SYNERGY™

SYNERGY LIGHTING CONTROL SYSTEM
WITH
MLC CONTROLLER

OPERATION AND
PROGRAMMING MANUAL

LITHONIA LIGHTING
LIGHTING CONTROL SYSTEMS

An AcuityBrands™ Company

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Your Introduction to SYNERGY

About the system

The Synergy System is a state-of-the-art lighting control system, capable of performing a wide variety of functions to automate and control lighting loads for energy management and aesthetic appeal. The system operates by recognizing events and acting on the outputs (relays or dimmers) per the system programming. Events occur when the controller recognizes external actions, such as a user operating a wall switch, a photosensor measuring a fluctuating light level, or a specific time-of-day. After events are recognized, the controller acts on the lighting by changing the state or level of a Group which contains one or more outputs.

Any output can be controlled with any input or schedule event. Outputs are assigned to Groups and Groups are then linked to events when the controller is programmed through the keypad or PC software, available free for download at http://www.lithonia.com/controls. This manual covers programming the system via the keypad, and is intended to be used in conjunction with the equipment installation instructions and MLC Quick Setup Guide, which include important information that is not included in this manual.

System Installation

The key to a correctly operating system is a careful and well-documented system installation. Begin by following the installation instructions that are furnished with each item, then record all input and output descriptions on the blank schedules included with this manual. Referring to this information will reduce programming time and errors. Some projects may have been supplied with factory documentation. **If factory documentation was furnished, record any changes for future reference**. The factory is available for technical support between the hours of 8:00AM and 6:00PM, EST. For systems less than one year old, call (800) 533-2719; for older systems, call (770) 987-4200. Please complete all schedules on Pages 4 - 9 that are applicable for your installation prior to contacting the factory for programming assistance.

What initial programming is present in the system?

Each Synergy controller is shipped from the factory pre-configured to help make the programming for most installations as easy as possible. This initial configuration contains the settings for 6 power modules. Each of these modules has 8 outputs (initially configured as normally open relays), 8 switch inputs (initially configured for connection to a latching switch), and 3 analog inputs (initially configured for connection to a photocell). This hardware configuration is fixed; if the power modules used in your installation have fewer inputs or outputs, any programming for the 'extra' inputs or outputs will simply be ignored by the system.

Each switch input is pre-programmed to control a Group which contains a single corresponding output. A few examples of this default programming are shown in Table 1.1, below:

Module #	Switch Input #	Controls Group:	Which contains:
1	1	011	Output #1 on Module #1
1	2	012	Output #2 on Module #1
3	1	031	Output #1 on Module #3

Table 1.1: Switch default programming examples

All of the switch inputs are pre-programmed to have a two hour timeout. This timeout will not turn off the lights during a scheduled ON period, although the switch may still be used to manually turn OFF the lights. Refer to *Chapter 9, Section 4* for further information on input timeouts.

The controller is also pre-programmed with a variety of schedules and networked control station configurations to help make the user programming for most installations easier. For complete information on these defaults and how to best take advantage of them, refer to the included MLC Quick Setup Guide and *Appendix IV*, which begins on page 55.

Chapter 1: Basic Concepts

Section 1: System Hardware

Synergy is a modular lighting control system that is made up of three basic components: enclosure, system controller and power modules. The system enclosure is a NEMA 1 panel that houses the system electronics. The enclosure is shipped from the factory with a transformer, low voltage power supply and a ribbon cable pre-installed. The transformer and power supply are used to convert the line voltage 120/230/277 VAC circuit feeding the cabinet into 12 and 24 VDC for the system electronics. The ribbon cable is used for data communication between the system components once the system controller and power modules have been installed.

The second component of Synergy is the system controller. The controller is installed at the bottom of the enclosure and connects to the power supply. The controller contains an embedded PC that allows the user to program, override, and verify the status of all lighting loads associated with the system. Also referred to as the **UIP** (User Interface Panel), the controller has an integral keypad that serves as the primary interface for programming the system. Included as part of the controller is an RS-232 port that allows for the connection of a laptop computer or A/V system.

The final component of Synergy is the power module. A power module may be either a relay module (containing eight SPST relay outputs), a dimmer module (containing six line voltage dimmer outputs), or a ballast module (containing eight SPST relay outputs and eight 0-10V low voltage dimmer outputs). The power modules are the equipment that will actually control the power for your lighting loads (turning loads on/off, or dimming up/down). The modules are mounted above the system controller assembly within the enclosure, and are connected to the controller via the ribbon cable (referred to as the I^2C bus). The I^2C bus is the data line that communicates information (i.e., schedules) programmed in the controller to the power modules.

Common to all power modules are low voltage input terminals that allow accessory devices such as low voltage switches, photocells, and occupancy sensors to connect to the system. Each module also contains an Override Switch that allows the user to manually override all outputs on that module to ON, OFF or AUTO. Placing the toggle in the AUTO position will allow the system programming to take control.

Section 2: Key Terms

It is very important to understand several key terms and concepts prior to programming your Synergy lighting control system:

Inputs: Switches, photocells, networked control stations, and occupancy sensors are all inputs that will activate an output (i.e., relay or dimmer) when triggered.

Trigger: An input device or scheduled event that causes a change in the status of an output.

Outputs: Either a relay or a dimmer that causes a change in the status of a lighting load (on/off, raise or lower).

Groups: A Group contains one or more outputs. Groups are the core elements of the Synergy system programming. All triggers (switches, scheduled events, etc.) are programmed to control Groups. Multiple triggers may control a single Group. For example, a Group called Hallway Lights can be programmed to turn on/off by a timeclock schedule. The same Group can also be controlled (overridden) by a local switch, networked control station, or both if desired.

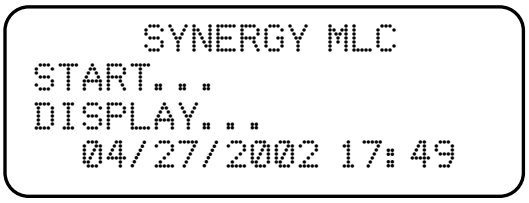
Section 3: Programming Concepts

Concept #1: As mentioned above, all triggers are programmed to control Groups. When programming the system, you will be required to build Groups and then assign each Group to one or more inputs. To build a Group, you simply combine one or more outputs that are to be controlled together (i.e., Exterior Lights) and place them into a Group. Once you have made your Group(s) you will then program switches, photocells, timeclock events, etc., to trigger the Group(s).

Concept #2: A Synergy lighting panel can contain up to six power modules, each having multiple inputs and outputs, so the controller requires that each power module have a unique address (1-6). The power module addresses should be set during the installation procedure by the installing contractor. The power module placed in the top position of the enclosure should be at address #1. The second module from the top should be at address #2, and so on. Switch inputs on the modules are arranged in the same manner. The topmost input on a power module is Switch Input #1. The second input from the top is Switch Input #2, and so on. Relay and ballast modules have eight Switch Inputs, and dimmer modules have two Switch Inputs.

Section 4: Using this Manual

This manual is organized into chapters and sections. Each chapter covers a general topic, and each section in that chapter covers one aspect of the topic in detail. Programming instructions in each section include a step-by-step guide and a graphic of what the UIP screen should look like at one or more of the steps. Note that all of the programming instructions will begin on the 'home' screen of the UIP, which looks like the graphic below:



The UIP will timeout and return to this screen automatically if no keys have been pressed for 60 seconds while any screen accessed with the START... softkey is displayed. Any programming changes that have been made will be saved automatically before the screen returns to the 'home' screen. Screens accessed with the DISPLAY... softkey will automatically return to the screen shown above at midnight. The 'home' screen can also be accessed by pressing the BACK key repeatedly while on any other screen.

Several appendices, which begin on page 42, have also been included in this manual. These appendices contain reference materials, advanced programming instructions, and other information that is useful but not required for most installations.

Helpful hints and information have been indicated with a ⓘ symbol.

Cautionary notes for steps that will erase programming or restrict access to parts of the system have been indicated with a symbol.

FEED-THROUGH (NO BREAKERS) LIGHTING CONTROL CABINET LOAD WIRING SCHEDULE

CONTROL CIRCUIT NUMBER: _____ SYNERGY CABINET I.D.: _____

CONTROL CIRCUIT PHASE: _____ CABINET LOCATION: _____

MODULE ADDRESS & TYPE	OUTPUT NUMBER	CIRCUIT DESCRIPTION	FEED CIRCUIT NUMBER	LOAD TYPE	LOAD (W)	PHASE (A,B,C)	CUSTOMER ASSIGNED CONTROL GROUP NUMBER(S)	DEFAULT GROUP NUMBERS	
1 SYPM 8_	1							011	010
	2							012	
	3							013	
	4							014	
	5							015	
	6							016	
	7							017	
	8							018	
2 SYPM 8_	1							021	020
	2							022	
	3							023	
	4							024	
	5							025	
	6							026	
	7							027	
	8							028	
3 SYPM 8_	1							031	030
	2							032	
	3							033	
	4							034	
	5							035	
	6							036	
	7							037	
	8							038	
4 SYPM 8_	1							041	040
	2							042	
	3							043	
	4							044	
	5							045	
	6							046	
	7							047	
	8							048	
5 SYPM 8_	1							051	050
	2							052	
	3							053	
	4							054	
	5							055	
	6							056	
	7							057	
	8							058	
6 SYPM 8_	1							061	060
	2							062	
	3							063	
	4							064	
	5							065	
	6							066	
	7							067	
	8							068	

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MAIN FEED
LIGHTING CONTROL CABINET
LOAD WIRING SCHEDULE

FEED VOLTAGE / TYPE: _____ SYNERGY CABINET I.D.: _____

CONTROL CIRCUIT # / PHASE: _____ CABINET LOCATION: _____

MODULE ADDRESS & TYPE	OUTPUT NUMBER	CIRCUIT DESCRIPTION	LOAD CIRCUIT # (from plans)	LOAD TYPE	LOAD (W)	PHASE (A,B,C)	CUSTOMER ASSIGNED CONTROL GROUP NUMBER(S)	DEFAULT GROUP NUMBERS	
	1							011	
	2							012	
	3							013	
1	4							014	010
	5							015	
SYPMB ___	6							016	
	7							017	
	8							018	
	1							021	
	2							022	
	3							023	
2	4							024	020
	5							025	
SYPMB ___	6							026	
	7							027	
	8							028	
	1							031	
	2							032	
	3							033	
3	4							034	030
	5							035	
SYPMB ___	6							036	
	7							037	
	8							038	
	1							041	
	2							042	
	3							043	
4	4							044	040
	5							045	
SYPMB ___	6							046	
	7							047	
	8							048	
	1							051	
	2							052	
	3							053	
5	4							054	050
	5							055	
SYPMB ___	6							056	
	7							057	
	8							058	

PHASE A TOTAL LOAD: _____

PHASE B TOTAL LOAD: _____

PHASE C TOTAL LOAD: _____

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LOW VOLTAGE SWITCH INPUT SCHEDULE

SYNERGY CABINET I.D.: _____

CABINET LOCATION: _____

MODULE ADDRESS	SWITCH INPUT NUMBER	SWITCH NAME / LOCATION	SWITCH TYPE	GROUP NUMBER	TIMEOUT (0-255 min)
1	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
2	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
3	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
4	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
5	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
6	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				

ANALOG INPUT SCHEDULE

SYNERGY CABINET I.D.: _____

CABINET LOCATION: _____

MODULE ADDRESS	ANALOG INPUT NUMBER	INPUT NAME / LOCATION	INPUT TYPE	GROUP NUMBER	TIMEOUT (0-255 minutes)	HIGH SET (1-100%)	LOW SET (0-99%)
1	1						
	2						
	3						
2	1						
	2						
	3						
3	1						
	2						
	3						
4	1						
	2						
	3						
5	1						
	2						
	3						
6	1						
	2						
	3						

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ADDRESSABLE STATION BUTTON INPUT SCHEDULE

SYNERGY CABINET I.D.: ____________________

CABINET LOCATION: ____________________

ROOM NUMBER	STATION ADDRESS	BUTTON NUMBER	FUNCTIONAL DESCRIPTION	BUTTON TYPE	GROUP NUMBER	TIMEOUT (0-255 min)

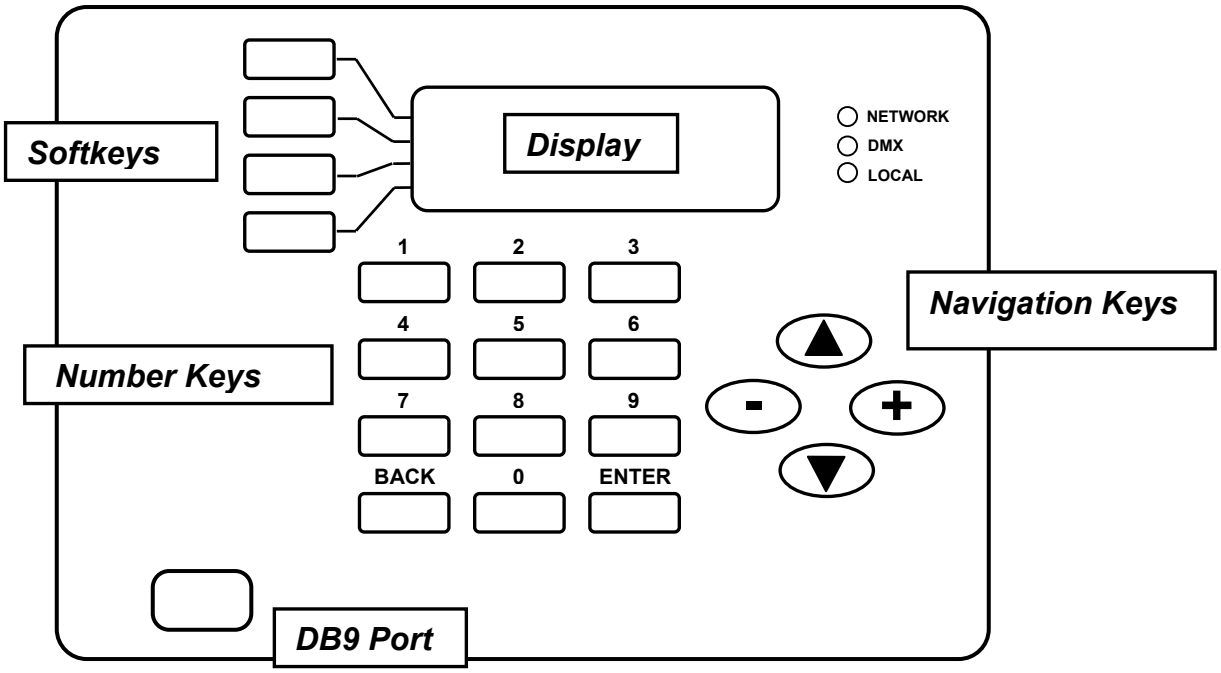
ADDRESSABLE STATION CHANNEL INPUT SCHEDULE

SYNERGY CABINET I.D.: ______________________

CABINET LOCATION: ______________________

ROOM NUMBER	STATION ADDRESS	CHANNEL NUMBER	FUNCTIONAL DESCRIPTION	CHANNEL TYPE	GROUP NUMBER	TIMEOUT (0-255 min)

Chapter 2: Keypad Layout and Functions



Display – Made up of four 20-character lines used to show Menu Choices, Data Selection or Data Values.

Softkeys – Keys that branch out to lower level menus, or allow editing of data values. These keys dynamically change function based on the words that are shown in the adjacent line of the display.

Number Keys – Keys to allow current information in Data Selection windows to be edited when a cursor is shown.

BACK Key – Key to return the display to the previous Menu Choice. The system programming is always saved when this key is pressed.

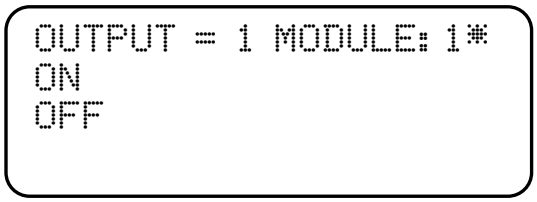
ENTER Key – Key required to store the value being edited.

Navigation Keys – Keys that are used to move through available data options. These keys dynamically change function based on the current Data Selection Screen. The up and down arrows are typically used to navigate through large blocks of data, and the + and – keys are usually used to cycle through individual data values.

DB9 Port – Connector that allows attachment of a serial data device, such as a personal computer or A/V system, through use of a Lithonia SYA CABLE or a null modem cable.

Chapter 3: Overriding the Outputs

The power module outputs can be individually overridden ON and OFF at the controller by following the procedure below.

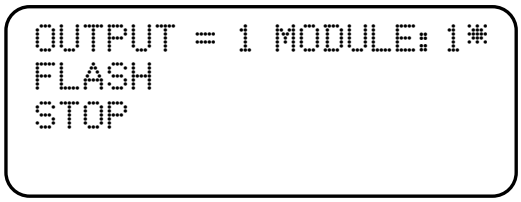


1. Press the START... softkey
2. Press the OVERRIDING... softkey. The display will show the screen on the right.
3. The output indicated on the top line can be turned ON and OFF by pressing the associated softkey.
4. Scroll through the individual outputs by using the + and - keys. The indicated power module can be changed by using the up and down arrows to scroll through the module addresses. Addresses for modules that are mounted in the cabinet and connected to the I^2C bus are indicated with a * next to the address.

Chapter 4: Flash to Find

The individual power module outputs can be made to repeatedly flash ON and OFF to help the user determine which loads are wired to each output. This feature is especially useful when the person programming the system is not the same person that installed or wired it.

The fastest way to find the lights that are controlled by any output is to override all of the other outputs OFF (see *Chapter 3: Overriding the Outputs* for instructions on how to do this) and follow the steps below to flash the output that you are looking for. If this is not practical for your installation, flash the output without overriding the others to help make it apparent.



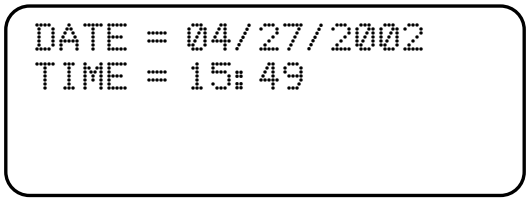
1. Press the START... softkey
2. Press the FLASH TO FIND... softkey. The display will show the screen on the right.
3. Navigate to the output that you want to find by using the + and – keys to scroll through the individual outputs. The indicated power module can be changed by using the up and down arrows to scroll through the module addresses. Addresses for modules that are mounted in the cabinet and connected to the I^2C bus are indicated with a * next to the address.
4. Press the FLASH softkey to make the output indicated on the top line begin to flash ON and OFF. A * will appear on the display next to the word FLASH when the output is being overridden ON.
5. Press the STOP softkey to make the output stop flashing after you have found the controlled load.

Chapter 5: Setting Up the System

Section 1: Introduction

The first step in programming a Synergy system is to configure the controller for its installed location and set a couple of system parameters, including the current time and date (if not correct). The controller uses this information to calculate sunrise and sunset times, to enable and disable daylight savings time, and to switch the relays at zero-cross to minimize the effect of inrush current spikes.

Section 2: Setting the Date and Time



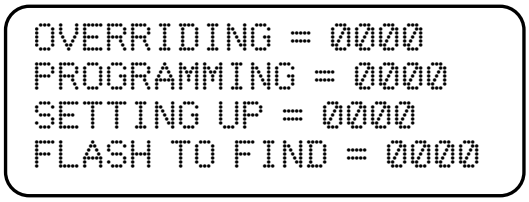
1. Press the Date & Time softkey – this is the bottom softkey when the UIP is on the 'home' screen. The display will show the screen on the right.
2. Press the DATE softkey to change the date. A cursor will appear over the first digit and a new date can be entered in MM/DD/YYYY format using the numeric keypad. The + and – keys can be used to move the cursor right and left as needed while making this entry. Press the ENTER key when you are done to save your entry.
3. Press the TIME softkey to change the time. A cursor will appear over the first digit and a new time can be entered in 24 hour format using the numeric keypad. The + and – keys can be used to move the cursor right and left as needed while making this entry. Press the ENTER key when you are done to save your entry.

Section 3: Configuring the Controller for the Project Location

4. Press the START... softkey
5. Press the SETTING UP... softkey.
6. Press the LOCATION... softkey. The display will show the screen on the right.
7. Press the PHASE softkey to rotate through the phases until the phase of the circuit that is feeding the cabinet transformer is shown.
8. Press the WARN softkey to change the amount of time (0 to 99 minutes) before a scheduled OFF event that the lights should blink to warn the occupants of the impending OFF. When you press this softkey, a cursor will appear and a new time can be entered using the numeric keypad. When you have completed entering the new time, press the ENTER key to save this entry.
9. Scroll through the available cities by using the + and – keys, and scroll through the available states by using the up and down arrows until the city that is closest to the installed location of the controller is shown. Note that the cities for each state are listed in alphabetical order and that the city that is displayed after changing to a different state may not be the first in the list for that state.
10. Press the BACK button to save your changes when you have finished.

Chapter 6: Setting Up System Passwords

Four levels of password protection are available to limit unauthorized access to the Synergy controller. These passwords prevent access to all functions in each of the sub-menus that are indicated. You may use the same password for each submenu or they may all be unique. '0000' means that no password will be required to access a submenu.



1. Press the START... softkey
2. Press the SETTING UP... softkey.
3. Press the PASSWORDS... softkey. The display will show the screen on the right.
4. Press the softkey associated with the desired submenu label to change the password for that submenu. A cursor will appear and a new password can be entered using the numeric keypad. When your changes are complete, press the ENTER key to save the entry.
5. Press the BACK button to save your changes when you have finished.

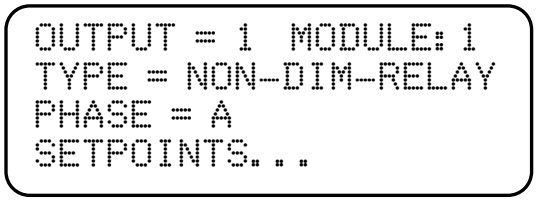
Write down your passwords and store them in a secure location for reference in case you forget them. A function protected with a password cannot be accessed without that password.

Chapter 7: Configuring Output Types

Section 1: Introduction

Each Synergy output is individually configurable and should be configured based on the actual installed hardware and desired functionality. Note that no single power module supports all output types; refer to Table 7.1 below for valid power module/output type combinations. Note also that the output type settings are stored on the power modules and once an output is configured, it will behave as configured for all events and overrides – even overrides from the ON-OFF-AUTO switch and when the system controller is removed or powered down.

