</b> screen.</p>	<div>Select NEXT<div></div> Select OR DONE<div></div></div>

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## CONNECTING MULTIPLE LMCP PANELS IN A NETWORK

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The LMCP can connect to other LMCP panels via BACnet, using the MS/TP connections. Connecting panels to each other via BACnet allows them to share common group numbers for schedules or switches. This provides the ability to program a common behavior for an entire building or section of a building, via LMCS-100 software.

One or more LMCPs can also be connected to other devices in a Building Automation System (BAS) using BACnet. This provides for connection to a Segment Manager or other supervisory system. The BACnet settings can be configured using the LMCT-100 controller or LMCS-100 software.

### BACnet Settings

The following parameter settings and concepts are important to understand when configuring the LMCP for BACnet communication:

- **Device ID** – The device ID is a unique number, between 0 and 4194302, that identifies a device in a BACnet network. Every device in the network must have a different number. By default, the LMCP uses the last 6 digits of the serial number (plus a leading 0 to complete the seven digit number). This number can be changed if needed, for example, when required by an integrator, as part of a BAS. Once set, the LMCP will remember the ID number even if other parameters are reset to their default values.
- **Device Name** – This is a label for the panel, useful when working with LMCS in a situation where multiple panels are used, to help more easily distinguish between the panels. Any numerals or letters can be used in naming the panel. By default, the name is the same as the serial number. The name can be programmed using either LMCS, the LMCT-100, or a BAS application.
- **MS/TP MAC Address** – The MS/TP MAC address is an additional identifier, used by the devices on the network to communicate with each other. It is a number between 0 and 127. It is important to understand the difference between the device ID and the MS/TP MAC Address. The Device ID is, in essence, a number that identifies “who” the device is, while the MS/TP MAC address identifies its “location”.

In a BACnet network, all the devices pass a token to each other to determine which device has control of communication over the network. The MS/TP MAC address is used to “locate” other devices. When a device receives the token, it will take control of the communication and send messages to other devices as needed. It then passes the token to the device with the **next highest** MS/TP MAC address. In order to do this, it sends an “Are you there?” message on the MAC address one higher than its own. If it receives a response, it passes the token. If it does not receive a response, it tries again on the next highest number, continuing in this manner until it receives a response. This “Are you there?” message is referred to as a Poll For Master.

**NOTE:** In order to send and respond to this Poll For Master message, a device must be designated as a master device. Other devices (slave devices) on the network will not respond, and cannot take control of the communication.

While the Device ID is fixed and should not change, the MS/TP MAC address can change as devices come on or drop off the network. By default, the LMCP will automatically assign an MS/TP MAC address. When the LMCP is powered up, it will check the network for other devices to determine if its current MAC address is being used by another device. If not it will keep the same address, but if it is, and will assign an unused number between 32 and 127.

You can manually assign an MS/TP MAC address instead of having the LMCP automatically assign the number. This can be useful, especially in larger networks where response time is important. Since the Poll For Master message checks the next highest address number and then increments that number until it finds a device, having devices with gaps between numbers can increase latency. If you have 10 devices, numbered 0–9, you will have optimal performance since no time is wasted sending the Poll For Master message to an unused number.

- **Max Master** – The Max Master parameter is another parameter that will cut down on latency. The value you set for this parameter is the highest number the LMCP will check when sending a Poll For Master message, before returning to 0. So, in the previous example, where there are 10 devices numbered 0–9, if you set the Max Master to 9, it will never check addresses 10–127.

**NOTE:** If using the LMCP with a global controller such as a router, BAS or Segment Manager, the global controller will always default to a MAC address of 0.

**NOTE:** You should be aware that devices connected over the DLM Local Network also have MAC addresses for communication purposes, but that MAC address is entirely separate from the MS/TP MAC address.

Further details on Device IDs and MAC addresses can be found in WattStopper’s Technical Bulletin #180 at <http://www.wattstopper.com/resources/download-center/tech-bulletins-whitepapers.aspx>.

### Examples of Using the LMCP in a BACnet Network

The following three examples demonstrate applications for connecting the LMCP to a BACnet network:

#### Two or more LMCP panels connected to each other without a Segment Manager or BAS

This is the simplest configuration. Remember that when a relay is assigned to a group, if more than one panel uses the same group number, those relays in the different panels will respond to any events or controllers that affect that group. While this can provide an easy way of controlling relays in multiple locations, if that is not what you want, make sure to use different group numbers in different panels.

When connecting the panels via the MS/TP jack, keep in mind that the general rules for BACnet MS/TP apply. This includes termination quality, polarity of the dataline, maximum network physical length, usage of repeaters/isolators, usage of proper dataline (LM-MSTP and LM-MSTP-DB only), etc.

