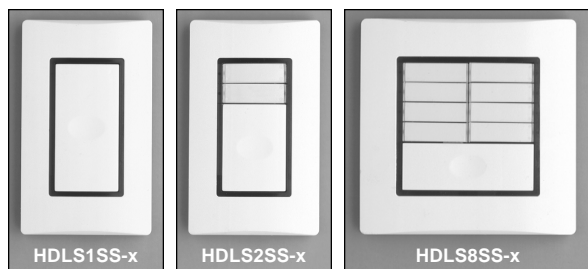


HDLS1SS-x / 2SS-x / 4SS-x / 8SS-x

Smartwired™ Dataline Switch

Installation and Operation



There are four basic Smartwired™ Dataline Switch configurations: the single-gang, 1-, 2- and 4-button HDLS1SS-x, HDLS2SS-x and HDLS4SS-x, respectively, and the two-gang, 8-button HDLS8SS-x.

Each switch includes bi-color LED status lights as well as a locator light. In addition, the 2-, 4- and 8-button units accept standard $\frac{3}{8}$ " wide (9 mm) identification labels.

The x suffix in the catalog number refers to button and switchplate color:

2 = ivory, 4 = almond, 7 = white and 9 = grey.

Any button on a Dataline Switch may be smartwired to:

- any relay or group of relays within a single relay panel
- a channel within a single relay panel
- the same channel among multiple panels (requires an HCLK8SS Network Clock, which also operates as a hand-held programmer, or an HBMS8SS Building Management System Interface Module)

These instructions cover wiring and testing of the Local Dataline and Dataline Switches, smartwiring the switches, and documenting the Smartwiring.

Before proceeding, read the instructions on the following pages. For an overview of the entire system and the documentation forms, refer to the other sections of the SMARTWIRED SWITCHING SYSTEM INSTALLATION AND OPERATION MANUAL.

If you have any questions, call our Service Team at: 888-852-2778.

The Smartwired™ Switching (SS) System is a small network of relay panels and occupant control switches linked by a 4-wire dataline. Together, these devices form a reconfigurable switching platform that uses "smartwiring" instead of hardwiring to link occupant switches to relays.



Santa Clara, CA 95050

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Installation Instructions

Install the Local Dataline

Refer to **Smartwired™ Switching System**
Interior Installation and Setup.

The dataline connects the relay panels, switches and optional control modules. Within the 4-wire dataline are two twisted pairs: the red and black wires, carrying data; and the blue and white wires, providing power to the dataline switches.

For simplicity, we refer to the 4-wire dataline running between a relay panel and the dataline switches as a “Local Dataline”. The relay panel provides the low-voltage power to all of the dataline switches on its local dataline.

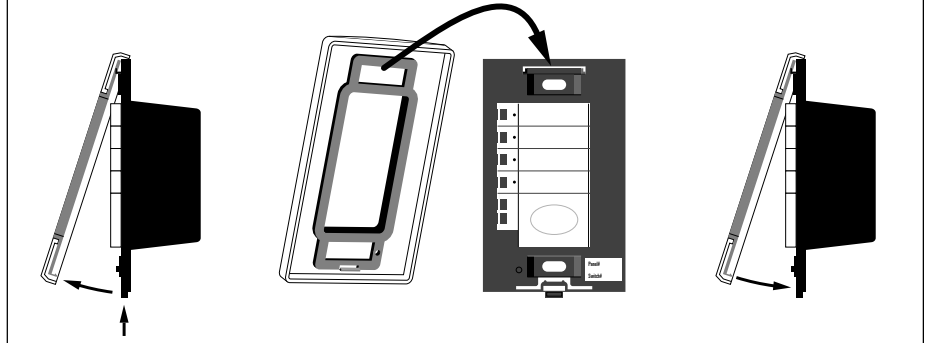


Note: To ensure good communications between panels, the installer must comply with the dataline specification. The Watt Stopper® will not warrant a system using a dataline that does not meet our specification. To avoid questions, use HDLW4(P) (plenum rated). Do not run the dataline in conduit or wiring trays with power wires. Do not connect the local datalines from two different panels.