Section 2: Configuring the Output Type and Phase



1. Press the START... softkey
2. Press the PROGRAMMING... softkey.
3. Press the OUTPUT TYPES... softkey. The display will show the screen on the right.
4. Navigate to the output that you want to configure by using the + and – keys to scroll through the individual outputs. The indicated power module can be changed by using the up and down arrows to scroll through the module addresses.
5. Press the TYPE softkey repeatedly to rotate through the available output types until the type that you need is shown. A list of all available output types and a short description of how they function is shown in Table 7.1 below.

TYPE	Valid for Modules	Functional Description
NON-DIM-RELAY	Relay, Dimmer, 0-10V Ballast	Normally open relay, non-dim dimmer output, low voltage dimmed output for 0-10V controllable fluorescent ballasts.
RELAY(N.C.)	Relay, 0-10V Ballast	Normally closed relay
MOMENTARY-ON	Relay, 0-10V Ballast	Normally open relay, contacts close momentarily (1 second) for any ON command
MOMENTARY-OFF	Relay, 0-10V Ballast	Normally open relay, contacts close momentarily (1 second) for any OFF command
SWEEP-RELAY	Relay, 0-10V Ballast	Normally closed relay, contacts open for 7 seconds for any OFF event; used with SSPL series sweep switches.
DISABLED	Relay, Dimmer, 0-10V Ballast	Output will not respond to any input or event. The output will remain at its current level when changed to DISABLED type.
INCANDESCENT	Dimmer	Dimmed output for incandescent, low voltage incandescent, cold cathode, and neon loads
HILUME	Dimmer	Dimmed output for Lutron HiLume and ECO series fluorescent ballasts
MARK-X	Dimmer	Dimmed output for Advance Mark X series fluorescent ballasts.

Table 7.1: Power Module Output Types

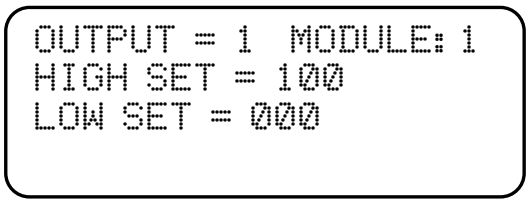
6. If you are configuring a relay or 0-10V ballast module, press the PHASE softkey to rotate through the phases until the phase that is feeding the relay that you are configuring is shown. Doing this allows the system to close the relay while the voltage being switched is at 0 Volts, which minimizes inrush currents that can damage the relay contacts.

Chapter 7: Configuring Output Types (continued)

Section 3: Adjusting the High-End and Low-End Limits

If you need to adjust the low-end and high-end limits for a dimmer or the level at which a relay is closed and opened, this is accomplished by adjusting the SETPOINTS for the output. The HIGH SET point is the highest percentage of full voltage (as defined by the output type) to which the dimmer can be raised. This is most often adjusted to a value other than 100% as part of a strategy to save energy. The LOW SET point is the lowest percentage that the dimmer can be lowered to before turning OFF.

ⓘ The LOW SET point is also the point at which a relay output is closed and opened. Most applications will not require that this value be adjusted for the relays. The HIGH SET point is not used by relay output types.



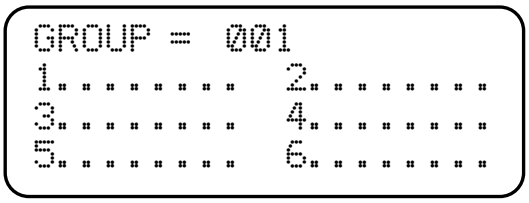
1. Press the START... softkey
2. Press the PROGRAMMING... softkey.
3. Press the OUTPUT TYPES... softkey.
4. Press the SETPOINTS... softkey. The display will show the screen on the right.
5. Navigate to the output that you want to configure by using the + and – keys to scroll through the individual outputs. The indicated power module can be changed by using the up and down arrows to scroll through the module addresses.
6. To adjust the high set percentage, press the HIGH SET softkey. A cursor will appear and a new percentage (0-100) can be entered using the numeric keypad. When you have finished entering the new value, press the ENTER key.
7. To adjust the low set percentage, press the LOW SET softkey. A cursor will appear and a new percentage (0-100) can be entered using the numeric keypad. When you have finished entering the new value, press the ENTER key.
8. Press the BACK button to save your changes when you have finished.

Chapter 8: Groups

Section 1: Introduction

Before an output can be controlled, it must first be placed into a Group. A Group is simply a collection of one or more outputs that need to be controlled together. There are 99 user configurable Output Groups. An Output Group may contain one or more outputs, and the outputs in the Group may be all relays, all dimmers, or a combination of relays and dimmers. Some Groups contain output members as part of the factory default programming and Groups 093 through 099 are used as part of the factory default schedules. For more information regarding default schedules and programming, refer to *Appendix IV*.

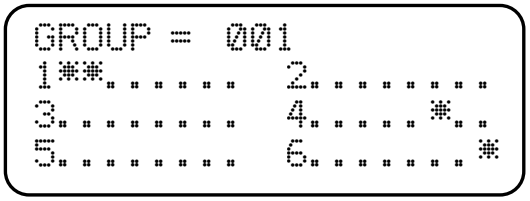
Section 2: Programming Output Groups



1. Press the START... softkey
2. Press the PROGRAMMING... softkey.
3. Press the GROUPS... softkey. The display will show the screen on the right.
4. Navigate to the Group number that you want to program by using the + and – keys to increment and decrement the Group # by 1's, or the up and down arrow keys to increment and decrement by 10's.
5. Select the appropriate power module that contains the outputs you are adding. You may access the module # by using the number keys. For example, if you are building a Group that contains the outputs located on power module #4, you will simply press button 4 on the keypad.
6. Once you have selected the appropriate module #, a blinking cursor will appear over the first output of that module. Outputs are represented by either a dot (.) or a star (*). A dot indicates that the output is not included in the Group. A star indicates that the output is included in the Group. Note that each module shows 8 outputs – the maximum number possible. If you are programming a dimmer module, which only has 6 outputs, disregard the last two.
7. Move the cursor to the desired output by pressing the + and - keys. Use the up arrow key to add the output to the Group and the down arrow key to remove the output from the Group.
8. Once you have added or removed the desired outputs on a module, press the ENTER key. You may now select another module # to repeat the process or press the BACK key save your programming.

Example

In the screen shown to the right, GROUP 001 contains outputs 1 & 2 from module #1, output 6 from module #4, and output 8 from module #6. When this Group is triggered, all of the outputs shown will be controlled together.



Section 3: System Group Information

There are a number of system Groups that are not programmable via the controller keypad, but may still be triggered by any system event or input. Refer to Table 8.1 below for information on the available System Groups.

Group Number(s)	Function	Notes
000	Null Group	Primarily used as a placeholder to allow SQCS preset buttons to be programmed at the SQCS station (see *Chapter 11* for more information on programming SQCS control stations). Group 000 may also be used as a way to program a switch or analog input to not control any Group, effectively disabling it without changing any other settings (see *Chapter 9* and *Chapter 10* for more information on programming switch and analog inputs).
001 – 099	Output Groups	User configurable Groups (See *Section 2* of this chapter for complete information on Output Groups). Used to allow Schedules and Switch, Analog, Button, and Channel inputs to control system outputs such as relays and dimmers.
101 – 109	Station 0 Presets 1-9	Used to allow Schedules, Switch Inputs, Analog Inputs, and A/V systems to access the first 9 presets saved on SQCS control stations at addresses 0 – 9 (see *Chapter 11* for further information on SQCS control stations). The first digit of a Group number in this range is always 1. The second digit of the Group number is the address of the SQCS station, and the third digit of the Group number is the preset number on that station.
111 – 119	Station 1 Presets 1-9	
121 – 129	Station 2 Presets 1-9	
131 – 139	Station 3 Presets 1-9	
141 – 149	Station 4 Presets 1-9	
151 –159	Station 5 Presets 1-9	
161 –169	Station 6 Presets 1-9	
171 –179	Station 7 Presets 1-9	
181 –189	Station 8 Presets 1-9	
191 –199	Station 9 Presets 1-9	
201 - 210	Partition Groups	Used to control logical partitions between rooms for addressable control stations. See *Chapter 11* and *Chapter 12* for complete information on configuring addressable control stations for use in an area with moveable partitions.

Table 8.1: System Group Ranges

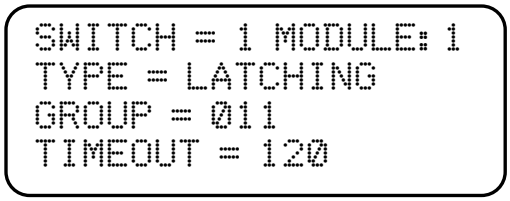
Chapter 9: Programming Switch Inputs

Section 1: Introduction

Synergy can accept a wide variety of user inputs to control lighting loads. The most common input device is the low voltage momentary switch. Low voltage switching devices are available in different configurations and each variety may require two, three or four low voltage wires to be connected to a power module. Synergy power modules are designed to accept all of these configurations. For detailed information on connecting the low voltage switches for your project, see the installation instructions that were included with the switches and the power modules. In this section you will configure your Switch Inputs and assign the Groups that you wish for them to control.

Before configuring and programming your low voltage switches, complete the Low Voltage Switch Input Schedule on Page 6. Once completed, this schedule will serve as an easy reference for all of the information that you will need to complete your switch programming. For information regarding the arrangement of switch inputs on a power module, refer to the module installation instructions and *Concept #2* in *Chapter 1, Section 3* of this manual.

Section 2: Configuring the Switch Type



1. Press the START... softkey
2. Press the PROGRAMMING... softkey.
3. Press the INPUTS... softkey.
4. Press the SWITCH... softkey. The display will show the screen on the right.
5. The first line on the menu display indicates that you are programming Switch Input #1 located on power module #1. Use the + and - keys to cycle through all available switch inputs found on module #1. Use the up and down arrows to cycle through the available power module addresses.
6. The second line on the menu display allows you to configure the input for the type of input device you are using. The factory default programmed for all switch inputs is LATCHING. By pressing the TYPE softkey repeatedly you can cycle through the various switch input types. See the Table 9.1 for a description of available switch input types.

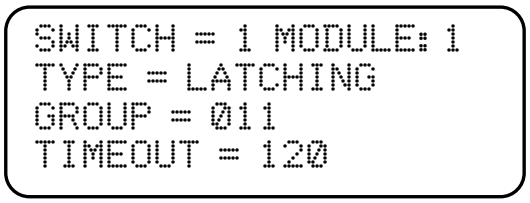
TYPE	USED WITH	Functional Description
LATCHING	S.P.D.T. momentary contact switches	The contacts wired to the ON terminal will set the assigned Group to 100%. The contacts wired to the OFF terminal sets the Group to 0%.
ALTERNATE	S.P.S.T. momentary contact switches	The contacts are wired to either the ON or OFF terminal and the common terminal. Each activation of the switch will alternately set the Group to 100% or 0%.
MAINTAINED	S.P.S.T. maintained contact switches	The contacts are wired to either the ON or OFF terminal and the common terminal. Closing the contacts will set the assigned Group to either ON or OFF (depending on the terminal to which the contacts are wired). Opening the contacts will set the Group to the inverse level (OFF or ON, respectively).
RAMPING	S.P.D.T. momentary contact switches	Used for dimmed outputs, the contact wired to the RAISE arrow (or ON terminal) on the input will raise the Group output level. The contact wired to the LOWER arrow (or OFF terminal) on the input will lower the Group output level.
DISABLED	Unused inputs	Disables the switch input.

Table 9.1: Switch Input Types

Chapter 9: Programming Switch Inputs (continued)

Section 3: Assigning a Group to a Switch Input

The procedure below will allow you to assign a Group number that will be controlled by the switch input. Note that this Group number can be an Output Group, a Preset Group, or a Partition Group as required by your installation. See *Chapter 8, Section 3* on page 18 of this manual for more information on the properties and uses of each of these Group types.

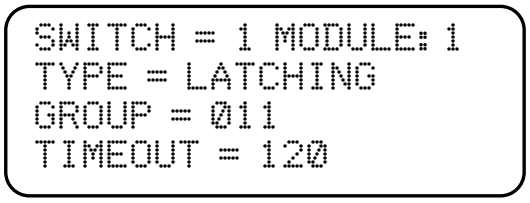


1. If the UIP display does not already show the screen in the figure to the right, follow steps 1 – 4 in *Section 2* of this chapter to navigate to it. (Press Start... Programming... Inputs... Switch...)
2. Press the GROUP softkey
3. A blinking cursor will appear over the first digit of the three digit Group number. Use the number keys to enter the desired Group. The + and - keys will allow you move the cursor right and left while editing this number.
4. Press the ENTER key to save your selection.

Section 4: Switch Timeouts

Adjusting the TIMEOUT setting, which appears on the fourth line of the switch inputs menu, will allow you to program the number of minutes (0-255) that this switch will override the assigned Group ON. Before the end of the timeout period, the lights will 'blink' to warn the occupants of the impending OFF. The number of minutes before the end of the timeout period that the lights will blink is 5 minutes by default, but is adjustable. If another warning period is desired, see *Chapter 5 (step 5)* for instructions on changing this value.

Pressing the switch again after the warning 'blink' will reset the timer for this switch. *Note that the switch timeout function will not automatically turn the lights OFF during a scheduled ON time*. Refer to *Chapter 13* for more information about programming schedules.



1. If the UIP display does not already show the screen in the figure to the right, follow steps 1 – 4 in *Section 2* of this chapter to navigate to it. (Press Start... Programming... Inputs... Switch...)
2. Press the TIMEOUT softkey.
5. A blinking cursor will appear over the first digit of the three digit Timeout number. Use the number keys to enter desired Timeout for this switch. Enter the number of minutes from 000 – 255. Entering a Timeout of 000 will cause no timeout to be assigned to this switch. The + and - keys will allow you move the cursor right and left while editing this number.
3. Press the ENTER key to save your selection.
4. Continue programming your switch inputs as required. Press the BACK key to save your changes when you are finished configuring your switch inputs.

Chapter 10: Programming Analog Inputs

Section 1: Introduction

Synergy is designed to accept two types of analog devices: Photocells and Occupancy Sensors. In this section you will configure your Analog Inputs and assign the Groups that you wish for them to control. As with switch inputs, you will need to know where wires from the analog device have been wired on the Synergy power module. Relay and ballast modules have two analog inputs that are located directly beneath the low voltage switch inputs. Dimmer modules have three analog inputs which are also located beneath the low voltage switch inputs. The analog inputs are numbered the same way as switch inputs: the top-most analog input is #1 and the analog input beneath it is #2, and so on.

ⓘ While following the steps below you will notice that the Analog Inputs have already been assigned to various Group Numbers. These assignments are part of the Factory Default Programming. For complete information on this default configuration and how to best take advantage of it, refer to the MLC Quick Setup Guide and *Appendix IV*, both included in this package. If you choose to NOT use the Factory Default programming, then you can re-configure the Analog Inputs as needed for your application by following the steps below.

Section 2: Configuring the Analog Input Type

1. Press the START... softkey
2. Press the PROGRAMMING... softkey
3. Press the INPUTS... softkey
4. Press the ANALOG... softkey. The display will show the screen to the right.

```
ANALOG = 1 MODULE: 1
TYPE = PHOTOCELL
GROUP = Ø98
SETPOINTS...
```

5. The first line on the menu display indicates that you are programming Analog Input #1 located on power module #1. Use the + and - keys to cycle through all available Analog Inputs found on Module #1. Use the up and down arrows keys to cycle through the available power module addresses.
6. The second line on the display allows you to configure the analog input for the type of device that is connected to this input. Inputs 1 and 2 are configured as PHOTOCELL and input 3 is configured as OCC. SENSOR by default. Press the TYPE softkey repeatedly to alternate between the available choices until the device that is connected to this input is shown. Refer to Table 10.1 for further details on the available choices.

TYPE	USED WITH	Functional Description
PHOTOCELL	Photocells controlling outside lights	Sets the level of the assigned Group at 100% when the returned signal voltage is below the Low Set point and sets the Group at 0% when the returned signal is above the High Set point (see *Section 4* of this chapter for more information on setpoints).
OCC. SENSOR	Occupancy Sensors	Sets the level of the assigned Group at 100% when the returned signal voltage is above the High Set point and sets the Group at 0% when the returned signal is below the Low Set point (see *Section 4* of this chapter for more information on setpoints).
DISABLED	Unused inputs	Disables the analog input.

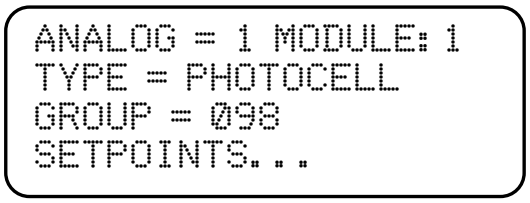
Table 10.1: Analog Input Types

Chapter 10: Programming Analog Inputs (continued)

Section 3: Assigning a Group to an Analog Input

The procedure below will allow you to assign a Group number that will be controlled by the analog input.

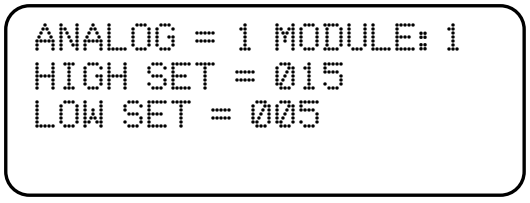
ⓘ This Group number can be an Output Group, a Preset Group, or a Partition Group as required by your installation. See *Chapter 8, Section 3* of this manual for more information on the properties and uses of each of these Group types.



1. If the UIP display does not already show the screen in the figure to the right, follow steps 1 – 4 in *Section 2* of this chapter to navigate to it. (Press Start... Programming... Inputs... Analog...)
2. Press the GROUP softkey
3. A blinking cursor will appear over the first digit of the three digit Group number. Use the number keys to enter the desired Group. The + and - keys will allow you move the cursor right and left while editing this number.
4. Press the Enter key to save your selection.

Section 4: Configuring the Analog Input Setpoints

ⓘ The Photocell type analog input will turn ON the lights as the sensed light level becomes dimmer than the LOW SET point, and will turn OFF the lights as the sensed light level becomes brighter than the HIGH SET. The Occupancy Sensor type analog input will turn ON the lights when Occupancy is detected and OFF during unoccupied periods. You should not need to change the HIGH and LOW setpoints for Occupancy Sensor type inputs.



1. If the UIP display does not already match the screen shown above in *Section 3*, follow steps 1 – 4 in *Section 2* of this chapter to navigate to it. (Press Start... Programming... Inputs... Analog...)
2. Press the SETPOINTS... softkey. The display will show the screen to the right.
3. The factory default HIGH SET and LOW SET values work well for most applications. If, however, your lights are not turning ON or OFF at the desired ambient light levels, then you can change these settings as needed for your installation. To change the setpoints for a Photocell Analog Input, press the softkey that is adjacent to the setpoint you wish to change. A blinking cursor will appear over the first digit of the selected setpoint. Use the number keys to enter the new setpoint and press Enter to save your selection. Use Table 10.2 for help with adjusting the setpoints to the correct values for your installation.

Problem	Solution
My lights are turning ON when the ambient light level is still too bright (turning ON too soon in the afternoon).	Lower the LOW SET point
My lights are turning ON after the ambient light level is too dark (turning ON too late in the evening).	Raise the LOW SET point
My lights are staying ON after the ambient light level has become too bright (staying ON too late in the morning).	Lower the HIGH SET point
My lights are turning OFF before the ambient light level has become bright enough (not staying ON long enough in the morning).	Raise the HIGH SET point

Table 10.2: Analog Input Setpoint Adjustment Guidelines

Chapter 11: Configuring Addressable Stations

Section 1: Introduction

The Synergy MLC controller can be connected to a digital network of up to 16 addressable stations such as SQCS control stations and SYRS remote stations, both available in a variety of hardware configurations. Each connected station must be set to a unique address (0-F, refer to your station installation instructions for information on setting this address) and is fully programmable to satisfy the requirements of your installation. All 16 stations may operate independently or may be configured to work in conjunction with each other to help limit programming time or for use in areas with moveable partitions.

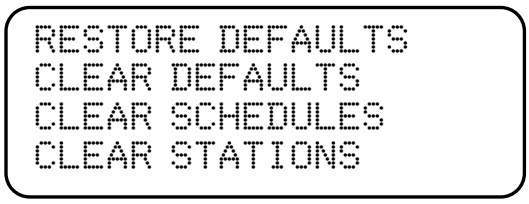
Stations are configured in Synergy by specifying what *type* of station is set at each address, which *room* it is in, and which *Groups* it should control. Rooms are numbered 1-8, and stations that are programmed to be in the same room will automatically work together. This means that programming multiple stations to work in a three-way or four-way configuration or programming a control station and entry station to work together is straightforward – simply program them to be in the same room.

If the control stations that you are configuring control the lights in an area with moveable partitions, the function of the control station in each partitioned space may be temporarily combined with the function of the control stations in each adjoining space. This allows all of the stations in a combined area to control all of the lights in that area while allowing the same stations to work separately when the area is partitioned again. When configuring the stations for this scenario, refer to *Chapter 12: Configuring Partitioned Areas* for complete information.

The Synergy controller is pre-programmed at the factory with a default configuration to help make programming most installations as easy as possible. For complete information on this default configuration and how to best take advantage of it, refer to the MLC Quick Setup Guide and *Appendix IV*, both included in this package. Use the instructions below if your installation requires a configuration not included in the default programming.

Section 2: Clearing the Factory Defaults

The first step to follow when setting up a system that will not use any of the factory programming is to clear the defaults and start with a blank station database.



1. Press the START... softkey
2. Press the SETTING UP... softkey.
3. Press the REINITIALIZE... softkey. The display will show the screen on the right.
4. Press the CLEAR STATIONS softkey to clear all factory default programming for the control stations. A warning message will appear, asking for confirmation that you want to clear the station programming. Press the ENTER button to continue and clear the station programming or press the BACK button if you do not want to clear the station programming.

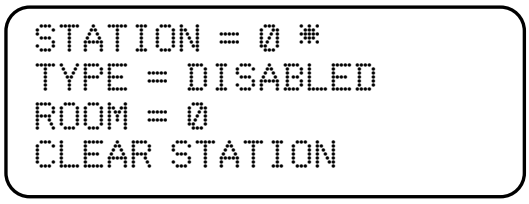
Use the reinitialize function ONLY if you are sure that you wish to ERASE all of the station programming. Once the reinitialize function has been run, the user programming for the stations CANNOT be automatically restored.