### One or more LMCP panels connected to an LMSM-3E or LMSM-6E Segment Manager

Best practice rules for connecting panels to a Segment Manager can be found in technical bulletin #189. Wiring information, including termination quality and polarity are discussed in technical bulletin #179.2. These technical bulletins can be found at <http://www.wattstopper.com/resources/download-center/tech-bulletins-whitepapers.aspx>.

The critical issue to keep in mind when using a Segment Manager is that you should normally use only the LMCP **or** the Segment Manager to control scheduled events, since these events are associated with groups. The group related control messages sent from the Segment Manager (see Appendix A) have the same priority as LMCP native schedules. Therefore, the group will always respond to the most recently received event, and Segment Manager schedules and LMCP schedules can conflict with each other.

Utilizing LMCS-100 allows for programming intricate coordinated behaviors, where either the LMCP or Segment Manager schedules can take precedence under certain circumstances, but this requires detailed understanding of the BACnet priority array and of LMCS configuration, and is not normally recommended.

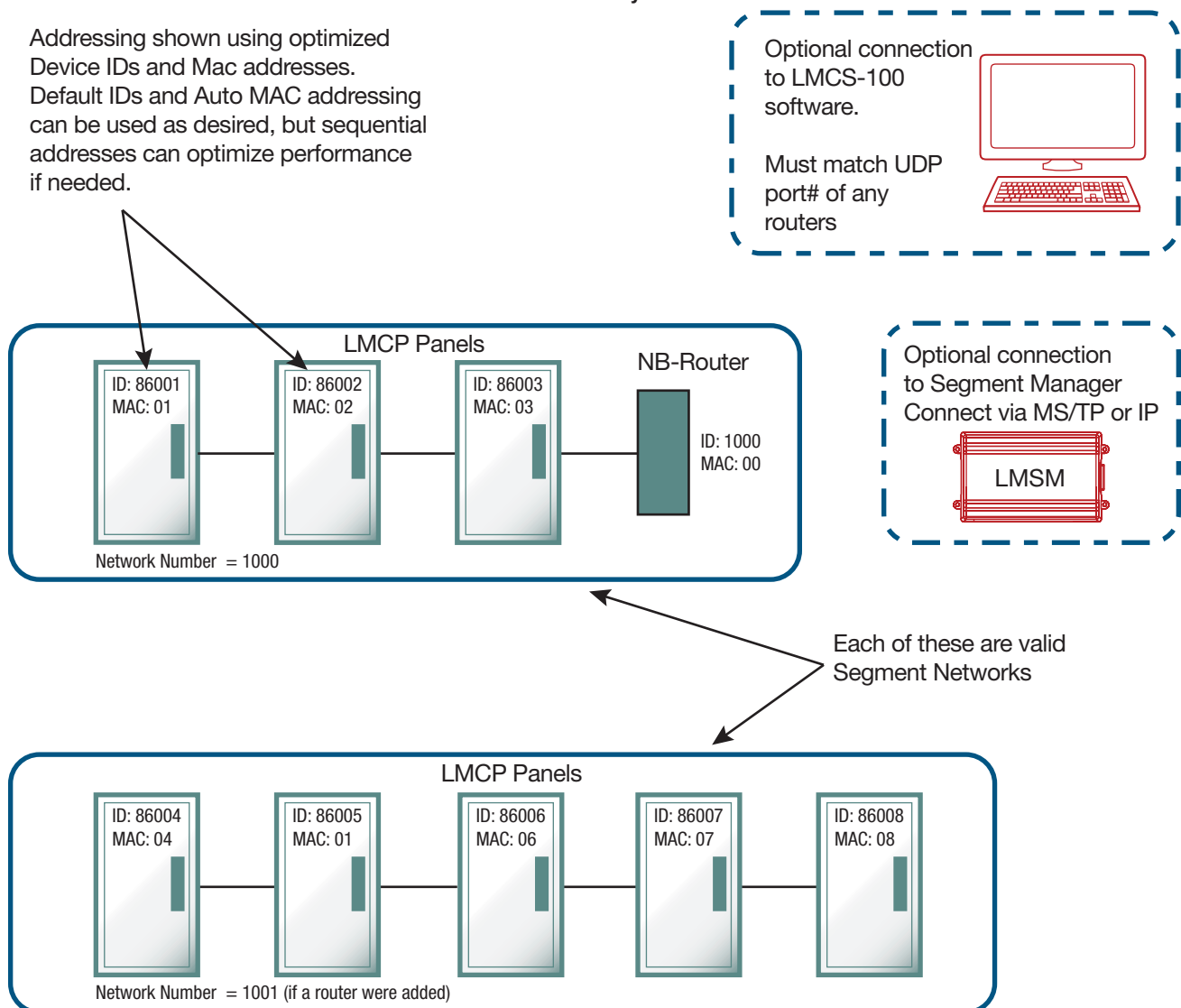
Additionally, similar to the way in which a load can be programmed individually and still be part of a group, and so that the group setting is applied when the group information is sent to the LMCP, you can send a message from the Segment Manager that will change a setting for a device that is part of a group, and the group setting will not revert to the group value until the group information is sent again to the LMCP by the LMCT-100 or LMCS-100.