For complete information on all of the reinitialize options shown on this screen, refer to *Chapter 14, Reinitializing the System.*

Chapter 11: Configuring Addressable Stations (continued)

Section 3: Setting the Station Type

The next step needed is the specification of which type of station is at each network address and the room number for each station. When programming multiple stations to be in the same room, the station that is at the highest address will be the leader or master station. This simply means that all presets or scenes that are programmed for that room will be saved on the master station. It is recommended that the most complex station in each room be set at the highest address. For example, if you have a 2 button SYRS station and a 16 channel SQCS station that you would like to work together, the SQCS station should be set at the higher address.



1. Press the START... softkey
2. Press the SETTING UP... softkey.
3. Press the STATIONS... softkey. The display will show the screen on the right.
4. Navigate to the station that you want to configure by using the + and – keys to scroll through the available addresses. A star (*) next to the address number means that a station currently connected to the network is set at that address.
5. Press the TYPE softkey repeatedly to rotate through the available station types until the (partial) catalog number of the station that is set at this address is shown.
6. Press the ROOM softkey repeatedly to rotate through the available room numbers (1-8) until the room number that you desire for this station is shown. Stations that are set in Room 0 can be thought of as not assigned to any room and will each function independently.
7. The CLEAR STATION softkey can be used to clear all of the programming for the indicated station address. All other station addresses and system programming will remain unchanged.
8. Press the BACK button to save your changes when you have finished.

ⓘ Changing the station type will configure the station's buttons per the requirements of most installations. Refer to *Table A4.6* on page 63 in *Appendix IV, Section 5* for a guide to the default settings for each station type. The configuration for each button on the station may be individually reconfigured as required by following the steps in *Section 5* of this chapter, on page 27.

Chapter 11: Configuring Addressable Stations (continued)

Section 4: Station Layout

The SYRS series digital remote station is available with 1 through 9 Buttons. The buttons are numbered sequentially, starting with the button that is closest to the top left corner of the station, as shown in Figure 11.1, below.

Refer to *Section 5* of this chapter for complete information on programming the SYRS station buttons for your application.

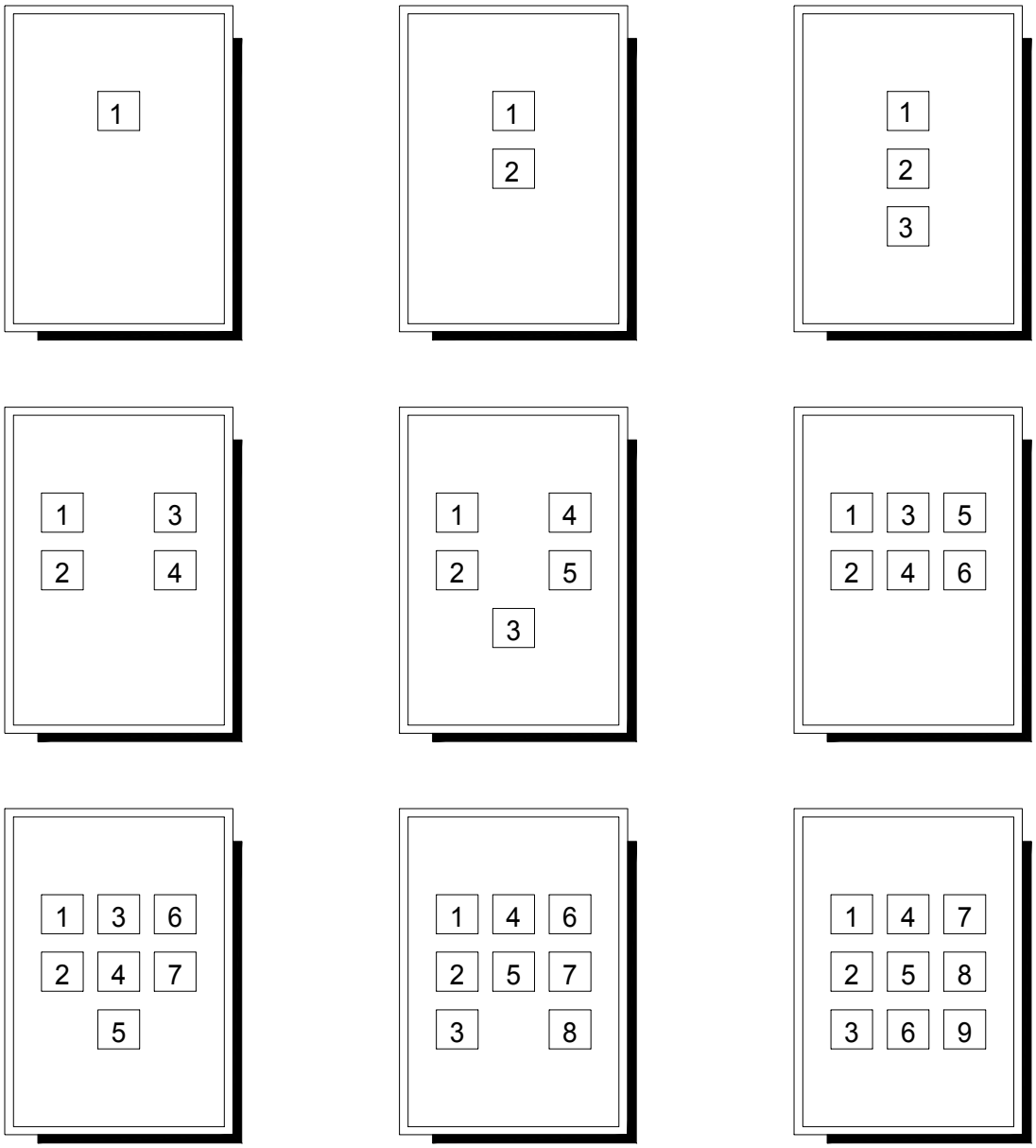


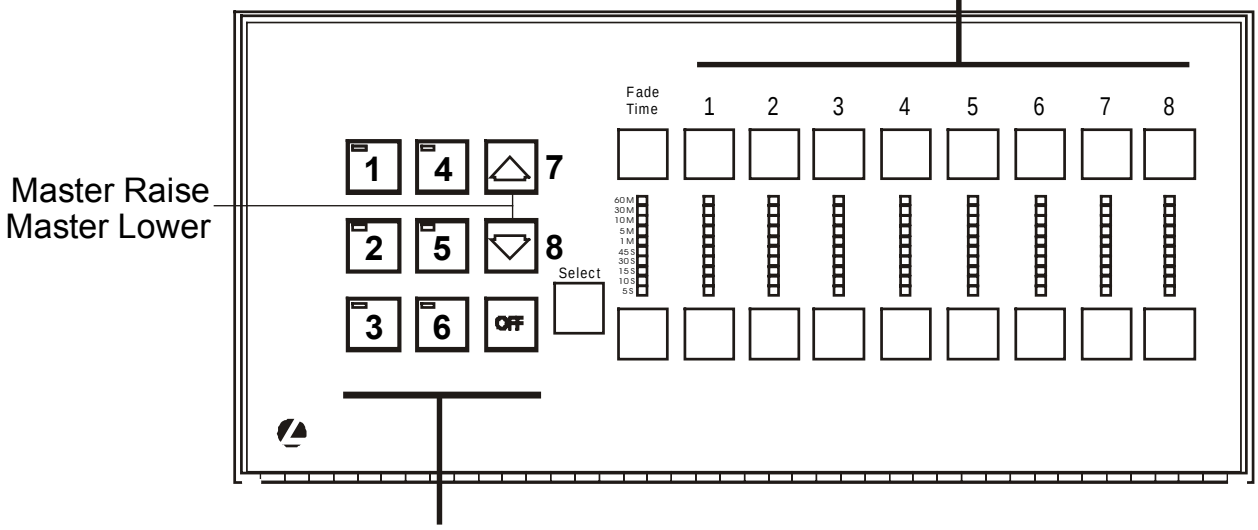
Figure 11.1: SYRS Remote Station Button Numbering

Chapter 11: Configuring Addressable Stations (continued)

Section 4: Station Layout (continued)

The SQCS series digital control station is available with 8 configurable buttons, a Master Off button, and 4 – 16 Channels. The most common configuration for these stations is shown below, with the first 6 buttons configured as presets and the 7th and 8th buttons configured for Master Raise and Lower functions. The buttons are numbered sequentially, starting with the button that is closest to the top left corner of the station, as shown in Figure 11.2, below.

CHANNELS (refer to Chapter 11, Section 6)
SQCS Stations available in
4, 8, 12, and 16 channel versions



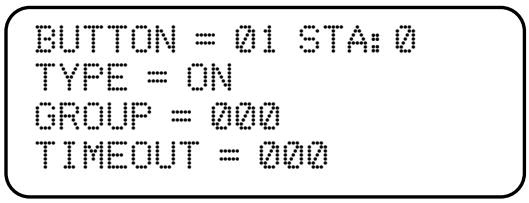
BUTTONS (refer to Chapter 11, Section 5)
Each SQCS Station supports 16 Buttons. 8 Buttons are accessible from the front of the station; all 16 are accessible via a terminal strip located on the back of the station that accepts momentary dry contact closures. Buttons 7 and 8 are factory configured to perform Master Raise and Master Lower functions to raise and lower all Ramping type channels on the station. Buttons 7 and 8 may instead be field-configured via DIP switches on the rear of the station to respond to the controller programming for these button numbers (i.e. they could act as additional presets if desired).

Figure 11.2: SQCS Control Station

Chapter 11: Configuring Addressable Stations (continued)

Section 5: Configuring the Station Buttons

Each station button is individually configurable and can be set up to perform a variety of functions for any system Group, much like the low voltage switch inputs covered in *Chapter 9*. This section is usually skipped for SQCS series control stations.



1. Press the START... softkey
2. Press the PROGRAMMING... softkey.
3. Press the INPUTS... softkey.
4. Press the BUTTONS... softkey. The display will show the screen on the right.
5. Navigate to the button that you want to configure by using the + and – keys to scroll through the individual buttons. The indicated control station can be changed by using the up and down arrows to scroll through the station addresses.
6. Press the TYPE softkey repeatedly to rotate through the available button types until the type that you need is shown. A list of all available button types and a short description of how they function is shown in Table 11.1 below.

TYPE	Functional Description
ON	Sets individual Group at 100%, typically used for SQCS presets and ON overrides.
OFF	Sets individual Group at 0%, typically used for OFF overrides.
RAMP-UP	Ramps individual Group up from its current level
RAMP-DOWN	Ramps individual Group down from its current level
MAINTAIN	Sets Group at 100% when contacts close, sets Group at 0% when contacts open, typically used for screen raise/lower buttons and occupancy sensors wired to a SYRS station with EXT option.
ALTERNATE	Sets assigned Group at ON or OFF based on its current level. If the Group is currently ON it is turned OFF and if it is currently OFF it is turned ON.
MST-RAISE	Ramps all channels in this room up from their current level
MST-LOWER	Ramps all channels in this room down from their current level
MST-OFF	Sets all channels in this room at 0%
MST-ON	Sets all channels in this room at 100%
DISABLED	Disables unused buttons

Table 11.1: Available Button Types

7. Press the GROUP softkey to program the Group that this button will control. A cursor will appear allowing a new Group number to be entered with the numeric keypad. When you have finished entering the new value, press the ENTER key.

ⓘ If you want to be able to dynamically save presets or scenes at the SQCS station, the buttons on which these presets will be saved should be left at Group 000. Any SQCS buttons that have been assigned to a Group number other than 000 cannot be changed at the station.

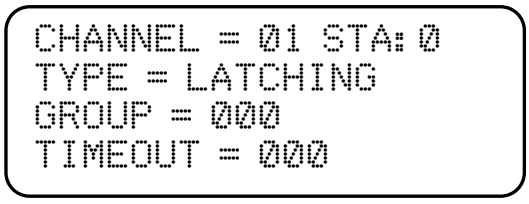
ⓘ Buttons that have been configured as a MST (master) type will ignore the Group setting (which can be left at 000) and act on all channels assigned to its room.

8. Press the TIMEOUT softkey to program a timeout period for this button. A cursor will appear, allowing a new timeout value in minutes to be entered. Valid entries are 000 to 255 minutes; setting this value at 000 will disable the timeout for this button. See *Chapter 9, Section 4* for complete information on the timeout function.

Chapter 11: Configuring Addressable Stations (continued)

Section 6: Configuring the Station Channels

SQCS control stations and SYRS remote stations with the IR option that are being used independently must have their Channels (also known as zones) configured for proper station operation.



1. Press the START... softkey
2. Press the PROGRAMMING... softkey.
3. Press the INPUTS... softkey.
4. Press the CHANNEL... softkey. The display will show the screen on the right.
5. Navigate to the channel that you want to configure by using the + and – keys to scroll through the individual channels. The indicated control station can be changed by using the up and down arrows to scroll through the station addresses. Refer to Table 11.2 below for the channels that should be configured for each station type.

Station Catalog Number	Valid Channels
SQCS 6P 4C	02, 04, 06, 08
SQCS 6P 8C	01 – 08
SQCS 6P 12C	01 – 12
SQCS 6P 16C	01 – 16
SYRS #BT IR	01 – 12

Table 11.2: Valid Control Station Channels

6. Press the TYPE softkey repeatedly to rotate through the available Channel types until the type that you need is shown. A LATCHING channel is used for non-dim loads and can only set the assigned Group to 0% or 100%; A RAMPING channel is used for dimmed loads and can set the assigned Group at any level between 0% and 100%.
7. Press the GROUP softkey to change the Group that this Channel will control. A cursor will appear, allowing a new Group number to be entered using the numeric keypad. Press ENTER when you have finished entering the new value to save this change.
8. Press the TIMEOUT softkey to program a timeout period for this channel if desired. A cursor will appear, allowing a new timeout value in minutes to be entered. Valid entries are 000 to 255 minutes; setting this value at 000 will disable the timeout for this button. See *Chapter 9, Section 4* for complete information on the timeout function. Note that this function is rarely used for Channel inputs.

ⓘ If you have configured two or more SQCS stations to work together by setting them to the same room number, only the station at the highest address needs to have its Channels assigned to Groups. The channels of stations at lower addresses should be assigned to Group 000. The Channel Type must be set for all channels on all stations, however, as this function remains independent for each station.

Chapter 12: Configuring Partitioned Areas

Section 1: Introduction

Addressable control stations that are controlling lighting in rooms with movable partitions have the ability to be dynamically re-configured by the Synergy system to match different partition door configurations. This type of dynamic system re-configuration is typically referred to as *Room Assignment.* Individual logical partitions between rooms are included in a specific range of Groups (201-210), and those Groups can be controlled with any available system input as needed. When partitions are Open (partition Group at 100%), all adjoining control stations will be linked for common control. When all the partitions for a room are Closed (partition Group at 0%), the stations in each room will only operate the lighting in that room.

Typically, one or more SYRS remote stations are used to control the partition Groups. Refer to *Chapter 11: Configuring Addressable Stations* and the SYRS installation instructions for complete information on setting up the SYRS station. Figure 12.1, below, shows a graphical representation of the logical Room Assignment array used by the system. In this array, a room can be combined with any of its neighbors by controlling the partition Group between them. Partition Groups that are not controlled by any input will remain at 0% (closed). By selectively controlling different partitions, the system can accommodate a wide variety of room partition configurations. *Section 2* of this chapter includes several examples of typical Room Assignment applications and how the rooms should be configured.

Figure 12.1: Room Assignment Array

Room 1	**Partition Group 201**	**Room 2**	**Partition Group 202**	**Room 3**	**Partition Group 203**	**Room 4**
Partition Group 204		**Partition Group 205**		**Partition Group 206**		**Partition Group 207**
Room 5	**Partition Group 208**	**Room 6**	**Partition Group 209**	**Room 7**	**Partition Group 210**	**Room 8**

Note that any Addressable Stations that are assigned to Room 0 may be thought of as not assigned to any room and will work independently regardless of status of any partition Group.

Chapter 12: Configuring Partitioned Areas (continued)

Section 2: Examples

In each of the examples below, a graphical representation shows a typical room assignment configuration with the appropriate room and partition Group numbers indicated. To use any of these examples in your application, simply assign the stations for each partitioned space to the appropriate room (see *Chapter 11, Section 3* for instructions on assigning stations to rooms), then program the button(s) on your partition station(s) to control the appropriate Partition Group number (see *Chapter 11, Section 5* for instructions on assigning Groups to buttons).

Figure 12.2: Two Room Example

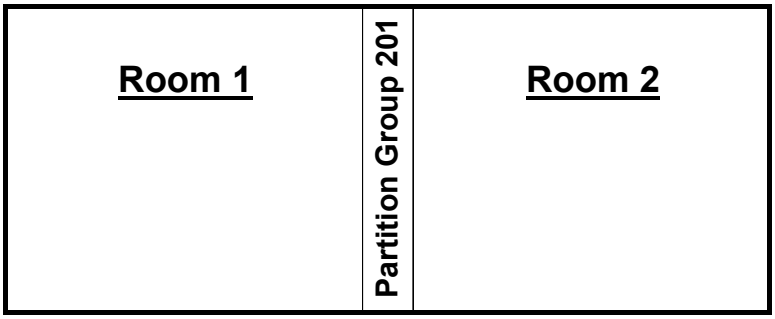
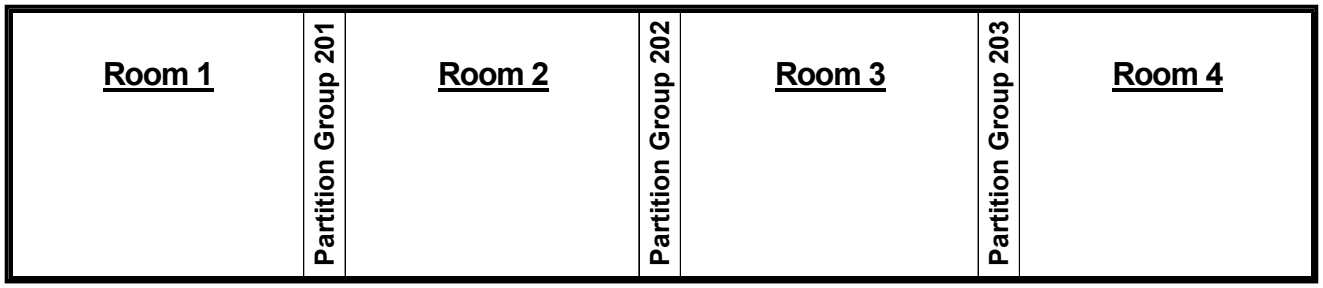


Figure 12.3: Four Room, Linear Arrangement Example



Section 2: Examples (continued)

Figure 12.4: Four Room, Quad Arrangement Example

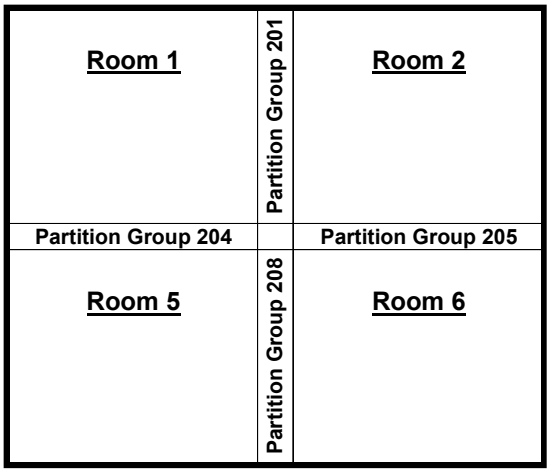
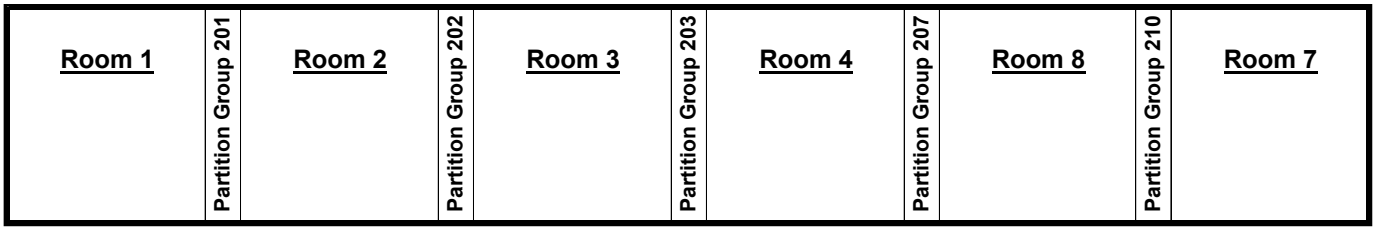
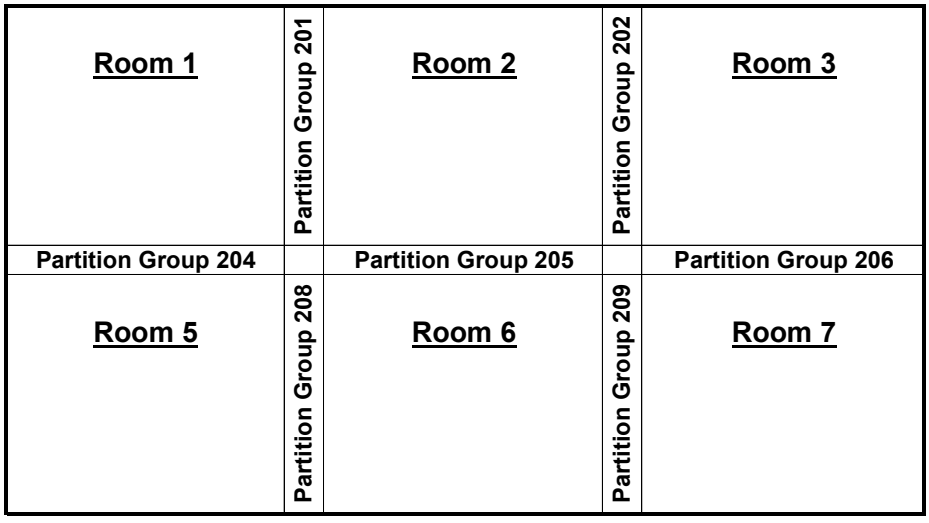


Figure 12.5: Six Room, Linear Arrangement Example



The above example demonstrates how a linear arrangement of more than four rooms can be accommodated by simply controlling the partitions between adjacent rooms and ignoring the partitions between rooms that are not adjacent in your application.

Figure 12.6: Six Room, Quad Arrangement Example



Chapter 13: Programming Time Schedules

Section 1: Introduction

All Synergy system Groups can be programmed to automatically switch ON or OFF per a highly flexible time schedule. This is accomplished by programming schedule *Events* for the Group that you wish to automate. These Events can take place at any time of the day that you specify or at Dawn and Dusk, which the system will calculate each day for your location. The Events can be programmed to take place only on individual days of the week, throughout the Monday – Friday work week, only on the weekend (Saturday and Sunday), throughout the entire Monday – Sunday week, or on specific Holiday dates that you define.

There are 99 Schedule Events available in the Synergy system. These Events are all independent and individually configurable, and there are no restrictions on when each event can be programmed to take place. Multiple Events can be scheduled to take place at the same time if multiple Groups need to be controlled.

ⓘ If more than one Event is accidentally programmed to control the same Group at the same time, both Events will take place in rapid succession and the lights will remain at the level set by the highest numbered event.

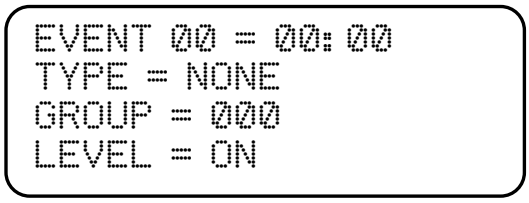
The Synergy controller is pre-programmed at the factory with a default schedule of events to help make programming most installations as easy as possible. For complete information on this default schedule and how to best take advantage of it, refer to the MLC Quick Setup Guide and *Appendix IV*, both included in this package. Use the instructions below if your installation requires a configuration not included in the default programming. If you wish to clear all of the default schedule programming, refer to *Chapter 14, Re-Initializing the System.*

Blank worksheets have been provided in *Section 4* of this chapter to record your event and holiday programming for future reference.

Chapter 13: Programming Schedules (continued)

Section 2: Programming Schedule Events

1. Press the START... softkey
2. Press the PROGRAMMING... softkey.
3. Press the SCHEDULES... softkey.
4. Press the EVENTS... softkey. The display will show the screen on the right. Use the + and – keys to navigate to the Event number that you want to configure.



5. Press the EVENT softkey. A blinking cursor will appear over the first digit of the event time. If you want this event to occur at a specific time of day (i.e. 07:00), use the number keys to enter the time that you want this event to occur. Note that Event times must be entered in 24 hour format (for example 10:00 PM must be entered as 22:00). Press ENTER when you have finished entering the new value to save this change.
6. If you want this event to occur at or near Dawn or Dusk, press the EVENT softkey repeatedly to cycle through the available Dawn and Dusk times with and without offsets. Offset values are shown in minutes. Note that the Synergy controller must be properly configured for its installed location for it to be able to accurately calculate Dawn and Dusk times. See *Chapter 5: Setting Up the System* for information on properly configuring your controller for its location.
7. Press the TYPE softkey repeatedly to rotate through the available options until the day or range of days that you want this event to take place is shown. The available options are: NONE, SUNDAY, MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, MON–FRI, SAT–SUN, MON–SUN, and HOLIDAY. Currently active schedule types are indicated with a star (*). For example, if you are programming the controller on a Sunday, the SUNDAY, SAT–SUN, and MON–SUN choices would each be flagged with a star. A schedule event that is programmed as a HOLIDAY event will take place only on the dates that have been configured as holidays. See *Section 3* of this chapter, *Programming Schedule Holidays* for more information on HOLIDAY type events.
8. Press the GROUP softkey to change the Group that this Event will control. A cursor will appear, allowing a new Group number to be entered using the numeric keypad. Press ENTER when you have finished entering the new value to save this change. Note that any system Group may be controlled by an event as required. See *Chapter 8, Section 3* for more information on the available system Groups.
9. Press the LEVEL softkey to specify the level that you want set for the assigned Group at the Event time. See Table 13.1, below for a functional description of each of your choices.

LEVEL	Functional Description
ON	Sets Group at 100%; used to turn ON Output Groups and to activate Preset Groups.
OFF	Sets Group at 0%, with no 'blink' warning prior to OFF; used to turn OFF outside lighting and HID lighting.
WARN OFF	Sets Group at 0%, 'blink' warning is given prior to OFF; used to turn OFF lighting in spaces that may be occupied when the lights are scheduled to be turned OFF (such as office lighting). The default length of time for the 'blink' warning to occur prior to the OFF event is 5 minutes, but this setting may be changed as required to suit the preferences of the occupants – see *Chapter 5, Setting Up the System* for information on changing this setting.

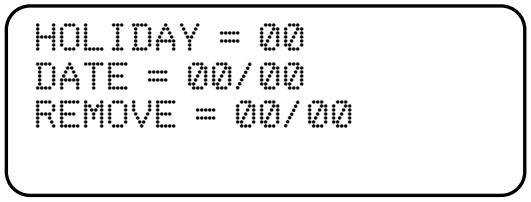
Table 13.1: Available Schedule Event Levels

Chapter 13: Programming Schedules (continued)

Section 3: Programming Schedule Holidays

The Synergy schedule allows the configuration of up to 32 Holiday dates, which may be configured to take place only once (i.e. March 29, 2002) or take place on the same date every year (i.e. July 4th). On these dates only Holiday type Events will run, taking precedence over the normal Events for that day of the week. The steps below will guide you through the process of configuring the Holiday dates for your installation.

1. Press the START... softkey
2. Press the PROGRAMMING... softkey.
3. Press the SCHEDULES... softkey.
4. Press the HOLIDAYS... softkey. The display will show the screen on the right.



5. Navigate to the Holiday number that you want to program by using the + and – keys to increment and decrement the Holiday # by 1's, or the up and down arrow keys to decrement and increment by 10's.
6. Press the DATE softkey to specify the date for this Holiday. A cursor will appear over the first digit of the date. Use the numeric keypad to enter the date in MM/DD/YYYY format. If you want this Holiday to automatically re-occur every year, enter 0000 for the year. Press ENTER when you are done entering the date to save your entry.
7. If you want to remove a Holiday date that was previously specified, navigate to the appropriate Holiday number as in Step 5 and press the REMOVE softkey. The date for the Holiday number will change to 00/00, which indicates that no date is specified for this Holiday number.

Section 4: Event and Holiday Schedule Worksheets

Holiday Date Worksheet

Holiday #	00	01	02	03
Assigned Date	/ /	/ /	/ /	/ /

Holiday #	04	05	06	07
Assigned Date	/ /	/ /	/ /	/ /

Holiday #	08	09	10	11
Assigned Date	/ /	/ /	/ /	/ /

Holiday #	12	13	14	15
Assigned Date	/ /	/ /	/ /	/ /

Holiday #	16	17	18	19
Assigned Date	/ /	/ /	/ /	/ /

Holiday #	20	21	22	23
Assigned Date	/ /	/ /	/ /	/ /

Holiday #	24	25	26	27
Assigned Date	/ /	/ /	/ /	/ /

Holiday #	28	29	30	31
Assigned Date	/ /	/ /	/ /	/ /

Schedule Event Worksheet (Page 1 of 2)

Event #	00	01	02	03	04
Event Time					
Event Type					
Group #					
Level					

Event #	05	06	07	08	09
Event Time					
Event Type					
Group #					
Level					

Event #	10	11	12	13	14
Event Time					
Event Type					
Group #					
Level					

Event #	15	16	17	18	19
Event Time					
Event Type					
Group #					
Level					

Event #	20	21	22	23	24
Event Time					
Event Type					
Group #					
Level					

Event #	25	26	27	28	29
Event Time					
Event Type					
Group #					
Level					

Event #	30	31	32	33	34
Event Time					
Event Type					
Group #					
Level					

Event #	35	36	37	38	39
Event Time					
Event Type					
Group #					
Level					

Event #	40	41	42	43	44
Event Time					
Event Type					
Group #					
Level					

Event #	45	46	47	48	49
Event Time					
Event Type					
Group #					
Level					

Schedule Event Worksheet (Page 2 of 2)

Event #	50	51	52	53	54
Event Time					
Event Type					
Group #					
Level					

Event #	55	56	57	58	59
Event Time					
Event Type					
Group #					
Level					

Event #	60	61	62	63	64
Event Time					
Event Type					
Group #					
Level					

Event #	65	66	67	68	69
Event Time					
Event Type					
Group #					
Level					

Event #	70	71	72	73	74
Event Time					
Event Type					
Group #					
Level					

Event #	75	76	77	78	79
Event Time					
Event Type					
Group #					
Level					

Event #	80	81	82	83	84
Event Time					
Event Type					
Group #					
Level					

Event #	85	86	87	88	89
Event Time					
Event Type					
Group #					
Level					

Event #	90	91	92	93	94
Event Time					
Event Type					
Group #					
Level					

Event #	95	96	97	98	99
Event Time					
Event Type					
Group #					
Level					

Chapter 14: Reinitializing the System

The Synergy controller is capable of having all of its programming or only specific components of its programming reinitialized. These reinitialize functions are typically used when programming errors have been made or the user would like to clear portions of the factory default programming. The procedure below will guide you through the steps required to reinitialize all or part of the system programming.

Use the reinitialize functions ONLY when you are sure that you wish to ERASE all of the specified user programming. Once the reinitialize function has been run, the old programming CANNOT be automatically restored.

1. Press the START... softkey
2. Press the SETTING UP... softkey.
3. Press the REINITIALIZE... softkey. The display will show the screen on the right.
4. Press the softkey that corresponds to the reinitialize function that you want to run. Refer to Table 14.1 below for information on each of these functions. A warning message will appear, asking for confirmation that you want to clear the programming. Press the ENTER button to continue and clear the programming or press the BACK button if you do not want to clear the programming.

Command	Actions
RESTORE DEFAULTS	Clears all User Programming
	Restores all default programming as shown in Appendix IV
CLEAR DEFAULTS	Ouputs default to RELAY(N.O) type
	Switches default to LATCHING
	Analogs default to PHOTOCELL type, setpoints at 5, 15.
	Switches assigned to group 0
	Analogs assigned to group 0
	No group members
	Stations default to DISABLED type.
	Buttons default to ON type (presets) or RAMPING type (channels)
	Buttons assigned to group 0.
	Stations assigned to room 0.
	Presets are cleared.
	Partitions all OFF (closed)
	No scheduled events or holidays
CLEAR SCHEDULES	Clear all scheduled events
	Warn time remains unchanged.
	All other user and default programming remains as programmed
CLEAR STATIONS	Station types remain unchanged.
	Buttons default to ON type (presets) or RAMPING type (channels)
	Buttons assigned to group 0.
	Presets are cleared.
	Partitions all OFF (closed)
	Stations assigned to room 0.
	All other user and default programming remains as programmed

Table 14.1: Reinitialize Options

Chapter 15: Displaying the Current System Status

Section 1: Introduction

The Synergy UIP can be used to view the current status of all system hardware, inputs and outputs. This capability is most often used to debug installation and programming problems. A good example of how these status screens can be used follows:

Situation: A Group of relays that is supposed to be controlled by a switch is not responding as intended.

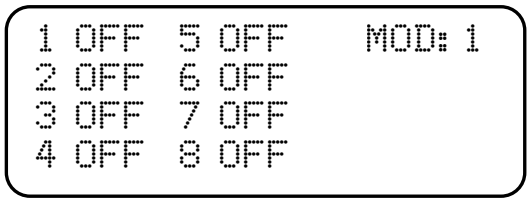
Debug Procedure: The user first views the status of the outputs when the switch is OFF and then when the switch is ON. If the status of the relays changes as intended, but the lights in the space are not responding, then either the wrong relay(s) are identified as controlling these lights, the circuit breaker feeding these lights is OFF, or there is a hardware issue with the power module.

If the status of the outputs does not change, then the user can next view the status of the input connected to the switch. If the switch input status responds properly to the action of the switch, then there is probably a mistake in the switch-to-Group or Group-to-relay programming. If the switch status does not respond properly, then there is most likely an issue with either the switch wiring or the switch itself.

The sections below will give you information for each of the status screens that are available, with instructions for navigating between them and descriptions to help interpret the data that is reported.

Section 2: Output Status

1. Press the DISPLAY... softkey.
2. Press the OUTPUTS... softkey. The display will show the screen on the right.



Use the - and + keys to cycle through the modules. The outputs display a percentage when they are at a level other than ON or OFF. Outputs controlled by ramping buttons or switches will display a ↑ when raising and a ↓ when lowering. A percentage ON or OFF level will replace the arrow when the output has stopped ramping. Note that a – may briefly appear while the controller determines the final level of the dimmer.

Section 3: Switch Input Status

1. Press the DISPLAY... softkey.
2. Press the INPUTS... softkey.
3. Press the SWITCHES... softkey. The display will show the screen on the right.

Use the - and + keys to cycle through the modules. If a switch input is configured as a Latching, Alternate, or Maintained type, a dot (.) will be displayed if the switch is currently OFF, and a star (*) will be displayed if the switch is currently ON. If a switch input is configured as a Ramping type, a ↑ will be displayed while the switch is raising the Group level, a ↓ will be displayed while the switch is lowering the Group level, and a – will be displayed when the switch is not being used.

Section 4: Analog Input Status

1. Press the DISPLAY... softkey.
2. Press the INPUTS... softkey.
3. Press the ANALOGS... softkey. The display will show the screen on the right.

Use the - and + keys to cycle through the modules. The displayed value for each analog input is a percentage, but the value shown for each input depends on the configuration of the Type and Setpoint for that input. If the High and Low Setpoints for an input are both zero, it is in 'tracking mode' and the value displayed for it on this screen can be any value between 0 and 100 percent. Note that tracking mode is rarely used and is primarily for dimming applications. If the Setpoints for an input are not both zero, then the displayed value for that input will either be 0 or 100, based on whether the current analog signal is above or below the High and Low setpoints.

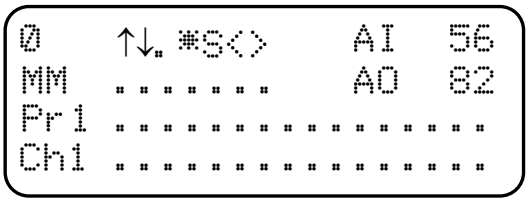
See Table 15.1 for information on how the reported analog input level corresponds to the actual analog signal voltage depending on how the input is configured. Refer to *Chapter 10* for more information on the analog input Type and Setpoint settings.

Input Type and Setpoints	When the analog signal is:	...the displayed value will be:
Photocell, High Set and Low Set ≠ 0	At or below the Low Set Value	100
	At or above the High Set Value	0
Photocell, High Set and Low Set = 0	Any value (0-100).	Inverse of the analog signal (100-0)
Occ Sensor, High Set and Low Set ≠ 0	At or below the Low Set Value	0
	At or above the High Set Value	100
Occ Sensor, High Set and Low Set = 0	Any value (0-100).	The analog signal value (0-100).
Disabled	Any value (0-100).	0

Table 15.1: Analog Input Signals and Displayed Values for Each Input Configuration

Chapter 15: Displaying the Current System Status (continued)

Section 5: Addressable Station Status



1. Press the DISPLAY... softkey.
2. Press the INPUTS... softkey.
3. Press the STATIONS... softkey. The display will show the screen on the right.
4. Navigate to the station that you want to view by using the -and + keys to cycle through the station addresses.

This screen is especially helpful to determine and correct field wiring errors related to the Control Station input wiring connections. The top display line from left to right indicates the station address [0, a star (*) will be shown next to the address if a station is detected at that address on the network], followed by the master function labels [master raise ↑, master lower ↓, off . , on *, select S, fade decrease <, fade increase >] ending with the optional external input level [AI 56]. The second line indicates both status of the master inputs as well as the optional external output status [AO 82] . The third line indicates the status of the station Preset buttons (1 – 16), and the fourth line indicates the status of the station Channels (1 – 16). The Presets and Channels on these lines will display a ↑ or ↓ while the button that corresponds to the preset or channel is being pressed and a . when the button is not being pressed.

Section 6: System Controller Status

1. Press the DISPLAY... softkey.
2. Press the SYSTEM... softkey. The display will show the screen on the right.

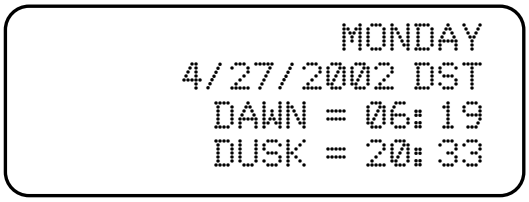
The A4 is the control station network that connects SEQUEL (SQCS) Control Stations and SYNERGY (SYRS) remote stations to the controller. A high error rate (5% or greater) indicates that a station is not communicating properly. Possible causes for a high error rate include improper network termination, network wiring problems, or duplicate station address on the network.

The BUS is the local (I^2C) bus that the controller uses to communicate with the Relay, Dimmer and Ballast modules. This data is transmitted on the ribbon cable mounted in the Synergy enclosure. A high error rate (2% or greater) indicates a module is not communicating properly or the bus connection is either damaged or too long.

The MEM and DATA fields are statistics on the available RAM and system programming memory space available, respectively. A low number in either of these fields (16K or less) may indicate a problem in either the system programming or the controller hardware.

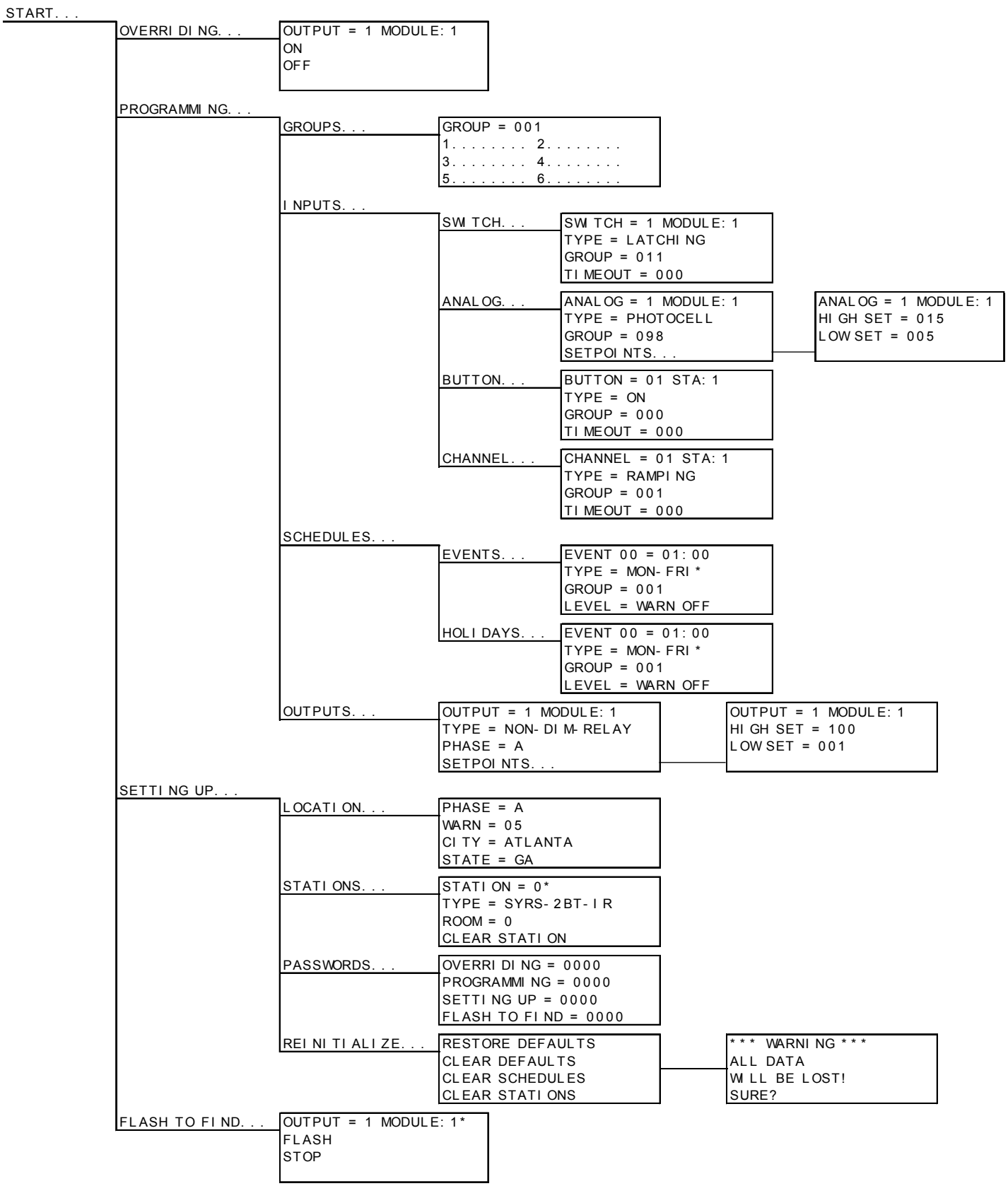
Section 7: Astronomic Timeclock Status

1. Press the DISPLAY... softkey.
2. Press the ASTRO... softkey. The display will show the screen on the right.

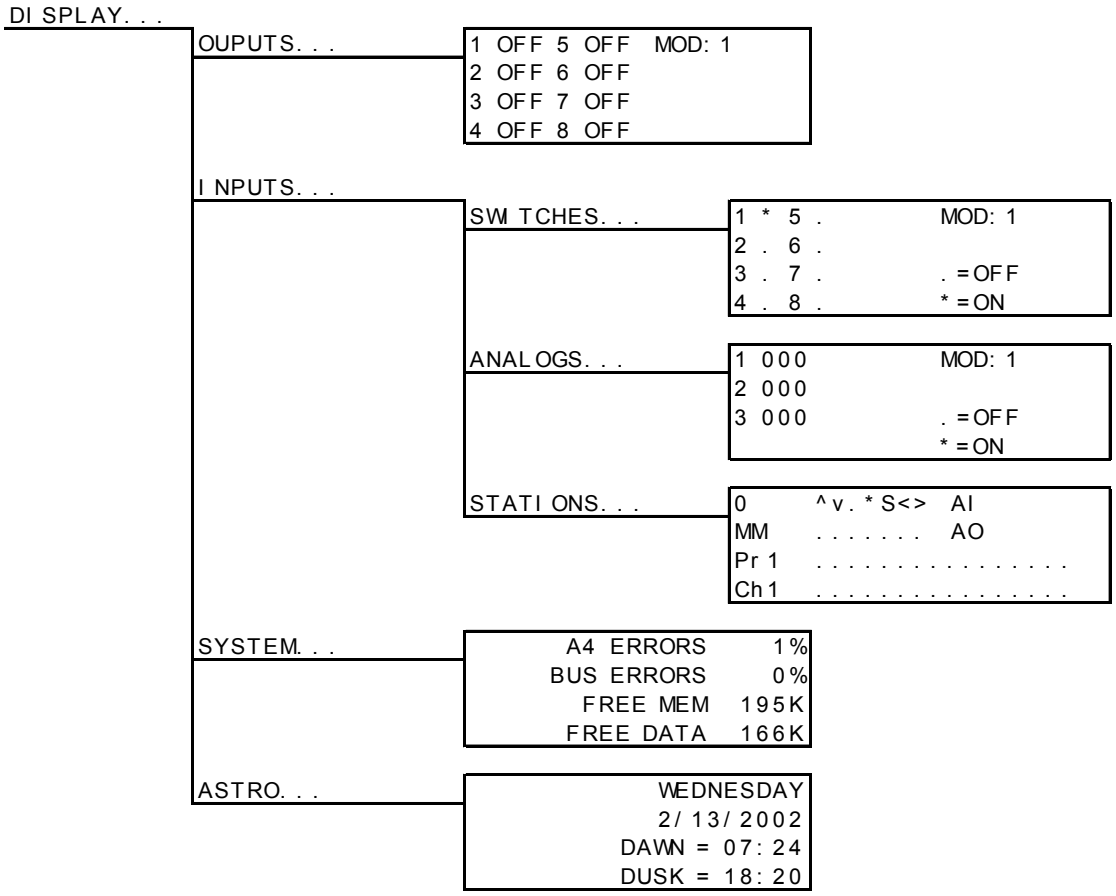


This screen shows all values calculated for the Synergy controller's astronomic timeclock function based on the location, time and date settings. The first line indicates the current day of the week. The second line indicates the current date and whether Daylight Savings Time is currently active or not. The third line is the calculated Dawn time for this date and location and the bottom line is the calculated Dusk time for this date and location. If any of these do not appear to be accurate, refer to *Chapter 5, Setting Up the System* for instructions on changing the settings that determine these calculated values.