### One or more LMCP panels connected directly to the front end systems configured by an integrator/BAS technician

When connected to a BAS application, the LMCP can provide a variety of status messages. The LMCP (and other devices connected via the DLM Local Network) can also respond to a variety of command messages. ["Appendix A" on page 32](#) lists the objects used for communication with the LMCP.

#### BACnet Connectivity Scenarios

Addressing shown using optimized Device IDs and Mac addresses.  
Default IDs and Auto MAC addressing can be used as desired, but sequential addresses can optimize performance if needed.



The Device ID's of this BACnet Segment Network are unique so that it could be combined with the top network if desired. Combining Segment Networks is done using NB-ROUTERS that must then assign a network number to each Segment Network.

## APPENDIX A

### BACnet Objects

**NOTE:** While there are 96 object instances available for many of the objects listed below, keep in mind that the LMCP panel supports only 48 devices per network (A & B), and the panel itself is one of the devices in each network. Therefore, there is never a case where you would use all 48 instances of an object in a single network.

Object Instance	Object Alias	Object Function
<b>Device/Group Specific Control Objects</b>		
BO1–BO64	Loads 1–64, state	Relay state, internally linked to the Analog Output objects by the trip point parameter. Relay is ON above trip point and OFF below trip point. Default trip point is 50% for LMRC-100 Series room controllers and 1% for LMRC-200 and -300 Series room controllers.
AO1–AO64	Loads 1–64, level	Dimming level, internally linked to the Binary Output objects by the trip point parameter. Range = 0 to 100%.
AV1–AV96	Wattage	Calculated based on the input voltage and measured current for room controller 1 to 96. This only provides a valid reading if LMCS is used to configure the “Baseline Wattage” values of all the panel’s relays. The panel has no Current Transformers so this reading is also subject to those loads operating correctly. If no full duty baseline power values are configured, this value is calculated as AV501 * AV401 when any one relay is active.  AV2-96 will only exist if any LMRCs or LMPLs or LMFCs are present on the CAT5 networks A or B.
AV401–496	Input Voltage	Per room controller, written by the user, default is 0. AV402–496 will only exist if any LMRCs or LMPLs or LMFCs are present on the CAT5 networks A or B.
AV501–596	Electrical current	Read total current flowing through the room controller in amps, for room controller 1 to 96. AV502–596 will only exist if any LMRCs or LMPLs or LMFCs are present on the CAT5 networks A or B.
AV101–AV196	Occupancy sensor 1–96, time delay	For occupancy sensor 1 to 96, 0 to 30 minutes.
AV201–AV296	Occupancy sensor 1–96, PIR sensitivity	Per PIR (passive infrared) sensor, 0 to 100% in percent, 10% resolution.
AV301–AV396	Occupancy sensor 1–96, ultrasonic sensitivity	Per ultrasonic sensor, 0 to 100% in percent, 10% resolution.
AI1–AI96	Exterior photocell	Daylight level as read by LMIO-301 photocell input module 1 to 96.
AI4001–AI4096	Daylight sensor 1–96, light level	Interior footcandle level as read by LMLS-400 daylight sensor 1 to 96.
AI5001–AI5096	Daylight sensor 1–96, light level	Interior footcandle level as read by LMLS-500 daylight sensor 1 to 96.
AV4101–AV4196	Daylight sensor 1–96, ramp up rate	For LMLS-400 daylight sensor 1 to 96, ramp up rate. Default is 20% per second, writable in the range of 1% to 100 % per second.
AV4201–AV4296	Daylight sensor 1–96, day setpoint	For LMLS-400 daylight sensor 1 to 96, day setpoint. Default is 50 footcandles, writable in the range of 1 to 255 footcandles.
AV4301–AV4396	Daylight sensor 1–96, night setpoint	For LMLS-400 daylight sensor 1 to 96, night setpoint. Default is 10 footcandles, writable in the range of 2 to 255 footcandles.
AV4401–AV4496	Daylight sensor 1–96, off time delay	For LMLS-400 daylight sensor 1 to 96, off time delay. Default is 10 minutes, writable in the range of 3 to 30 minutes.
AV4501–AV4596	Daylight sensor 1–96, on setpoint	For LMLS-400 daylight sensor 1 to 96, on setpoint. Default is 7.5 foot-candles, writable in the range of 1 to 3000 footcandles.
AV4601–AV4696	Daylight sensor 1–96, off setpoint	For LMLS-400 daylight sensor 1 to 96, off setpoint. Default is 11.25 foot-candles, writable in the range of 1.5 to 6000 footcandles.
AV5101–AV5196	Daylight sensor 1–96, zone 1 setpoint	For LMLS-500 daylight sensor 1 to 96, target setpoint for zone 1. Writable in the range of 1 to 200 footcandles.
AV5201–AV5296	Daylight sensor 1–96, zone 2 setpoint	For LMLS-500 daylight sensor 1 to 96, target setpoint for zone 2. Writable in the range of 1 to 200 footcandles.
AV5301–AV5396	Daylight sensor 1–96, zone 3 setpoint	For LMLS-500 daylight sensor 1 to 96, target setpoint for zone 2. Writable in the range of 1 to 200 footcandles.
AV601–AV664	Loads 1–64, demand response cap level	Maximum dimming level for load during a demand response (shed) event. 100 = disabled.