Appendix I: UIP Menu Tree



Appendix I: UIP Menu Tree (continued)



Appendix II: Glossary

0-10V Ballast: An output used to switch and dim fluorescent fixtures equipped with ballasts that accept a 0-10VDC control signal, such as the Advance Mark VII, Lutron TVE-10, Osram-Sylvania Helios and ESI SuperDim. These ballasts can all be quickly identified in the field by the 0-10VDC control leads, which are purple and gray. The 0-10VDC Ballast output is a component of the SYPM 8F and SYPMB 8FB series power modules.

Addressable Stations: Also known as Digital Stations and Network Stations, these are configurable user interfaces that communicate with the Synergy panel via a digital network (referenced in some literature as the 'A4' network). Up to 16 of these stations may be connected to each Synergy panel with a SYSC MLC controller, and all are individually configurable to control any system output or Group of outputs to suit the requirements of the installation. The network for these stations is wired in a 'daisy-chain' (in and out) manner and the network wire must be either Lithonia SYA CABLEA4, which includes all needed conductors, or Belden 3105A, which must be pulled with (2) #16 AWG wires for station power. Addressable stations have catalog numbers that begin with 'SQCS' or 'SYRS'.

Astronomic Timeclock: Industry term for a time schedule with events that occur at DAWN and DUSK, which are calculated each day for the installed location of the panel.

Channel: A Group of lights that are always controlled together by a digital control station. The channel raise/lower controls are located on the right side of a SQCS control station and include a LED bargraph that indicates the current level of the channel (see page 26 for the SQCS station layout diagram). Channels are sometimes also called 'zones'.

Controller: An integrated User Interface Panel (UIP) and embedded PC. The controller is where the system programming is entered, stored, and executed.

Dimmer: An output device used by the system to raise and lower the light output of a connected lighting load in a continuous fashion. Dimmers work by changing the RMS voltage delivered to the connected load, which must be dimmable to work properly. Note that some types of low voltage incandescent and neon fixtures and most types of fluorescent fixtures are not dimmable; check with Lithonia Controls or your fixture manufacturer for more information if you are unsure about your loads. Dimmers are a component of SYPMB 6DB series power modules.

Enclosure: A NEMA 1 panel that houses the system electronics (power modules, controller, and low voltage power supply).

Event: Any change in the status of a Group triggered by an input or schedule.

Fade Time: The amount of time that the system will use to fade from the current lighting level to the selected preset.

Groups: A Group contains one or more outputs (i.e., relays or dimmers). Groups are the core element of the Synergy system programming. All triggers (switches, scheduled events, etc.) are programmed to control Groups. Multiple triggers can control a single Group. For example, a Group called Hallway Lights can be programmed to turn on/off by a timeclock schedule. The same Group can also be controlled (overridden) by a local switch, networked control station, or both if desired.

Inputs: An Input activates an event and changes the status of a Group when triggered. Switches, photocells, networked control stations, and occupancy sensors are all inputs.

Master Raise/Lower/On/Off: A button programmed as a Master type (MST xxx) will affect all of the channels on its control station and the control stations in its logical room. The Group programming for master type buttons is ignored.

Appendix II: Glossary (continued)

Outputs: Either a relay or a dimmer that is used to change in the status of a lighting load (on/off, raise or lower) by changing the amount power delivered to that load. See the Relay, Dimmer, and 0-10V Ballast definitions in this glossary for more information about these output types.

Photocell: A low voltage analog input device used to measure the light level. Compatible photocells include the Lithonia LSA APS OL, LSA APS OH, and LSA APS S.

Power Module: An electronic assembly that includes power handling devices and low voltage inputs. Power modules are mounted above the controller in the Synergy enclosure and have catalog numbers that begin with SYPM.

Preset: A stored set of digital control station channel levels with an associated fade time. Preset buttons are located on the left side of a SQCS control station and include a LED pilot light that indicates the current preset (see page 26 for the SQCS station layout diagram). Presets are sometimes also referred to as 'scenes'

Relay: An output device used by the system to turn a load ON or OFF. A relay can be thought of as a computer controlled switch. Relays are a component of SYPM 8R and SYPMB 8RB series power modules.

Room: A set of digital control stations that are programmed to work together. A room may be used to shorten the time required to program a system: stations that are to control the same lights may all be configured to be in the same room, and then only the station with the highest address needs to be programmed. Rooms are separated by logical partitions, which may be controlled by any system input through the use of Partition Groups (Groups 201 – 210) to temporarily combine and separate the control of the rooms. Refer to *Chapter 11* and *Chapter 12* for more information on digital station configuration options.

Schedule: A series of programmed events that cause the light level to change at specific times of the day or dawn and dusk.

Trigger: An input device or scheduled event that causes a change in the status of an output.

UIP: User Interface Panel: the integral keypad and LCD display on the Synergy SYSC MLC controller.

Appendix III: Location Table

This data is used by the MLC controller to calculate sunrise and sunset times for each location and to enable and disable the automatic Daylight Savings Time adjustment. The controller sets these values automatically when a city and state are selected from the Start... Setting Up... Location... menu, and they are provided here as a reference only. Refer to *Chapter 5, Section 3* on Page 13 for more information about this programming step.

United States

City	Abbr.	State	Time Zone	Longitude	Latitude	Daylight Savings
Birmingham	AL	Alabama	-6	-86:16	33:31	Y
Dothan	AL	Alabama	-6	-85:33	31:13	Y
Huntsville	AL	Alabama	-6	-86:14	34:44	Y
Mobile	AL	Alabama	-6	-88:14	30:42	Y
Montgomery	AL	Alabama	-6	-86:30	32:23	Y
Phenix_City	AL	Alabama	-6	-85:14	32:28	Y
Adak	AK	Alaska	-9	-176:33	51:40	Y
Anchorage	AK	Alaska	-9	-149:33	61:10	Y
Barrow	AK	Alaska	-9	-156:30	71:20	Y
Deadhorse	AK	Alaska	-9	-148:33	70:12	Y
Denali_N.Park	AK	Alaska	-9	-148:30	63:43	Y
Eielson_AFB	AK	Alaska	-9	-147:30	64:40	Y
Fort_Yukon	AK	Alaska	-9	-145:30	66:30	Y
Juneau	AK	Alaska	-9	-134:33	58:18	Y
Kenai	AK	Alaska	-9	-151:14	60:33	Y
Ketchikan	AK	Alaska	-9	-131:30	55:21	Y
Kodiak	AK	Alaska	-9	-152:33	57:47	Y
Nome	AK	Alaska	-9	-165:33	64:30	Y
Prudhoe_Bay	AK	Alaska	-9	-148:14	70:16	Y
Seward	AK	Alaska	-9	-149:16	60:6	Y
Shemya	AK	Alaska	-9	174:33	52:43	Y
Sitka	AK	Alaska	-9	-135:30	57:3	Y
Flagstaff	AZ	Arizona	-7	-111:14	35:12	N
Phoenix	AZ	Arizona	-7	-112:16	33:27	N
Prescott	AZ	Arizona	-7	-112:33	34:33	N
Sanders	AZ	Arizona	-7	-109:14	35:13	N
Tucson	AZ	Arizona	-7	-110:14	32:13	N
Yuma	AZ	Arizona	-7	-114:33	32:43	N
El_Dorado	AR	Arkansas	-6	-92:33	33:12	Y
Fort_Smith	AR	Arkansas	-6	-94:33	35:23	Y
Little_Rock	AR	Arkansas	-6	-92:30	34:45	Y
Texarkana	AR	Arkansas	-6	-94:30	33:26	Y
West_Memphis	AR	Arkansas	-6	-90:16	35:9	Y
Anaheim	CA	California	-8	-117:30	33:50	Y
Bakersfield	CA	California	-8	-119:33	35:23	Y
Barstow	CA	California	-8	-117:30	34:53	Y
Berkeley	CA	California	-8	-122:33	37:52	Y
Compton	CA	California	-8	-118:14	33:54	Y
Dmd.Springs	CA	California	-8	-120:16	38:42	Y
E.Los_Angeles	CA	California	-8	-118:14	34:1	Y
Edwards_AFB	CA	California	-8	-117:30	34:54	Y
Escondido	CA	California	-8	-117:14	33:7	Y
Eureka	CA	California	-8	-124:30	40:45	Y
Fairfield	CA	California	-8	-122:16	38:15	Y
Fresno	CA	California	-8	-119:30	36:44	Y
Glendale	CA	California	-8	-118:14	34:9	Y

Appendix III: Location Table (continued)

United States (continued)

City	Abbr.	State	Time Zone	Longitude	Latitude	Daylight Savings
Hawthorne	CA	California	-8	-118:30	33:55	Y
Hayward	CA	California	-8	-122:16	37:40	Y
Huntington_B.	CA	California	-8	-118:14	33:40	Y
Long_Beach	CA	California	-8	-118:30	33:46	Y
Los_Angeles	CA	California	-8	-118:33	34:3	Y
Modesto	CA	California	-8	-121:30	37:39	Y
Needles	CA	California	-8	-114:14	34:51	Y
Oakland	CA	California	-8	-122:30	37:48	Y
Oxnard	CA	California	-8	-119:30	34:12	Y
Redding	CA	California	-8	-122:16	40:36	Y
Redwood_City	CA	California	-8	-122:14	37:28	Y
Riverside	CA	California	-8	-117:33	33:59	Y
Sacramento	CA	California	-8	-121:14	38:40	Y
Salinas	CA	California	-8	-121:30	36:40	Y
San_Diego	CA	California	-8	-117:14	32:43	Y
San_Francisco	CA	California	-8	-122:30	37:47	Y
San_Jose	CA	California	-8	-121:16	37:20	Y
San_Leandro	CA	California	-8	-122:33	37:44	Y
SanBernardino	CA	California	-8	-117:33	34:6	Y
Santa_Barbara	CA	California	-8	-119:33	34:25	Y
Santa_Rosa	CA	California	-8	-122:33	38:26	Y
Stockton	CA	California	-8	-121:30	37:57	Y
Ventura	CA	California	-8	-119:33	34:17	Y
Visalia	CA	California	-8	-119:14	36:20	Y
Yuba_City	CA	California	-8	-121:33	39:8	Y
Boulder	CO	Colorado	-7	-105:33	40:1	Y
Col.Springs	CO	Colorado	-7	-104:30	38:50	Y
Cortez	CO	Colorado	-7	-108:16	37:21	Y
Denver	CO	Colorado	-7	-104:14	39:45	Y
GrandJunction	CO	Colorado	-7	-108:33	39:5	Y
Greeley	CO	Colorado	-7	-104:14	40:25	Y
Lakewood	CO	Colorado	-7	-105:33	39:44	Y
Pueblo	CO	Colorado	-7	-104:16	38:16	Y
Bridgeport	CT	Connecticut	-5	-73:16	41:11	Y
Hartford	CT	Connecticut	-5	-72:16	41:46	Y
New_Haven	CT	Connecticut	-5	-72:14	41:18	Y
Stamford	CT	Connecticut	-5	-73:16	41:3	Y
Waterbury	CT	Connecticut	-5	-73:16	41:33	Y
Newark	DE	Delaware	-5	-75:33	39:41	Y
Wilmington	DE	Delaware	-5	-75:16	39:45	Y
Washington	DC	District Of Columbia	-5	-77:16	38:54	Y
Boca_Raton	FL	Florida	-5	-80:33	26:21	Y
Clearwater	FL	Florida	-5	-82:16	27:58	Y
Daytona_Beach	FL	Florida	-5	-81:33	29:13	Y
Fort_Myers	FL	Florida	-5	-81:33	26:36	Y
Ft.Lauderdale	FL	Florida	-5	-80:16	26:7	Y
Jacksonville	FL	Florida	-5	-81:30	30:20	Y
Lakeland	FL	Florida	-5	-81:30	28:0	Y
Miami	FL	Florida	-5	-80:16	25:47	Y
Ocala	FL	Florida	-5	-82:16	29:11	Y
Orlando	FL	Florida	-5	-81:30	28:33	Y
Pensacola	FL	Florida	-5	-87:14	30:25	Y

Appendix III: Location Table (continued)

United States (continued)

City	Abbr.	State	Time Zone	Longitude	Latitude	Daylight Savings
Sarasota	FL	Florida	-5	-82:33	27:20	Y
St.Petersburg	FL	Florida	-5	-82:30	27:46	Y
Tallahassee	FL	Florida	-5	-84:33	30:27	Y
Tampa	FL	Florida	-5	-82:14	27:57	Y
W.Palm_Beach	FL	Florida	-5	-80:30	26:43	Y
Atlanta	GA	Georgia	-5	-84:30	33:45	Y
Augusta	GA	Georgia	-5	-81:16	33:28	Y
Columbus	GA	Georgia	-5	-84:16	32:28	Y
Macon	GA	Georgia	-5	-83:14	32:50	Y
Savannah	GA	Georgia	-5	-81:16	32:5	Y
Tifton	GA	Georgia	-5	-83:33	31:25	Y
Honolulu	HI	Hawaii	-10	-157:30	21:18	Y
Kona	HI	Hawaii	-10	-156:30	19:39	Y
Lanai_City	HI	Hawaii	-10	-156:16	20:50	Y
Boise	ID	Idaho	-8	-116:33	43:38	Y
Moscow	ID	Idaho	-8	-117:30	46:44	Y
New_Meadows	ID	Idaho	-8	-116:14	44:58	Y
Pocatello	ID	Idaho	-7	-112:30	42:52	Y
Salmon	ID	Idaho	-7	-115:14	45:30	Y
Wallace	ID	Idaho	-7	-115:30	47:27	Y
Carbondale	IL	Illinois	-6	-89:14	37:42	Y
Chicago	IL	Illinois	-6	-87:33	41:52	Y
E._St._Louis	IL	Illinois	-6	-90:16	38:37	Y
Kankakee	IL	Illinois	-6	-87:14	41:7	Y
Moline	IL	Illinois	-6	-90:33	41:31	Y
Peoria	IL	Illinois	-6	-89:33	40:42	Y
Rockford	IL	Illinois	-6	-89:16	42:16	Y
Springfield	IL	Illinois	-6	-89:30	39:48	Y
Urbana	IL	Illinois	-6	-88:33	40:7	Y
Bloomington	IN	Indiana	-5	-86:33	39:10	N
Evansville	IN	Indiana	-5	-87:16	37:58	N
Ft._Wayne	IN	Indiana	-5	-85:33	41:4	N
Gary	IN	Indiana	-6	-87:14	41:36	N
Indianapolis	IN	Indiana	-5	-86:33	39:46	N
Muncie	IN	Indiana	-5	-85:30	40:11	N
New_Albany	IN	Indiana	-5	-85:16	38:17	N
South_Bend	IN	Indiana	-5	-86:14	41:41	N
Cedar_Rapids	IA	Iowa	-6	-91:33	41:58	Y
Danville	IA	Iowa	-6	-91:14	40:47	Y
Davenport	IA	Iowa	-6	-90:30	41:31	Y
Des_Moines	IA	Iowa	-6	-93:16	41:35	Y
Mason_City	IA	Iowa	-6	-93:14	43:8	Y
Sioux_City	IA	Iowa	-6	-96:30	42:30	Y
Dodge_City	KS	Kansas	-6	-100:30	37:45	Y
Kansas_City	KS	Kansas	-6	-94:33	39:7	Y
Oakley	KS	Kansas	-6	-100:30	39:8	Y
Salina	KS	Kansas	-6	-97:33	38:50	Y
Wichita	KS	Kansas	-6	-97:16	37:42	Y
Bowling_Green	KY	Kentucky	-6	-86:30	36:59	Y
Covington	KY	Kentucky	-5	-84:33	39:5	Y
Lexington	KY	Kentucky	-5	-84:30	38:3	Y
Louisville	KY	Kentucky	-5	-85:16	38:15	Y

Appendix III: Location Table (continued)

United States (continued)

City	Abbr.	State	Time Zone	Longitude	Latitude	Daylight Savings
Paducah	KY	Kentucky	-6	-88:30	37:5	Y
Somerset	KY	Kentucky	-5	-84:33	37:2	Y
Alexandria	LA	Louisiana	-6	-92:30	31:18	Y
Baton_Rouge	LA	Louisiana	-6	-91:16	30:27	Y
Bossier_City	LA	Louisiana	-6	-93:14	32:31	Y
Lafayette	LA	Louisiana	-6	-92:33	30:14	Y
Monroe	LA	Louisiana	-6	-92:33	32:30	Y
New_Orleans	LA	Louisiana	-6	-90:16	29:57	Y
Shreveport	LA	Louisiana	-6	-93:30	32:31	Y
Bangor	ME	Maine	-5	-68:30	44:48	Y
Kennebunk	ME	Maine	-5	-70:33	43:24	Y
Millinocket	ME	Maine	-5	-68:16	45:40	Y
Portland	ME	Maine	-5	-70:16	43:40	Y
Rangeley	ME	Maine	-5	-70:33	45:0	Y
Van_Buren	ME	Maine	-5	-67:16	47:9	Y
Annapolis	MD	Maryland	-5	-76:33	38:58	Y
Baltimore	MD	Maryland	-5	-76:14	39:17	Y
Hagerstown	MD	Maryland	-5	-77:30	39:39	Y
Boston	MA	Massachusetts	-5	-71:30	42:21	Y
Lawrence	MA	Massachusetts	-5	-71:14	42:42	Y
Lowell	MA	Massachusetts	-5	-71:30	42:38	Y
New_Bedford	MA	Massachusetts	-5	-70:16	41:38	Y
Pittsfield	MA	Massachusetts	-5	-73:14	42:27	Y
Springfield	MA	Massachusetts	-5	-72:16	42:6	Y
Worcester	MA	Massachusetts	-5	-71:14	42:16	Y
Ann_Arbor	MI	Michigan	-5	-83:30	42:17	Y
Battle_Creek	MI	Michigan	-5	-85:16	42:19	Y
Bay_City	MI	Michigan	-5	-83:33	43:36	Y
Detroit	MI	Michigan	-5	-83:16	42:20	Y
E._Lansing	MI	Michigan	-5	-84:33	42:44	Y
Flint	MI	Michigan	-5	-83:14	43:1	Y
Grand_Rapids	MI	Michigan	-5	-85:30	42:58	Y
Kalamazoo	MI	Michigan	-5	-85:16	42:17	Y
Lansing	MI	Michigan	-5	-84:33	42:44	Y
Muskegon	MI	Michigan	-5	-86:33	43:15	Y
Saginaw	MI	Michigan	-5	-83:16	43:26	Y
SaultSt.Marie	MI	Michigan	-5	-84:33	46:29	Y
Traverse_City	MI	Michigan	-5	-85:14	44:45	Y
Argyle	MN	Minnesota	-6	-96:16	48:21	Y
Aurora	MN	Minnesota	-6	-92:33	47:31	Y
Duluth	MN	Minnesota	-6	-92:33	46:47	Y
Minneapolis	MN	Minnesota	-6	-93:30	44:59	Y
Rochester	MN	Minnesota	-6	-92:33	44:1	Y
St._Cloud	MN	Minnesota	-6	-94:14	45:34	Y
St._Paul	MN	Minnesota	-6	-93:16	44:57	Y
Biloxi	MS	Mississippi	-6	-88:33	30:24	Y
Greenville	MS	Mississippi	-6	-91:33	33:24	Y
Gulfport	MS	Mississippi	-6	-89:30	30:22	Y
Hattiesburg	MS	Mississippi	-6	-89:16	31:20	Y
Jackson	MS	Mississippi	-6	-90:14	32:18	Y
Tupelo	MS	Mississippi	-6	-88:33	34:14	Y
Winona	MS	Mississippi	-6	-89:30	33:29	Y

Appendix III: Location Table (continued)

United States (continued)

City	Abbr.	State	Time Zone	Longitude	Latitude	Daylight Savings
Chillicothe	MO	Missouri	-6	-93:16	39:46	Y
Kansas_City	MO	Missouri	-6	-94:14	39:5	Y
Poplar_Bluff	MO	Missouri	-6	-90:16	36:43	Y
Rockport	MO	Missouri	-6	-95:14	40:25	Y
Springfield	MO	Missouri	-6	-93:30	37:13	Y
St._Louis	MO	Missouri	-6	-90:14	38:38	Y
Billings	MT	Montana	-7	-108:14	45:47	Y
Butte	MT	Montana	-7	-112:16	46:1	Y
Cut_Bank	MT	Montana	-7	-112:14	48:38	Y
Helena	MT	Montana	-7	-112:30	46:36	Y
Lewistown	MT	Montana	-7	-109:33	47:5	Y
Columbus	NE	Nebraska	-6	-97:14	42:25	Y
Grand_Island	NE	Nebraska	-6	-98:14	40:55	Y
Lincoln	NE	Nebraska	-6	-96:30	40:49	Y
Mc_Cook	NE	Nebraska	-6	-100:33	40:13	Y
Omaha	NE	Nebraska	-6	-95:33	41:16	Y
Alamo	NV	Nevada	-8	-115:33	37:22	Y
Austin	NV	Nevada	-8	-117:14	39:30	Y
Boulder_City	NV	Nevada	-8	-114:16	35:59	Y
Carson_City	NV	Nevada	-8	-119:14	39:10	Y
E._Las_Vegas	NV	Nevada	-8	-115:30	36:6	Y
Elko	NV	Nevada	-8	-115:16	40:50	Y
Las_Vegas	NV	Nevada	-8	-115:14	36:10	Y
Mc_Gill	NV	Nevada	-8	-114:16	39:25	Y
N._Las_Vegas	NV	Nevada	-8	-115:14	36:12	Y
Winnemucca	NV	Nevada	-8	-119:16	40:6	Y
Berlin	NH	New Hampshire	-5	-71:30	44:25	Y
Manchester	NH	New Hampshire	-5	-71:33	42:59	Y
Portsmouth	NH	New Hampshire	-5	-70:16	43:5	Y
Atlantic_City	NJ	New Jersey	-5	-74:14	39:22	Y
Cape_May	NJ	New Jersey	-5	-74:16	38:55	Y
Newark	NJ	New Jersey	-5	-74:14	40:44	Y
Trenton	NJ	New Jersey	-5	-74:30	40:13	Y
Albuquerque	NM	New Mexico	-7	-106:30	35:5	Y
Belen	NM	New Mexico	-7	-106:33	34:40	Y
Farmington	NM	New Mexico	-7	-108:16	36:44	Y
Gallup	NM	New Mexico	-7	-108:14	35:31	Y
Las_Cruces	NM	New Mexico	-7	-106:16	32:19	Y
Roswell	NM	New Mexico	-7	-104:14	33:24	Y
Santa_Fe	NM	New Mexico	-7	-105:30	35:41	Y
Tucumcari	NM	New Mexico	-7	-103:33	35:11	Y
Buffalo	NY	New York	-5	-78:33	42:53	Y
New_York	NY	New York	-5	-73:33	40:45	Y
Poughkeepsie	NY	New York	-5	-73:14	41:45	Y
Rochester	NY	New York	-5	-77:30	43:10	Y
Syracuse	NY	New York	-5	-76:16	43:3	Y
Troy	NY	New York	-5	-73:14	42:44	Y
Watertown	NY	New York	-5	-75:33	44:0	Y
Asheville	NC	North Carolina	-5	-82:16	35:36	Y
Chapel_Hill	NC	North Carolina	-5	-79:30	35:56	Y
Charlotte	NC	North Carolina	-5	-80:16	35:14	Y
Durham	NC	North Carolina	-5	-78:33	36:0	Y

Appendix III: Location Table (continued)

United States (continued)

City	Abbr.	State	Time Zone	Longitude	Latitude	Daylight Savings
Gastonia	NC	North Carolina	-5	-81:33	35:16	Y
Greensboro	NC	North Carolina	-5	-79:30	36:4	Y
High_Point	NC	North Carolina	-5	-80:33	35:57	Y
Raleigh	NC	North Carolina	-5	-78:33	35:47	Y
Wilmington	NC	North Carolina	-5	-77:33	34:14	Y
Winston-Salem	NC	North Carolina	-5	-80:14	36:6	Y
Bowman	ND	North Dakota	-7	-103:14	46:11	Y
Garrison	ND	North Dakota	-6	-101:14	47:38	Y
Grand_Forks	ND	North Dakota	-6	-97:30	47:55	Y
Jamestown	ND	North Dakota	-6	-98:16	46:54	Y
Minot	ND	North Dakota	-6	-101:16	48:14	Y
Akron	OH	Ohio	-5	-81:33	41:5	Y
Canton	OH	Ohio	-5	-81:33	40:48	Y
Cincinnati	OH	Ohio	-5	-84:16	39:6	Y
Cleveland	OH	Ohio	-5	-81:14	41:30	Y
Columbus	OH	Ohio	-5	-83:16	39:57	Y
Dayton	OH	Ohio	-5	-84:30	39:46	Y
Hamilton	OH	Ohio	-5	-84:14	39:24	Y
Portsmouth	OH	Ohio	-5	-83:30	38:45	Y
Toledo	OH	Ohio	-5	-83:30	41:39	Y
Warren	OH	Ohio	-5	-80:16	41:14	Y
Youngstown	OH	Ohio	-5	-80:33	41:6	Y
Elk_City	OK	Oklahoma	-6	-99:16	35:23	Y
Lawton	OK	Oklahoma	-6	-98:16	34:37	Y
Oklahoma_City	OK	Oklahoma	-6	-97:30	35:28	Y
Ponca_City	OK	Oklahoma	-6	-97:16	36:42	Y
Tulsa	OK	Oklahoma	-6	-95:30	36:9	Y
Astoria	OR	Oregon	-8	-123:30	46:11	Y
Bend	OR	Oregon	-8	-121:33	44:4	Y
Burns	OR	Oregon	-8	-119:30	43:35	Y
Eugene	OR	Oregon	-8	-123:14	44:3	Y
Hillsboro	OR	Oregon	-8	-122:14	45:31	Y
Medford	OR	Oregon	-8	-122:14	42:19	Y
Newport	OR	Oregon	-8	-124:30	44:39	Y
Portland	OR	Oregon	-8	-122:33	45:31	Y
Salem	OR	Oregon	-8	-123:14	44:56	Y
Allentown	PA	Pennsylvania	-5	-75:30	40:36	Y
Altoona	PA	Pennsylvania	-5	-78:16	40:31	Y
Bethlehem	PA	Pennsylvania	-5	-75:33	40:37	Y
Coopersburg	PA	Pennsylvania	-5	-75:33	40:28	Y
Erie	PA	Pennsylvania	-5	-80:30	42:7	Y
Harrisburg	PA	Pennsylvania	-5	-76:16	40:16	Y
Lancaster	PA	Pennsylvania	-5	-76:14	40:2	Y
McKeesport	PA	Pennsylvania	-5	-79:30	40:21	Y
Philadelphia	PA	Pennsylvania	-5	-75:14	39:57	Y
Pittsburgh	PA	Pennsylvania	-5	-80:30	40:26	Y
Reading	PA	Pennsylvania	-5	-75:14	40:20	Y
Scranton	PA	Pennsylvania	-5	-75:30	41:25	Y
Warren	PA	Pennsylvania	-5	-79:16	41:50	Y
Yardley	PA	Pennsylvania	-5	-74:16	40:13	Y
York	PA	Pennsylvania	-5	-76:33	39:58	Y
San_Juan	PR	Puerto Rico	-4	-66:30	18:27	Y

Appendix III: Location Table (continued)

United States (continued)

City	Abbr.	State	Time Zone	Longitude	Latitude	Daylight Savings
Providence	RI	Rhode Island	-5	-71:33	41:50	Y
Anderson	SC	South Carolina	-5	-82:30	34:31	Y
Charleston	SC	South Carolina	-5	-79:14	32:47	Y
Columbia	SC	South Carolina	-5	-81:16	34:0	Y
Greenville	SC	South Carolina	-5	-82:14	34:51	Y
Myrtle_Beach	SC	South Carolina	-5	-78:33	33:42	Y
Rock_Hill	SC	South Carolina	-5	-81:16	34:56	Y
Spartanburg	SC	South Carolina	-5	-81:33	34:57	Y
Aberdeen	SD	South Dakota	-6	-98:30	45:28	Y
Armour	SD	South Dakota	-6	-98:16	43:18	Y
Milbank	SD	South Dakota	-6	-96:30	45:13	Y
Mitchell	SD	South Dakota	-6	-98:33	43:33	Y
Pierre	SD	South Dakota	-6	-100:33	44:22	Y
Rapid_City	SD	South Dakota	-5	-103:14	44:5	Y
Sioux_Falls	SD	South Dakota	-6	-96:30	43:33	Y
Vermillion	SD	South Dakota	-6	-96:16	42:47	Y
Bristol	TN	Tennessee	-6	-82:33	36:36	Y
Chattanooga	TN	Tennessee	-5	-85:14	35:3	Y
Johnson_City	TN	Tennessee	-5	-82:16	36:19	Y
Kingsport	TN	Tennessee	-5	-82:33	36:33	Y
Knoxville	TN	Tennessee	-5	-83:14	35:58	Y
Memphis	TN	Tennessee	-6	-90:30	35:9	Y
Nashville	TN	Tennessee	-6	-86:14	36:10	Y
Abilene	TX	Texas	-6	-99:30	32:28	Y
Arlington	TX	Texas	-6	-97:33	32:44	Y
Austin	TX	Texas	-6	-97:14	30:16	Y
Beaumont	TX	Texas	-6	-94:16	30:5	Y
Brownsville	TX	Texas	-6	-97:33	25:54	Y
Corp.Christi	TX	Texas	-6	-97:30	27:48	Y
Dallas	TX	Texas	-6	-96:16	32:47	Y
Del_Rio	TX	Texas	-6	-100:33	29:22	Y
El_Paso	TX	Texas	-6	-106:33	31:46	Y
Flower_Mound	TX	Texas	-6	-97:14	33:2	Y
Ft._Worth	TX	Texas	-6	-97:30	32:45	Y
Galveston	TX	Texas	-6	-94:16	29:18	Y
Houston	TX	Texas	-6	-95:30	29:45	Y
Laredo	TX	Texas	-6	-99:33	27:30	Y
Lubbock	TX	Texas	-6	-101:30	33:35	Y
McAllen	TX	Texas	-6	-98:33	26:12	Y
Port_Arthur	TX	Texas	-6	-93:16	29:53	Y
San_Angelo	TX	Texas	-6	-100:30	31:28	Y
San_Antonio	TX	Texas	-6	-98:16	29:26	Y
Victoria	TX	Texas	-6	-97:33	28:48	Y
Waco	TX	Texas	-6	-97:14	31:33	Y
Cedar_City	UT	Utah	-7	-113:30	37:40	Y
Green_River	UT	Utah	-7	-110:30	39:0	Y
Milford	UT	Utah	-7	-113:30	38:20	Y
Monticello	UT	Utah	-7	-109:16	37:55	Y
Ogden	UT	Utah	-7	-111:14	41:14	Y
SaltLake_City	UT	Utah	-7	-111:30	40:45	Y
Brandon	VT	Vermont	-5	-73:16	43:45	Y
Brattleboro	VT	Vermont	-5	-72:33	42:51	Y

Appendix III: Location Table (continued)

United States (continued)

City	Abbr.	State	Time Zone	Longitude	Latitude	Daylight Savings
Burlington	VT	Vermont	-5	-73:30	44:29	Y
Charlottesvil	VA	Virginia	-5	-78:33	38:0	Y
Lynchburg	VA	Virginia	-5	-79:33	37:25	Y
Newport_News	VA	Virginia	-5	-76:16	36:59	Y
Norfolk	VA	Virginia	-5	-76:33	36:51	Y
Richmond	VA	Virginia	-5	-77:33	37:32	Y
Roanoke	VA	Virginia	-5	-79:14	37:16	Y
Virginia_Bch.	VA	Virginia	-5	-76:33	36:51	Y
Wytheville	VA	Virginia	-5	-81:33	36:55	Y
Aberdeen	WA	Washington	-8	-123:30	47:0	Y
Everett	WA	Washington	-8	-122:16	47:59	Y
Lynden	WA	Washington	-8	-122:16	48:56	Y
Olympia	WA	Washington	-8	-122:30	47:2	Y
Seattle	WA	Washington	-8	-122:16	47:37	Y
Spokane	WA	Washington	-8	-117:33	47:40	Y
Tacoma	WA	Washington	-8	-122:14	47:15	Y
Vancouver	WA	Washington	-8	-122:16	45:38	Y
Walla_Walla	WA	Washington	-8	-118:33	46:4	Y
Yakima	WA	Washington	-8	-120:16	46:36	Y
Bluefield	WV	West Virginia	-5	-81:33	37:16	Y
Charleston	WV	West Virginia	-5	-81:14	38:21	Y
Clarksburg	WV	West Virginia	-5	-80:30	39:17	Y
Wheeling	WV	West Virginia	-5	-80:30	40:4	Y
Appleton	WI	Wisconsin	-6	-88:33	44:16	Y
Delavan	WI	Wisconsin	-6	-88:33	49:39	Y
Eau_Claire	WI	Wisconsin	-6	-91:14	44:49	Y
Hurley	WI	Wisconsin	-6	-90:33	46:26	Y
Kenosha	WI	Wisconsin	-6	-87:16	42:36	Y
La_Crosse	WI	Wisconsin	-6	-91:33	43:48	Y
Madison	WI	Wisconsin	-6	-89:14	43:4	Y
Milwaukee	WI	Wisconsin	-6	-87:33	43:2	Y
Oshkosh	WI	Wisconsin	-6	-88:14	44:1	Y
Racine	WI	Wisconsin	-6	-87:30	42:44	Y
Wausau	WI	Wisconsin	-6	-89:33	44:58	Y
Casper	WY	Wyoming	-7	-106:14	42:51	Y
Cheyenne	WY	Wyoming	-7	-104:30	41:8	Y
Cody	WY	Wyoming	-7	-109:16	44:31	Y
Gillette	WY	Wyoming	-7	-105:14	44:18	Y
Laramie	WY	Wyoming	-7	-105:14	41:19	Y
Riverton	WY	Wyoming	-7	-108:16	43:1	Y
Rock_Springs	WY	Wyoming	-7	-109:33	41:35	Y

Appendix III: Location Table (continued)

Canada

City	Abbr.	Province	Time Zone	Longitude	Latitude	Daylight Savings
Calgary	AB	Alberta	-7	-114:14	51:3	Y
Cold_Lake	AB	Alberta	-7	-110:14	54:26	Y
Edmonton	AB	Alberta	-7	-113:30	53:30	Y
Fort_McMurray	AB	Alberta	-7	-111:16	56:44	Y
Jasper	AB	Alberta	-7	-118:33	53:0	Y
Lethbridge	AB	Alberta	-7	-112:14	49:37	Y
Medicine_Hat	AB	Alberta	-7	-110:30	50:2	Y
Fort_Nelson	BC	British Columbia	-8	-122:33	58:48	Y
Kamloops	BC	British Columbia	-8	-120:14	50:42	Y
Prince_George	BC	British Columbia	-8	-122:30	53:55	Y
Vancouver	BC	British Columbia	-8	-123:33	49:15	Y
Victoria	BC	British Columbia	-8	-123:14	48:38	Y
Churchill	MB	Manitoba	-6	-94:16	58:46	Y
The_Pas	MB	Manitoba	-6	-101:33	53:53	Y
Winnipeg	MB	Manitoba	-6	-97:14	49:54	Y
Chatham	NB	New Brunswick	-4	-65:30	47:3	Y
Moncton	NB	New Brunswick	-4	-64:14	46:7	Y
St._John	NB	New Brunswick	-4	-65:30	45:20	Y
Gander	NF	Newfoundland	-3.5	-54:16	48:56	Y
Goose_Bay	NF	Newfoundland	-3.5	-60:33	53:20	Y
St._John's	NF	Newfoundland	-3.5	-52:14	47:5	Y
Alert	NWT	Northwest Territories	-7	-62:33	82:31	Y
Fort_Simpson	NWT	Northwest Territories	-7	-121:30	61:46	Y
Ft.McPherson	NWT	Northwest Territories	-7	-134:14	67:26	Y
Inuvik	NWT	Northwest Territories	-7	-133:16	68:19	Y
Iqaluit	NWT	Northwest Territories	-7	-68:33	63:46	Y
Yellowknife	NWT	Northwest Territories	-7	-114:14	62:29	Y
Halifax	NS	Nova Scotia	-4	-63:30	44:40	Y
Sydney	NS	Nova Scotia	-4	-60:16	46:8	Y
Kingston	ON	Ontario	-5	-76:14	44:13	Y
London	ON	Ontario	-5	-81:16	43:0	Y
North_Bay	ON	Ontario	-5	-79:14	46:19	Y
Ottawa	ON	Ontario	-5	-75:30	45:25	Y
Sioux_Lookout	ON	Ontario	-5	-91:33	50:4	Y
Sioux_Narrows	ON	Ontario	-5	-94:14	49:24	Y
Thunder_Bay	ON	Ontario	-5	-89:33	48:27	Y
Toronto	ON	Ontario	-5	-79:30	43:40	Y
Windsor	ON	Ontario	-5	-82:33	42:17	Y
Charlevoix	PQ	Quebec	-5	-70:30	47:37	Y
Chibougamau	PQ	Quebec	-5	-74:16	49:54	Y
Gaspe	PQ	Quebec	-5	-64:33	48:47	Y
Montreal	PQ	Quebec	-5	-73:16	45:30	Y
Quebec	PQ	Quebec	-5	-71:33	46:45	Y
Sept-Iles	PQ	Quebec	-5	-66:14	50:13	Y
Moose_Jaw	SK	Saskatchewan	-6	-105:30	50:22	Y
Prince_Albert	SK	Saskatchewan	-6	-111:33	55:24	Y
Regina	SK	Saskatchewan	-6	-104:14	50:30	Y
Saskatoon	SK	Saskatchewan	-6	-106:16	52:9	Y
Swift_Current	SK	Saskatchewan	-6	-107:33	50:17	Y
Whitehorse	YK	Yukon	-8	-135:30	60:43	Y

Appendix IV: System Factory Defaults

Section 1: Default Group Members

Some Groups contain an output member or selection of output members as part of the factory default programming. This default Group programming ensures that all system outputs can be overridden by the power module low voltage inputs without additional user programming. These Groups may be changed or adapted as needed for your application. For further information regarding output Group programming, refer to *Chapter 8, Section 2*.

Groups that are not listed in the table below have no members by default.

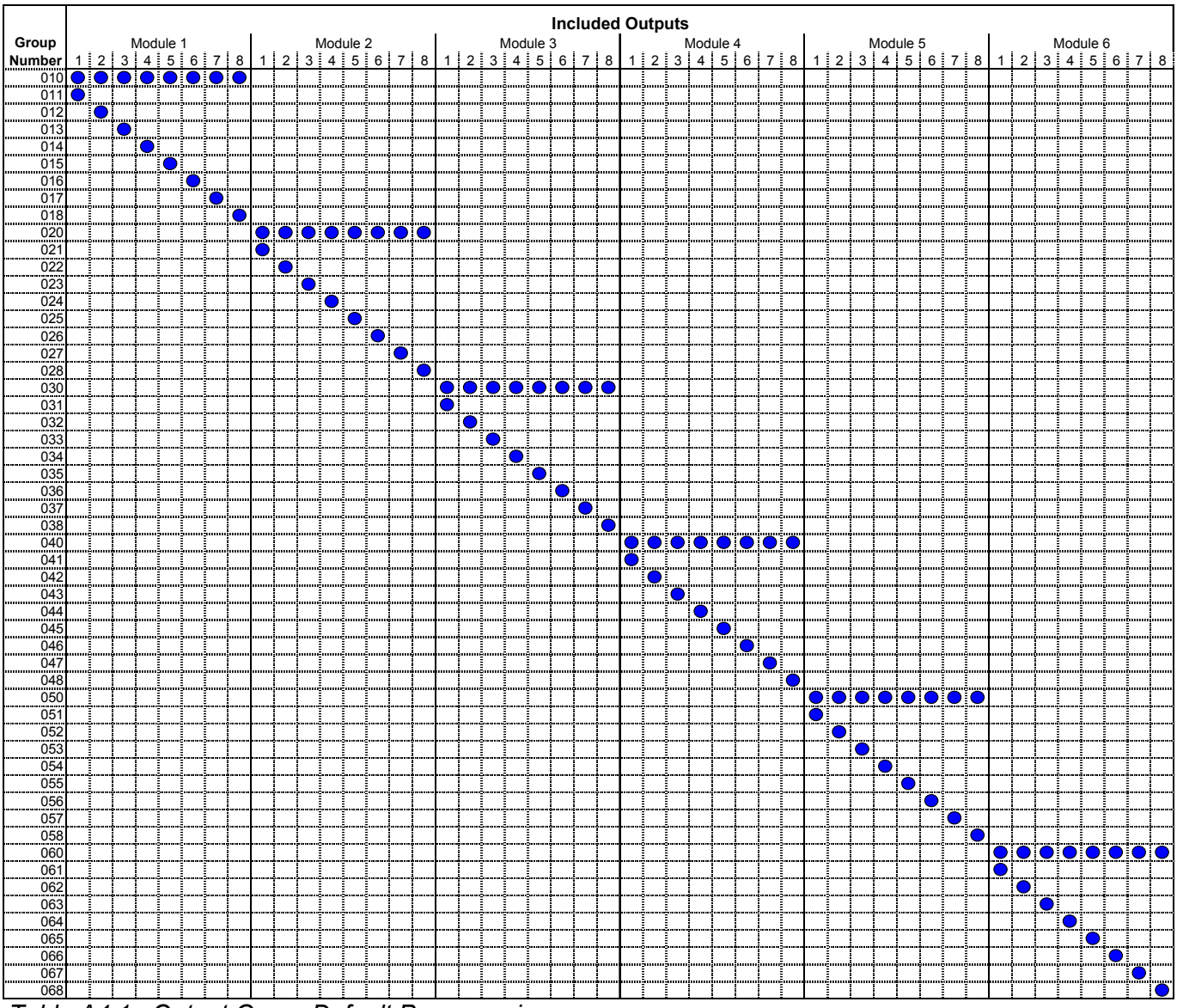


Table A4.1: Output Group Default Programming

Appendix IV: System Factory Defaults (continued)

Section 2: Default Switch Input Programming

All of the low voltage switch inputs on the Synergy power modules are programmed to control a Group that contains single output on the same module. This default programming is configured so that the switch input number, Group number, and output number all correspond in a logical manner. For example, switch input 1 on module 1 is programmed to control Group 011, which contains output 1 on module 1. Table A4.2 below lists the default Group programming for all of the switch inputs.

The default switch programming also includes a 2 hour timeout for each switch. This timeout will not turn OFF the lights automatically during a scheduled ON period, although the lights may still be manually turned OFF by the switch. The lights will blink to warn the occupants of the impending automatic OFF event at the end of the timeout period, allowing the occupants to override the lights for another two hours if they desire. Refer to *Chapter 9, Section 4* for more information about switch timeouts.