Object Instance	Object Alias	Object Function
BI101–BI9608	Button state	Read button state for 1 to 8 buttons per switch for 1 to 96 switches.
BI1–BI96	Detection state	Occupancy sensor detection state. Active = occupied.
BV101–196	Switch lock status	Read switch status (locked or unlocked). Active = locked.
BV201-299	Group Normal Hours/After Hours	Normal Hours/After Hours selection for a group. Active = after hours.
MV4001–MV4096	Daylight sensor 1–96, operating mode	For LMLS-400 daylight sensor 1–96, operation mode: 1 = ON/OFF, 2 = bi-level, 3 = tri-level, 4 = dimming.
MV4101–MV4196	Daylight sensor 1–96, setpoint multiplier	For LMLS-400, off setpoint multiplier: 1=1.25x, 2=1.50x, 3=1.75x, 4=2x.
<b>Room Level Control Objects</b>		
BV1	Schedule state	Normal hours/after hours selection. Active = after hours. <b>NOTE:</b> This changes the status for the <b>entire</b> panel, and therefore can conflict with BV201-299, if not used carefully.
BV2	Switch lock control	Lock or unlock enabled switches. Active = lock. <b>NOTE:</b> This changes the switch lock status for <b>every</b> switch connected to the panel, and therefore can conflict with BV101-196, if not used carefully.
BV3	Room occupancy status	Read occupancy status (occupied or unoccupied). Active = occupied. <b>NOTE:</b> This is the logical OR of the states of ALL sensors connected to the panel regardless of their local control scheme. In other words, if <b>any</b> sensor has a status of occupied, this value will read occupied.
BV4	Force all loads ON	Active = all loads ON at priority 1. Inactive = relinquish at 1 and ON at priority 8. <b>NOTE:</b> This will force <b>all loads</b> connected to the panel ON.
BV5	Force all loads OFF	Active = all loads OFF at priority 2. Inactive = relinquish. <b>NOTE:</b> This will force <b>all loads</b> connected to the panel OFF.
MV1	Scene control	Write scene selection. Range = 1 to 16.
MV2	Demand response (shed) control	Activate room level DR mode: 1 = no shed, 2 = shed mode, permit switch override, 3 = shed mode, prohibit switch override. <b>NOTE:</b> This will affect <b>all loads</b> connected to the panel.
AV901	MS/TP MAC address	Default is 255 for automatic, writable in the range of 0 to 127.
AV902	MS/TP network speed	Baud rate: 9600, 19200, 38400, 57600, 78600, 115200.
AV903	Input room size	Allows user to write area in square feet from 0 to 65,534, default is 0.
AV904	Room lighting watts	Read total lighting wattage for room. Total of baseline watts for active relays, or if no baseline wattage for the relays are used, then this is calculated as AV401 * AV501 + any usage from LMRC/LMFC connected via CAT5 to the panel. <b>NOTE:</b> This does not include used from LMPLs. Use AV906 for plug load controllers.
AV905	Room watts/sq.ft.	Read total room lighting W/ft2. If the input room size for the entire application area is used and the baseline watts method or AV401 * AV501 method is used, then this object will calculate the aggregate watts per square foot of the whole panel's application area. Use of this object is not recommended for use in applications where panels cover mixed areas.
AV906	Room plug load watts	Read total plug load wattage for LMPLs connected to the panel.

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