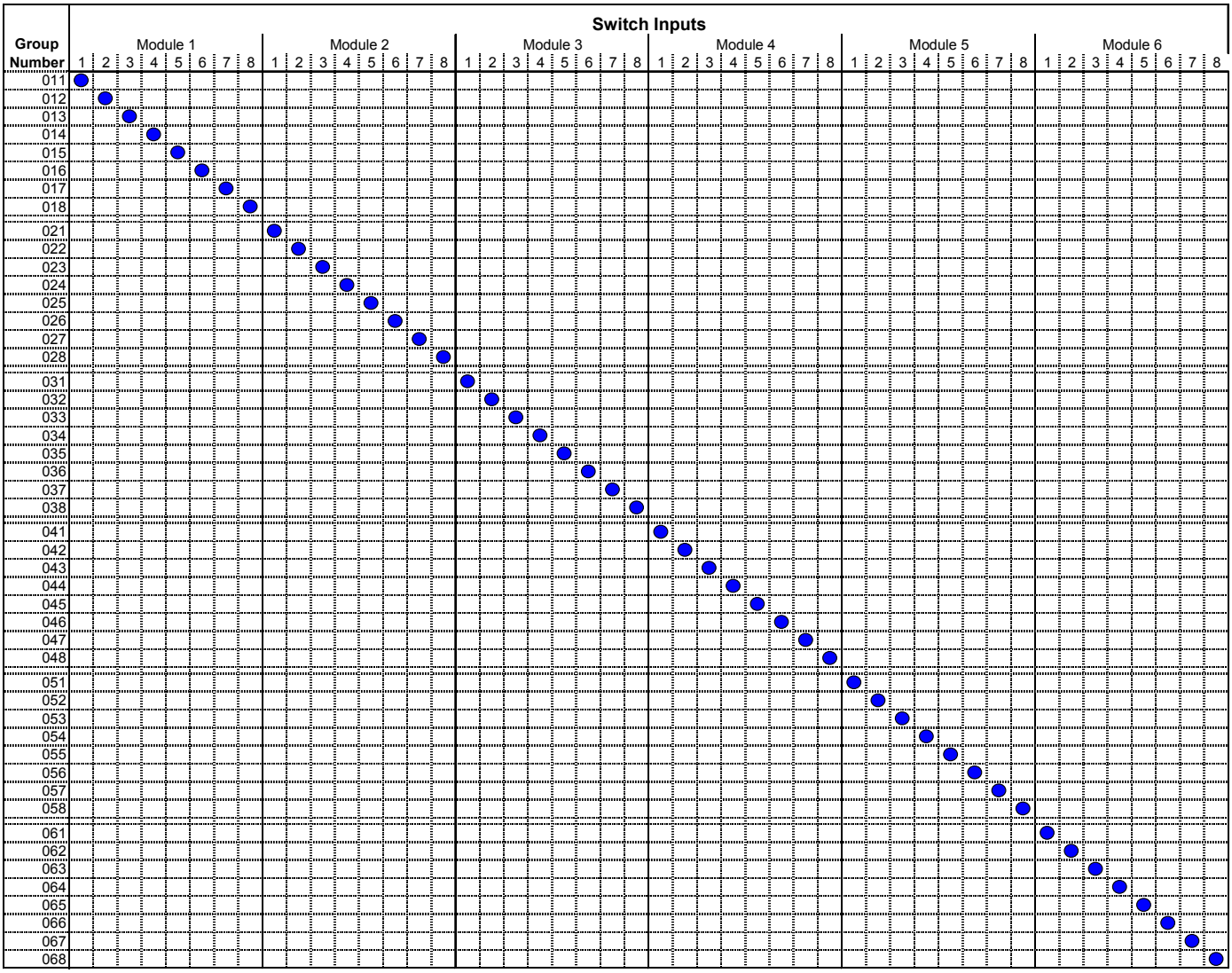


Table A4.2: Switch Input Default Programming

Appendix IV: System Factory Defaults (continued)

Section 3: Default Analog Input Programming

The analog inputs on the Synergy power modules are each programmed to control a default Group. The first analog input on each module is programmed to control Group 98, the second analog input on each module is programmed to control Group 99, and the third analog input (available only on SYPMB 6DB dimmer modules) is programmed to control a Group that contains all of the outputs on that module. Groups 98 and 99 do not contain any pre-programmed members and are used as part of the default automatic control scheme for outdoor lighting circuits.

Group 99 is not controlled by any default schedule event. Use this Group for circuits that should only be controlled by a photocell and connect the photocell for these lights to analog input 2 on any power module.

Group 98 is turned OFF at 0200 by a default schedule event. Use this Group for circuits that should be turned ON with a photocell but do not need to be left ON all night. Connect the photocell to control these circuits to analog input 1 on any module.

Refer to *Section 4* of this Appendix for more information about default schedules and automatic control schemes.

	Analog Inputs																	
Group	Module 1			Module 2			Module 3			Module 4			Module 5			Module 6		
Number	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
10			●															
20						●												
30									●									
40												●						
50															●			
60																		●
98	●			●			●			●			●			●		
99		●			●			●			●			●			●	

Table A4.3: Analog Input Default Programming

Appendix IV: System Factory Defaults (continued)

Section 4: Default Time Schedule Programming

The factory default time schedule programming allows the lighting of most installations to be easily automated for energy savings and aesthetic impact. To accomplish this, Groups 93 – 98 have each been assigned to one or more schedule events that allows that Group to be automated per a typical requirement. Each of these Groups is listed below along with a functional description of how it is controlled and details on each of the events that will control it. To take advantage of this default programming, simply add the outputs that you would like to have controlled to the appropriate Group.

Group 93: Interior (Office) Lights, ON at 0700, OFF at 1900 Monday – Friday. The lights will also sweep OFF at 1900 on weekend evenings and on Holiday dates. The lights will blink to warn the occupants of an impending OFF before each OFF event.

Override switches may be programmed to control Group 93 as well, or the override switches may be programmed to control subsets of the outputs in Group 93. The default switch programming includes a two hour timeout for each switch input, as noted in *Section 2,* which will not override the lights OFF during a scheduled ON time. Outputs that are assigned to Group 93 as well as the appropriate override switches will meet the requirements for ASHRAE Standard 90.1 and California's Title 24 requirements for automating interior lights.

EVENT	TIME	TYPE	GROUP	LEVEL	DESCRIPTION
86	0700	MON-FRI	93	ON	Inside Lights
85	1900	MON-SUN	93	WARN OFF	ON at 0700, OFF at 1900
84	1900	HOLIDAY	93	WARN OFF	with override switches masked (no OFF) during scheduled ON Monday - Friday Weekend and Holiday sweep OFF at 1900

Group 94: Outside Lights, ON at DUSK, OFF at 0200 Monday – Sunday

EVENT	TIME	TYPE	GROUP	LEVEL	DESCRIPTION
88	DUSK	MON-SUN	94	ON	Outside Lights
87	0200	MON-SUN	94	OFF	ON at Dusk, OFF at 0200 Monday - Sunday

Group 95: Outside Lights, ON at DUSK, OFF at DAWN Monday – Sunday

EVENT	TIME	TYPE	GROUP	LEVEL	DESCRIPTION
90	DUSK	MON-SUN	95	ON	Outside Lights
89	DAWN	MON-SUN	95	OFF	ON at Dusk, OFF at Dawn Monday - Sunday

Group 96: Outside Lights, ON at DUSK, OFF at 0200 Monday – Friday. The lights will also sweep OFF at 0200 on Holiday dates.

EVENT	TIME	TYPE	GROUP	LEVEL	DESCRIPTION
95	DUSK	MON-FRI	96	ON	Outside Lights
94	0200	MON-FRI	96	OFF	ON at Dusk, OFF at 0200
93	0200	SATURDAY	96	OFF	Monday - Friday
92	0200	HOLIDAY	96	OFF	

Appendix IV: System Factory Defaults (continued)

Section 4: Default Time Schedule Programming (continued)

Group 97: Outside Lights, ON at DUSK, OFF at DAWN Monday – Friday. The lights will also sweep OFF at DAWN on Holiday dates.

EVENT	TIME	TYPE	GROUP	LEVEL	DESCRIPTION
99	DUSK	MON-FRI	97	ON	Outside Lights
98	DAWN	MON-FRI	97	OFF	ON at Dusk, OFF at Dawn
97	DAWN	SATURDAY	97	OFF	Monday - Friday
96	DAWN	HOLIDAY	97	OFF	

Group 98: Outside Lights, ON with Photocell, OFF at 0200 Monday – Sunday. The photocell to control these lights must be connected to Analog Input #1 on any power module.

EVENT	TIME	TYPE	GROUP	LEVEL	DESCRIPTION
91	0200	MON-SUN	98	OFF	Outside Lights ON with Photocell (Analog Input #1), OFF at 0200 Monday - Sunday

Group 99: Outside Lights, ON with Photocell, OFF with Photocell. The photocell to control these lights must be connected to Analog Input #2 on any power module.

EVENT	TIME	TYPE	GROUP	LEVEL	DESCRIPTION
N/A	N/A	N/A	99	As set by Photocell	Outside Lights ON with Photocell, OFF with Photocell (Analog Input #2) Monday - Sunday

Appendix IV: System Factory Defaults (continued)

Section 5: Default Control Station Programming

The default control station programming includes a predefined station configuration for each control station address. These defaults allow most systems to be configured by simply setting the appropriate address for each station and then assigning outputs to predefined Groups. The default configuration for each station address is shown in *Table A4.4* below.

Stations that are programmed to be in the same room will automatically work together. The indicated Groups for each station are assigned to the control station channels for that room. For example, channel 1 on station 5 is assigned to Group 9, channel 2 on station 5 is assigned to Group 10, and so on. A detailed listing of the default control station programming for each address and station types is included in *Table A4.6* and *Table A4.7* at the end of this section.

Address	Station Type	Station Description	Assigned Groups	Room
0	SYRS 2BT IR	2 Button Remote Station w/ IR Receiver	001 - 008	1
1	SYRS 9BT	9 Button Remote Station	001 - 008	1
2	SQCS 6P 8C	8 Channel Control Station	001 - 008	1
3	SYRS 2BT IR	2 Button Remote Station w/ IR Receiver	009 - 016	2
4	SYRS 9BT	9 Button Remote Station	009 - 016	2
5	SQCS 6P 8C	8 Channel Control Station	009 - 016	2
6	SYRS 2BT IR	2 Button Remote Station w/ IR Receiver	017 - 024	6
7	SYRS 9BT	9 Button Remote Station	017 - 024	6
8	SQCS 6P 8C	8 Channel Control Station	017 - 024	6
9	SYRS 2BT IR	2 Button Remote Station w/ IR Receiver	025 - 032	5
A	SYRS 9BT	9 Button Remote Station	025 - 032	5
B	SQCS 6P 8C	8 Channel Control Station	025 - 032	5
C	SYRS 2BT IR	2 Button Remote Station w/ IR Receiver	001 - 004	3
D	SQCS 6P 4C	4 Channel Control Station	001 - 004	3
E	SYRS 9BT	9 Button Remote Station	001 - 016	7
F	SQCS 6P 16C	16 Channel Control Station	001 - 016	7

Table A4.4: Default Control Station Overview

Programming Example 1:

Project Description: The lights in a single room are controlled by dimmers in a Synergy cabinet. This room is equipped with a SQCS 6P 8C BJ4 TR control station and a SYRS 1G 2BT BJ4 IR entry station with infrared receiver.

Programming: The hardware configuration in this room matches the hardware included in the configurations for logical Rooms 1, 2, 5, & 6. Any of these will work – we'll use Room 1 for this example. Per the table above and the station installation instructions, set the address for the SQCS 6P 8C BJ4 TR control station as '2', and set the address for the SYRS 1G 2BT BJ4 IR station as '0'. Follow the instructions listed in *Chapter 8,* on page 17 of this manual, to add the dimmers that should be controlled by channel 1 on the control station for this room to Group 001. The dimmers that should be controlled by channel 2 should be added to Group 002, dimmers controlled by channel 3 should be added to Group 003, and so on.

Appendix IV: System Factory Defaults (continued)

Section 5: Default Control Station Programming (continued)

Programming Example 2:

Project Description: The lights in a single room are controlled by dimmers in a Synergy cabinet. This room is equipped with a SQCS 6P 8C BJ4 TR control station and a SYRS 1G 8BT BJ4 IR preset recall station with infrared receiver.

Programming: The hardware configuration in this room almost matches the default configurations for logical Rooms 1, 2, 5 & 6. We'll use Room 1 for the example, as we did in *Example 1.* Set the address for the SQCS 6P 8C station at '2', and set the address for the SYRS station at '1'. Next, follow the instructions in *Chapter 11, Section 3* on page 24 of this manual to change the TYPE setting for station 1 to SYRS-8BT-IR to match the installed hardware. Finally, follow the instructions listed in *Chapter 8,* on page 17 of this manual, to add the dimmers that should be controlled by channel 1 on the control station for this room to Group 001. The dimmers that should be controlled by channel 2 should be added to Group 002, dimmers controlled by channel 3 should be added to Group 003, and so on.

Programming Example 3:

Project Description: The lights in three separate rooms are controlled by dimmers in a Synergy cabinet. Each room is equipped with a SQCS 6P 8C BJ4 TR control station and a SYRS 1G 9BT BJ4 preset recall station.

Programming: The hardware configuration in these rooms matches the hardware included in the configurations for logical Rooms 1, 2, 5, & 6. Any three of these will work – we'll use Rooms 1, 2, & 6 for this example. Per *Table A3.4* and the station installation instructions, set the address for the first SQCS 6P 8C BJ4 TR control station as '2', and set the address for the first SYRS 1G 9BT BJ4 station as '1'; set the address of the second SQCS station as 5 and the second SYRS station as 4; then set the address for the third SQCS station as 8 and the third SYRS station as 7. Follow the instructions listed in *Chapter 8,* on page 17 of this manual, to add the dimmers that should be controlled by each station to the appropriate Groups for that station's Room.

Programming Example 4:

Project Description: The lights in a single room are controlled by dimmers in a Synergy cabinet. This room is equipped with two SQCS 6P 16C BJ4 TR control stations and a SYRS 1G 9BT BJ4 preset recall station that should all work in tandem to control the same loads.

Programming: The hardware configuration in this application matches the default configuration for logical Room 7, but includes another control station. Per *Table A3.4* and the station installation instructions, set the address for the first SQCS 6P 16C BJ4 TR control station as 'F', and set the address for the SYRS 1G 9BT BJ4 station as 'E'. Set the address of the second SQCS 6P 16C BJ4 TR station at an unused address – for this example, we'll use 'D'. Next, follow the instructions in *Chapter 11, Section 3* on page 24 of this manual to change the ROOM setting to 7. Erase the old default programming for this station, which is no longer needed, by selecting CLEAR STATION. Finally, follow the instructions listed in *Chapter 8,* on page 17 of this manual, to add the dimmers that should be controlled by channel 1 on the control stations for this room to Group 001. The dimmers that should be controlled by channel 2 should be added to Group 002, dimmers controlled by channel 3 should be added to Group 003, and so on.

Appendix IV: System Factory Defaults (continued)

Section 5: Default Control Station Programming (continued)

The default programming also includes the ability to accommodate installations where two or more rooms are separated by moveable partitions. The default room, partition, and station configuration is shown in Table A4.5 below. For complete information about configuring areas with moveable partitions, refer to *Chapter 12* on page 29 of this manual.

Room 1 **Station 0 - 2BT IR** **Station 1 - 9BT** **Station 2 - 8C** **Groups 1-8**	**Partition Group 201**	**Room 2** **Station 3 - 2BT IR** **Station 4 - 9BT** **Station 5 - 8C** **Groups 9-16**	**Partition Group 202**	**Room 3** **Station C - 2BT IR** **Station D - 4C** **Groups 1-4**	**Partition Group 203**	**Room 4**
Partition Group 204		**Partition Group 205**		**Partition Group 206**		**Partition Group 207**
Room 5 **Station 9 - 2BT IR** **Station A - 9BT** **Station B - 8C** **Groups 25-32**	**Partition Group 208**	**Room 6** **Station 6 - 2BT IR** **Station 7 - 9BT** **Station 8 - 8C** **Groups 17-24**	**Partition Group 209**	**Room 7** **Station E - 9BT** **Station F - 16C** **Groups 1-16**	**Partition Group 210**	**Room 8**

Table A4.5: Default Room Partition Configuration

Programming Example 5:

Project Description: The lights in three rooms separated by moveable partitions are controlled by dimmers in a Synergy cabinet. Each room is equipped with a SQCS 6P 8C BJ4 TR control station and a SYRS 1G 9BT BJ4 preset recall station. The stations will be combined and separated using a SYRS 1G 2BT BJ4 partition station.

Programming: The hardware configuration in these rooms matches the hardware included in the configurations for logical Rooms 1, 2, 6, & 5. Any three of these will work – we'll use Rooms 1, 2, & 6 for this example, just as we did in Example 3. Follow the instructions in Example 3 to configure the lighting control stations; they apply in this example as well. Next, set the address of the SYRS 1G 2BT BJ4 partition station at an unused address – for this example, we'll use 'A'. Follow the instructions in *Chapter 11, Section 3* on page 24 of this manual to change the following settings for station A: change the TYPE setting to SYRS-2BT, change the ROOM setting to 0, and select CLEAR STATION. Finally, follow the instructions listed in *Chapter 11, Section 5* on page 26 of this manual, to assign the buttons of station A to control the logical partitions separating Rooms 1, 2, & 6. Do this by changing the TYPE setting for buttons 1 and 2 to ALTERNATE and programming button 1 to control Group 201 and button 2 to control Group 205.

Appendix IV: System Factory Defaults (continued)

Section 5: Default Control Station Programming (continued)

	Button #															
Station Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SYRS 1BT	PR1															
SYRS 2BT	PR1	M. OFF														
SYRS 3BT	PR1	PR2	M. OFF													
SYRS 4BT	PR1	PR2	PR3	M. OFF												
SYRS 5BT	PR1	PR2	M. OFF	PR4	PR5											
SYRS 6BT	PR1	PR2	PR3	PR4	M.R.	M.L.										
SYRS 7BT	PR1	PR2	PR3	PR4	M. OFF	M.R.	M.L.									
SYRS 8BT	PR1	PR2	PR3	PR4	PR5	M.R.	M.L.	M. OFF								
SYRS 9BT	PR1	PR2	PR3	PR4	PR5	PR6	M.R.	M.L.	M. OFF							
SYRS 1BT EXT	PR1 (Alt)									DEG (M)		DEG (R)		NG (M)	NG (R)	
SYRS 3BT EXT	PR1 (Alt)	M.R.	M.L.							DEG (M)		DEG (R)		NG (M)	NG (R)	
SYRS 5BT EXT	PR1	PR2	M. OFF	M.R.	M.L.					DEG (M)		DEG (R)		NG (M)	NG (R)	
SYRS 7BT EXT	PR1	PR2	PR3	PR4	M. OFF	M.R.	M.L.			DEG (M)		DEG (R)		NG (M)	NG (R)	
SYRS 9BT EXT	PR1	PR2	PR3	PR4	PR5	PR6	M.R.	M.L.	M. OFF	DEG (M)		DEG (R)		NG (M)	NG (R)	
SYRS 2BT IR	PR1	PR2	PR3	PR4												
SYRS 4BT IR	PR1	PR2	PR3	M. OFF												
SYRS 6BT IR	PR1	PR2	PR3	PR4	M.R.	M.L.										
SYRS 8BT IR	PR1	PR2	PR3	PR4	PR5	M.R.	M.L.	M. OFF								
SQCS	PR1	PR2	PR3	PR4	PR5	PR6	M.R.	M.L.	M. OFF	PR10	PR11	PR12	PR13	PR14	PR15	PR16
SQRSI	PR1	PR2	PR3	PR4	PR5	PR6	PR7	PR8	PR9	PR10	PR11	PR12	PR13	PR14	PR15	PR16

	Channel # (Button)															
Station Type	1 (17)	2 (18)	3 (19)	4 (20)	5 (21)	6 (22)	7 (23)	8 (24)	9 (25)	10 (26)	11 (27)	12 (28)	13 (29)	14 (30)	15 (31)	16 (32)
SYRS 1BT																
SYRS 2BT																
SYRS 3BT																
SYRS 4BT																
SYRS 5BT																
SYRS 6BT																
SYRS 7BT																
SYRS 8BT																
SYRS 9BT																
SYRS 1BT EXT	DEG (R)															
SYRS 3BT EXT	DEG (R)															
SYRS 5BT EXT	DEG (R)															
SYRS 7BT EXT	DEG (R)															
SYRS 9BT EXT	DEG (R)															
SYRS 2BT IR	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)				
SYRS 4BT IR	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)				
SYRS 6BT IR	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)				
SYRS 8BT IR	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)				
SQCS	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)	DSG (R)
SQRSI	NG (R)															

PR1, PR2, … PR8 = Preset 1, Preset 2, … Preset 8
M. OFF = Master OFF
M.R. = Master Raise
M.L. = Master Lower
G# = Group Number #
DEG = Default EXT Group = "6" & Station Address (1-8)
DSG = Default Station Group (Address specific, see "Station Defaults Per Address" table)
NG = Assigned to Group 0 (no group)

All buttons ON type unless otherwise indicated
- Alt. = Alternate
- M = Maintained
- L = Latching
- R = Ramping

= DISABLED, Assigned to Group 0 (no group)

Table A4.6: Default Programming Detail for Each Station Type

Appendix IV: System Factory Defaults (continued)

Section 5: Default Control Station Programming (continued)

Station Address	Room	Type	Channel Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	1	RS2IR																
1	1	RS9																
2	1	SQCS	**G1 (R)**	**G2 (R)**	**G3 (R)**	**G4 (R)**	**G5 (R)**	**G6 (R)**	**G7 (R)**	**G8 (R)**								
3	2	RS2IR																
4	2	RS9																
5	2	SQCS	**G9 (R)**	**G10 (R)**	**G11 (R)**	**G12 (R)**	**G13 (R)**	**G14 (R)**	**G15 (R)**	**G16 (R)**								
6	6	RS2IR																
7	6	RS9																
8	6	SQCS	**G17 (R)**	**G18 (R)**	**G19 (R)**	**G20 (R)**	**G21 (R)**	**G22 (R)**	**G23 (R)**	**G24 (R)**								
9	5	RS2IR																
A	5	RS9																
B	5	SQCS	**G25 (R)**	**G26 (R)**	**G27 (R)**	**G28 (R)**	**G29 (R)**	**G30 (R)**	**G31 (R)**	**G32 (R)**								
C	3	RS2IR																
D	3	SQCS		**G1 (R)**		**G2 (R)**		**G3 (R)**		**G4 (R)**								
E	7	RS9																
F	7	SQCS	**G1 (R)**	**G2 (R)**	**G3 (R)**	**G4 (R)**	**G5 (R)**	**G6 (R)**	**G7 (R)**	**G8 (R)**	**G9 (R)**	**G10 (R)**	**G11 (R)**	**G12 (R)**	**G13 (R)**	**G14 (R)**	**G15 (R)**	**G16 (R)**

Legend

G# = Group Number #

= DISABLED, Assigned to Group 0 (no group)

All buttons ON type unless otherwise indicated

L = Latching

R = Ramping

Table A4.7: Default Programming Detail for Each Station Address

Appendix V: Using SYRS Stations with the 'EXT' Option

Section 1: Introduction

SYRS addressable remote stations may be ordered equipped with inputs and outputs for external devices. This option is available on the 1, 3, 5, 7, and 9 button versions of the SYRS station and is identified by the letters 'EXT' at the end of the catalog number. These stations may only be set at addresses 1 through 8. Stations with this option are equipped with an occupancy sensor input, a photocell input, 24VDC switched output that may be used to control a LPCS Power pack, and a dimmed output that may be used to control 0-10VDC controllable fluorescent ballasts. The external input and output leads are shown in Figure A5.1 below.

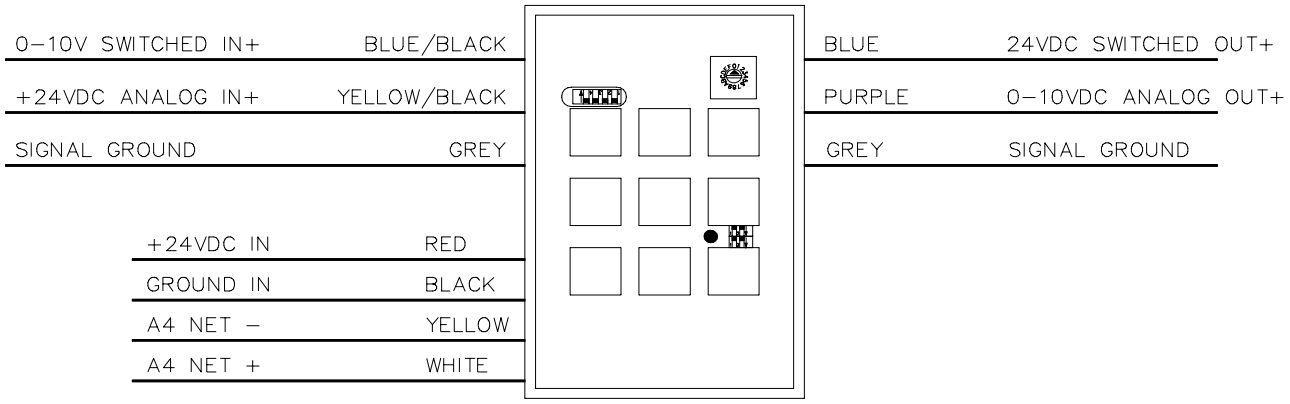


Figure A5.1: SYRS EXT External Input and Output Leads

Section 2: Programming SYRS EXT Inputs

The external inputs are handled and programmed as button inputs on the Synergy MLC controller and in the configuration software. The switched (occupancy sensor) input may be thought of as a maintained button, and may be used to control any Synergy system Group. The analog (photocell) input is used primarily for daylight harvesting applications in conjunction with the analog output of the station and should not be used to control a system Group.

The following is the button configuration for an SYRS station:

Buttons 01 – 09: these are the buttons on the front of the station.

Button 10 – Digital Input: the current level of the digital input. Assign a Group to this button to have this input control Synergy Outputs.

Button 11: used by the Digital remote to report back the current level of the digital output. Do not alter the default programming for this button.

Button 12 – Analog Input: the current level of the analog input. Assign a Group to this button to have this input control Synergy Outputs.

Button 13: used by the Digital remote to report back the current level of the analog output. Do not alter the default programming for this button.

Button 14: the inverted current level of the digital input. Assign a Group to this button to have this input control Synergy Outputs.

Button 15: the inverted current level of the analog input. Assign a Group to this button to have this input control Synergy Outputs.

Appendix V: Using SYRS Stations with the 'EXT' Option

Section 3: Programming SYRS EXT Outputs

The external outputs of the digital remote station are programmed as if they were outputs on power module 6. The outputs of Station 1 are programmed and work in conjunction with Output 1 on Module 6; the outputs of Station 2 are programmed and work in conjunction with Output 2 on Module 6, and so on. Just like the outputs on a SYPMB 6DB power module, the switched and dimmed outputs of the digital remote are controlled together. The digital output of the station will be ON and the analog output will be set to the appropriate level for any level above 0%.

The Digital Input can withstand a voltage of 24VDC. The Analog Input is a 0-10 VDC input. Digital Output is a 24 VDC output used to drive up to two LPCS S11 power packs. Analog Output is a 0-10 VDC output used to drive up to forty 0-10 VDC ballasts.

Section 4: PID (Daylight Harvesting) Mode

The SYRS station with the EXT option includes a daylight harvesting algorithm, known as P.I.D. mode, which uses the photocell signal to maintain a constant light level by varying the level of the dimmed fixtures in the space. This allows the fixtures to be automatically and continuously dimmed to save energy when there is adequate sunlight to light the room. P.I.D. mode is selected by placing the 3rd position of SW1 in the ON (up) position. Refer to the SYRS installation instructions for more information on this station function.

ⓘ SPECIAL NOTE WHEN P.I.D. MODE IS ACTIVE: Setting the value of the station dimmer, or analog output, will change the Analog Setpoint which is not the actual analog output level. Reading the value of the dimmer, however, will return the actual level of the analog output.

Appendix VI: RS-232 Interface Protocol

Section 1: Introduction

This Appendix describes the most commonly used commands available to monitor and control the Synergy system through the RS-232 ports (located on the front and side of the MLC Controller, as shown in Figure A6.1, below). Typically, the front connector is used for temporary connections and the side connector is used when a permanent connection is required.

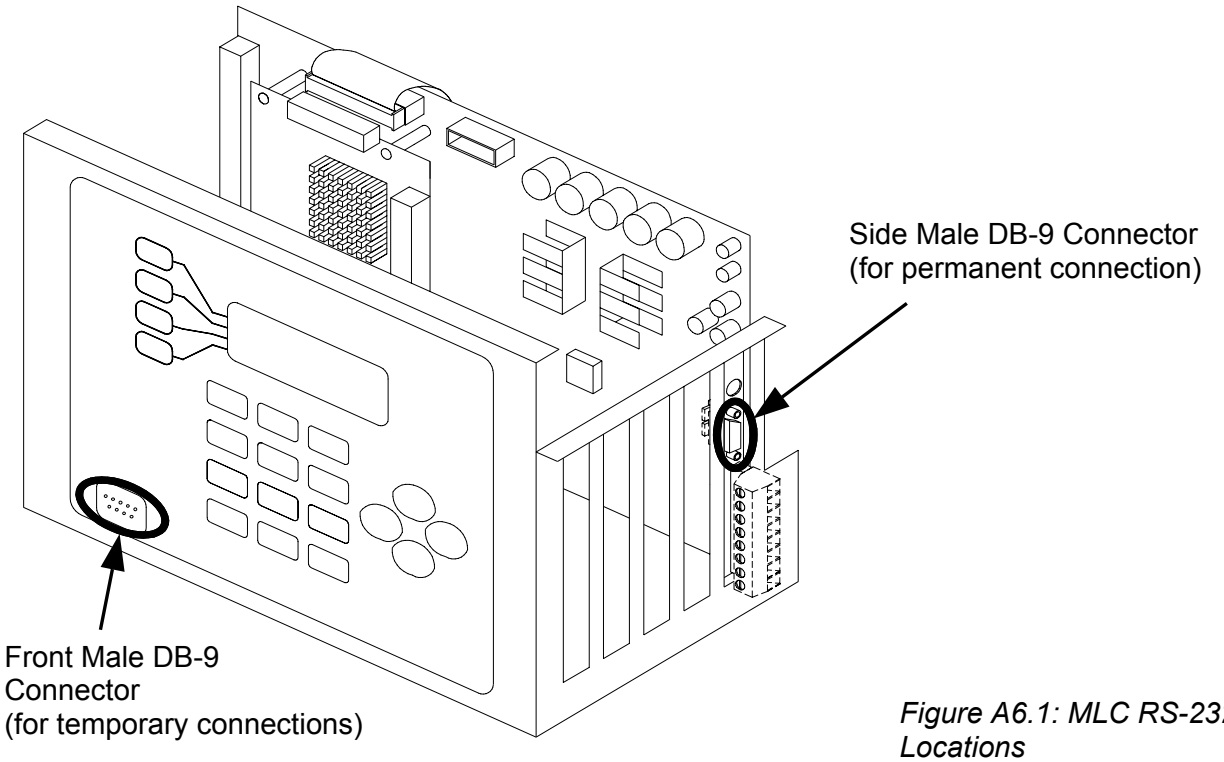


Figure A6.1: MLC RS-232 Port Locations

Section 2: Communication Settings

A device that is to communicate with the MLC Controller should be connected via a Null Modem cable and configured per the settings listed below.

Synergy Male 9 Pin D-Sub Connector		Communication Settings
Pin	**Description**	
1	DCD (Data Carrier Detect)	Bits Per Second = 19,200
2	**RX (Receive Data)**	Data Bits = 8
3	**TX (Transmit Data)**	Parity = None
4	DTR (Data Terminal Ready)	Stop Bits = 1
5	**GND (Signal Ground)**	Flow Control = Hardware
6	DSR (Data Set Ready)	
7	RTS (Request To Send)	
8	CTS (Clear To Send)	
9	RI (Ring Indicator)	
Connections indicated in bold type are the minimum required.		

Appendix VI: RS-232 Interface Protocol (continued)

Section 3: General Information

Command Structure

All commands listed in this Appendix are expressed as ASCII text and must be followed by a carriage return <*cr*> and a line feed <*lf*>. Command characters may be uppercase, lowercase or a mixture of both. The maximum number of characters that can be included in a command line is 78.

Command Prompt

The system will respond to every carriage return and line feed with a "**>**" command prompt character, indicating that it is waiting for command (similar to a MS-DOS command prompt). This character will also follow all system responses to override and programming commands.

System Responses to Commands

All system responses listed in this section are followed by a carriage return, a line feed, and a "**>**" character.

Override Command Received

If an override command has been received, the system will respond with an "**Ok**"

Example:

```
> GROUP 121 100
Ok
>
```

Status Command Received

The system responds to status commands by responding with the status or current programming of the item that was queried. See the command explanations below for the specific format and information returned for each status command.

Example:

```
> SWITCH 102
SWITCH 102 LATCHING 12 120
>
```

Raw Data Status Command Received

Some system status commands, such as **A4**, **ABUS**, and **REDIRECT**, request a continuous stream of data be reported by the system. While this data is being reported, the system will still respond to commands even though no command prompt is given. An Escape character <*esc*> will stop the data reporting.

Example:

```
> A4
01 FE 01 00 0A
02 FE 01 00 0B
```

Bad Input Data / Command Error Response

If the system cannot interpret a string that has been received as a command, it will respond with the following line: **Invalid Command. Type ? for help.**

Example: In the following example, "SWITCH" has been mistyped and is invalid:

```
> SWITHC 102
Invalid Command. Type ? for help.
>
```

On-Line Help

A complete list of the available commands is available on-line at the controller and may be viewed by connecting to the controller with a PC and running HyperTerminal (or a similar terminal emulator). Set the parameters for the PC communications port as outlined in *Section 2* of this Appendix. Set the terminal parameters so that 'Local Echo' and 'Send Line End with Line Feed' are both turned off for inbound and outbound communication.

Once connected, enter **?** for a simple command list, or **??** for a command list with a short description for each command, and then press Enter. A short description for an individual command is available by entering a **?** followed by a space <*sp*> and then the command. Further help is available for most commands by entering the command with no variables and then pressing Enter.

Example: Enter a "?" followed by a carriage return for a list of commands.

```
> ?
SYNERGY MLC Version v1.02 released on 19-Jul-2002
test            dev             stations        rooms
a4              abus            syrs            schedule
timeout         redirect        bootdisk        attrib
dump            checksum        dir             rename
type            copy            send            get
del             cpu             state           fifo
irq             mem             date            time
ver             clear           name            location
warn            phase           Group           holiday
output          switch          analog          button
channel         preset          station         event
password        save            data            reinit
restart         exit            ??              ?
>
```

Example: Enter a "?" followed by a space and then a command and a carriage return for a short description of the function of that command.

```
> ? Group
SYNERGY MLC Version v1.02 released on 19-Jul-2002
group    - program/view group data
>
```

Example: Type a command with no variables followed by a carriage return for more detailed help for that command.

```
> Group
GROUP nn card:relays card:relays card:relays ...
GROUP nn level - set a Group level
GROUP nn - display the Group settings
>
```

Appendix VI: RS-232 Interface Protocol (continued)

Section 4: Addressable Station Commands

Read Station Status

This command requests the status of an addressable wallstation.

Command: SYRS <ADDRESS>

Response:

Line 1: Station <current address> Fade <fade time of active preset> s
Station addresses will be **0** - **F**, fade times will be **0** - **6553** seconds

Line 2: (Preset / Channel column labels)
This line will always be the same and labels the columns **1** - **16**

Line 3: PrValid: (***** in a preset column indicates that a valid preset is currently saved)
The fields in this line will either be ***** or spaces <*sp*>

Line 4: PrStatus: (**100** in column indicates that the preset matches the current channel levels)
The fields in this line will either be **100** or **0**

Line 5: Presets: (**100** in a preset column indicates that a preset LED is currently lit)
The fields in this line will either be **100** or **0**

Line 6: Channels: (Numbers in each column indicate the current level of that station channel)
The fields in this line will be **0** to **100**

Example: This example returns the status of the station at address 2.

```
> syrs 2
Station 2 Fade   10s
            1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16
PrValid :   *   *       *   *       *   *
PrStatus:   0   0   0   0 100   0   0   0   0   0   0   0   0   0   0   0
Presets :   0   0   0   0 100   0   0   0   0   0   0   0   0   0   0   0
Channels:  26   0  26  58  26  35  26  99   0   0   0   0   0   0   0   0
>
```

The returned data indicates that presets 1, 2, 4, 5, 7, and 8 have saved data, that preset 5 is currently active and has a 10 second fade time, that channels 1, 3, 5, and 7 are at 26%, channels 3 and 9 -16 are at 0%, channel 4 is at 58%, channel 6 is at 35%, and channel 8 is at 99%.

Set Channel Level

Individual SQCS Channels can be overridden by controlling the load Groups that are assigned to those channels. This override is temporary and will not affect any preset programming for the station being controlled. Load Groups are numbered 001 – 099, and may be set at any level from 0% - 100%. Refer to *Chapter 11, Section 5* for instructions on viewing and programming the Channel Group assignments from the UIP.

Command: GROUP <GROUP NUMBER> <LEVEL>

Example: In this example, Group 021 is overridden to 75%.

```
> GROUP 021 75
Ok
>
```

Ramp Channel Up

An individual SQCS Channel can be ramped up by putting the load Group that is assigned to that Channel into *raise level auto-mode*. In this mode, the level will increment automatically from its current level at a constant rate (a 1% change takes 80 milliseconds; the level will change 12.5% in 1 second).

Command: GROUP <GROUP NUMBER> 130

Example: In this example, Group 008 is commanded to begin ramping up.

```
> GROUP 008 130
Ok
>
```

Ramp Channel Down

An individual SQCS Channel can be ramped down by putting the load Group that is assigned to that Channel into *lower level auto-mode*. In this mode, the level will decrement automatically from its current level at a constant rate (a 1% change takes 80 milliseconds; the level will change 12.5% in 1 second).

Command: GROUP <GROUP NUMBER> 129

Example: In this example, Group 008 is commanded to begin ramping down.

```
> GROUP 008 129
Ok
>
```

Stop Channel Ramp Up or Down

This command takes the Group out of the raise- or lower- level auto-mode and leaves the Group at its current level.

Command: GROUP <GROUP NUMBER> 128

Example: In this example, Group 008 is commanded to stop ramping.

```
> GROUP 008 128
Ok
>
```

Appendix VI: RS-232 Interface Protocol (continued)

Section 4: Addressable Station Commands (continued)

SQCS Preset Activation and Override

This command allows Presets 1 – 9 on SQCS stations at addresses 0 – 9 to be activated or overridden OFF. This override will only affect the Channels included in the preset that is being overridden. To activate a Preset, set the Preset Group at any level 1% or higher. To override a preset OFF, set the Preset Group at 0%. Table A6.1, below, shows an overview of the SQCS Preset Group numbers for each station.

Group Number(s)	Function	Notes
101 – 109	Station 0 Preset 1-9 Activation	The first digit of a Group number in this range is always 1. The second digit of the Group number is the address of the SQCS station. The third digit of the Group number is the preset number on that station.
111 – 119	Station 1 Preset 1-9 Activation	
121 – 129	Station 2 Preset 1-9 Activation	
131 – 139	Station 3 Preset 1-9 Activation	
141 – 149	Station 4 Preset 1-9 Activation	
151 –159	Station 5 Preset 1-9 Activation	
161 –169	Station 6 Preset 1-9 Activation	
171 –179	Station 7 Preset 1-9 Activation	
181 –189	Station 8 Preset 1-9 Activation	
191 –199	Station 9 Preset 1-9 Activation	

Table A6.1: Preset Group Addressing Overview

Command: GROUP <GROUP NUMBER> LEVEL

Example: In this example, Preset 7 on Station 3 is activated.

```
> GROUP 137 100
Ok
>
```

Example: In this example, the Channels included in Preset 7 on Station 3 are turned OFF.

```
> GROUP 137 0
Ok
>
```

Read SQCS Preset Programming

This command displays the current programming for a SQCS station preset. Note that the preset addressing for this command is different than the addressing used for the preset activation and override command. To view the programming, the presets are addressed with a four-digit decimal number. The first two digits are the station address (00-15), and the second two digits are the preset number (01-16).

Command: PRESET <PRESET ADDRESS>

Response:
PRESET <ADDRESS> <FADE TIME (in seconds)> <CHANNEL:LEVEL> <CHANNEL:LEVEL>...

Example: In this example the programming for preset 1 on station 15 (a.k.a. F) is requested.

```
> preset 1501
PRESET 1501 5 1:100 2:100 3:100 4:100 5:100 6:100 7:100 8:100 9:100 10:100
11:100 12:100 13:100 14:100 15:100 16:100
>
```

This preset is programmed to set all 16 channels on this station at 100% over a 5 second fade time.

Program Station Preset

This command allows a station preset to be remotely programmed. Note that the preset addressing for this command is different than the addressing used for the preset activation and override command. The presets are addressed with a four-digit decimal number, as in the 'View Programming' command. The first two digits are the station address (00-15), and the second two digits are the preset number (01-16). Valid fade times that may be programmed are 0 – 6553 seconds.

A command line may contain 78 characters maximum. Any fields that are not included in the preset programming command line will remain unchanged, so a preset that includes all 16 Channels and requires a command line with more than 78 characters can be programmed with two or more seperate command lines.

Command:
PRESET <PRESET ADDRESS> <FADE TIME (seconds)> <CHANNEL:LEVEL> <CHANNEL:LEVEL>...

Example: In this example preset 1 on station 15 (a.k.a. F) is programmed to dim Channel 1 to 100%, Channel 2 to 20%, Channel 3 to 75%, Channel 4 to 100%, Channel 5 to 0%, Channel 6 to 20%, Channel 7 to 80%, and Channel 8 to 100% over a 15 second fade time.

```
> PRESET 1501 15 1:100 2:20 3:75 4:100 5:0 6:20 7:80 8:100
Ok
>
```

Example: In this example preset 4 on station 6 is programmed to dim Channels 1 – 6 to 100%, Channel 7 to 80%, Channel 8 to 95%, Channel 9 to 20%, Channel 10 to 0%, Channel 11 to 0%, Channel 12 to 48%, Channel 13 to 100%, and Channels 14 – 16 to 35% over a 30 minute (1800 second) fade time.

```
> PRESET 0604 1800 1:100 2:100 3:100 4:100 5:100 6:100 7:80 8:95
Ok
> PRESET 0604 1800 9:20 10:0 11:0 12:48 13:100 14:35 15:35 16:35
Ok
>
```

Appendix VI: RS-232 Interface Protocol (continued)

Section 5: System Commands

Read the System Time
Read the current time set in the system real-time clock. The current time is reported in 24 hour format.

Command: TIME

Response: <HH>:<MM>:<SS>

Example:

```
> TIME
15:12:45
>
```

Set the System Time
Set the current time in the system real-time clock in 24 hour format.

Command: TIME <HH>:<MM>:<SS>

Example: In this example the time is set to 3:15:00 PM, which is 15:15:00 in 24 hour format.

```
> TIME 15:15:00
Ok
>
```

Read the System Date
Read the current date set in the system real-time clock.

Command: DATE

Response: <MM>/<DD>/<YYYY>

Example:

```
> DATE
8/4/2002
>
```

Set the System Date
Set the current date in the system real-time clock.

Command: DATE <MM>/<DD>/<YYYY>

Example: In this example the date is set to August 5, 2002.

```
> DATE 08/05/2002
Ok
>
```

Read the Code Revision Level

This command requests the code revision level of the controller firmware and the date that it was compiled. This data may also be viewed by pressing the top softkey on the MLC keypad while the display is on the root (START...) menu.

Command: VER

Response: SYNERGY MLC v<VERSION NUMBER> <BUILD DATE>

Example:

```
> VER
SYNERGY MLC v1.02 19-Jul-2002
>
```

Rename the Cabinet

This command changes the name displayed on the top line of the UIP display for the root menu. Twenty characters maximum can be displayed on the line, and both upper and lower case letters may be used. The top softkey on the MLC keypad will need to be pressed twice to refresh the name data on the display once the command has been entered.

Command: NAME <TEXT>

Example: In this example, the top line of the display is changed to "East Meeting Rooms"

```
> NAME East Meeting Rooms
Ok
>
```

Save the Programmed Data

This command saves the program data to non-volatile memory. This command must be used after a programming or configuration change has been executed from the RS-232 interface or the change(s) will be lost the next time the controller loses power.

Command: SAVE

Example: In this example, the program data is saved to non-volatile memory.

```
> SAVE
Ok
>
```

Part. No. CDCS000253 Rev D 7/2002

LITHONIA LIGHTING
An AcuityBrands Company

LIGHTING CONTROL SYSTEMS
One Lithonia Way, Decatur GA 30035
Telephone 770-987-4200, Fax 770-987-1002

In Canada: 1100 50th Ave., Lachine Quebec H8T 2V3