HDLW4P Dataline Wire Specifications

- 18 AWG (7 strands x 26 AWG)
- 2 independent twisted pairs
- Unshielded copper conductors
- 2-inch twist lay on pairs, 6-inch on cable
- Plenum-rated copolymer jacket, 0.230" O.D.
- FEP 0.010" insulation, 0.060" O.D.
- 30 pF/foot maximum capacitance
- -20°C to 150°C operating temperature range
- 17 lbs. per 500 foot reel
- UL rated

Figure 1 – Removing and Replacing the Screwless Cover Plate



Removing the Cover Plate

To remove the screwless cover plate, press in the black tab at the bottom edge of the plate and lift the plate up and off as shown in **Figure 1**. To replace the cover plate, place the hang bar at the top of the plate onto the hang hook at the top of the switch base and snap the bottom in place until it clicks as shown above and on page 5.

Install and Test Switches

The 1-, 2- and 4-button Dataline Switches mount in standard 1-gang switch boxes. The 8-button unit mounts in a standard 2-gang box. The dataline is typically connected in a “daisy-chain” from switch to switch, eliminating expensive home runs.

Connect the dataline red/black/white/blue wires to the corresponding pigtails on the switch with wire nuts, as illustrated in **Figure 2**.

For proper operation, there must be a **good dataline** which:

- Provides 24 VAC power to each switch
- Has a low resistance connection of the red and black wires between all switches and the relay panel
- Has no short of the red and/or black to ground

24 VAC Power

The power supply in the relay panel must be on. To test for 24 VAC power at each switch, simply toggle each button on the switch ON/OFF after you have connected the dataline but before mounting the switch in the electrical box. The red LED for each button should go on and off.

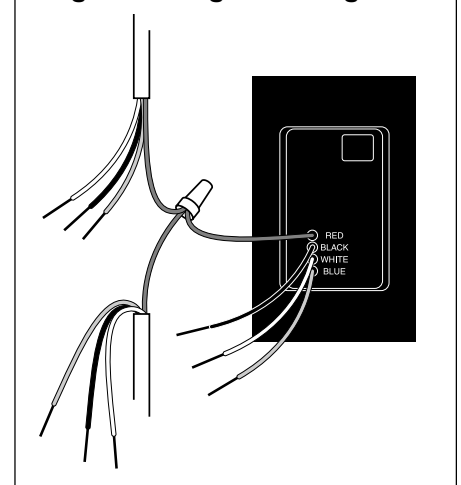
Low-Resistance Red/Black Data Path

After wiring the last switch on the local dataline, disconnect the red and black wires from the dataline terminals in the relay panel and wire nut them together. Then measure the resistance between the red and black terminals on the last switch. It should be less than 3 ohms. If it is higher, work backwards toward the relay panel, checking the resistance at each switch to find the bad connection. When finished, reconnect the dataline at the panel.

Shorted Dataline

After the dataline resistance test checks out, you can easily test for a shorted dataline by measuring the resistance from red to white, then black to white anywhere on the dataline. You should see an open circuit. If there is a short, start at the last switch and work backwards to locate it.

Figure 2 – Pigtail Wiring



Number and Document the Dataline Switches

As shown in **Figure 3**, dataline switches are numbered sequentially beginning with 01-01 (Panel 01-Switch unit 01). A single switch unit may have 1, 2, 4 or 8 buttons. Switch units, and the number of buttons in each, should be identified on the reflected ceiling plan. Check to confirm that the correct switch unit has been installed at each location. A separate **Dataline Switch Documentation** form should be used for each relay panel to record the number of the switch and its number of buttons. Allow one line for each button as shown on the form in **Figure 4** below right. For example, switch 01-01 has four buttons. The form should list all buttons on each switch, even if you are not using all of them.

Any switch button may be smartwired to control a single relay or a group of relays within any single panel (see the next page for smartwiring a dataline switch). For example, assume that you want the top two buttons of a 4-button switch to control open office areas associated with relays in Panel 01, while the third button controls common areas (rest rooms and hallways) in Panel 02. The form shows how to record this intent and also shows the labeling for each switch button. Finally, write the switch unit number on the label in the lower right corner of the switch base as shown below in **Figure 5**.

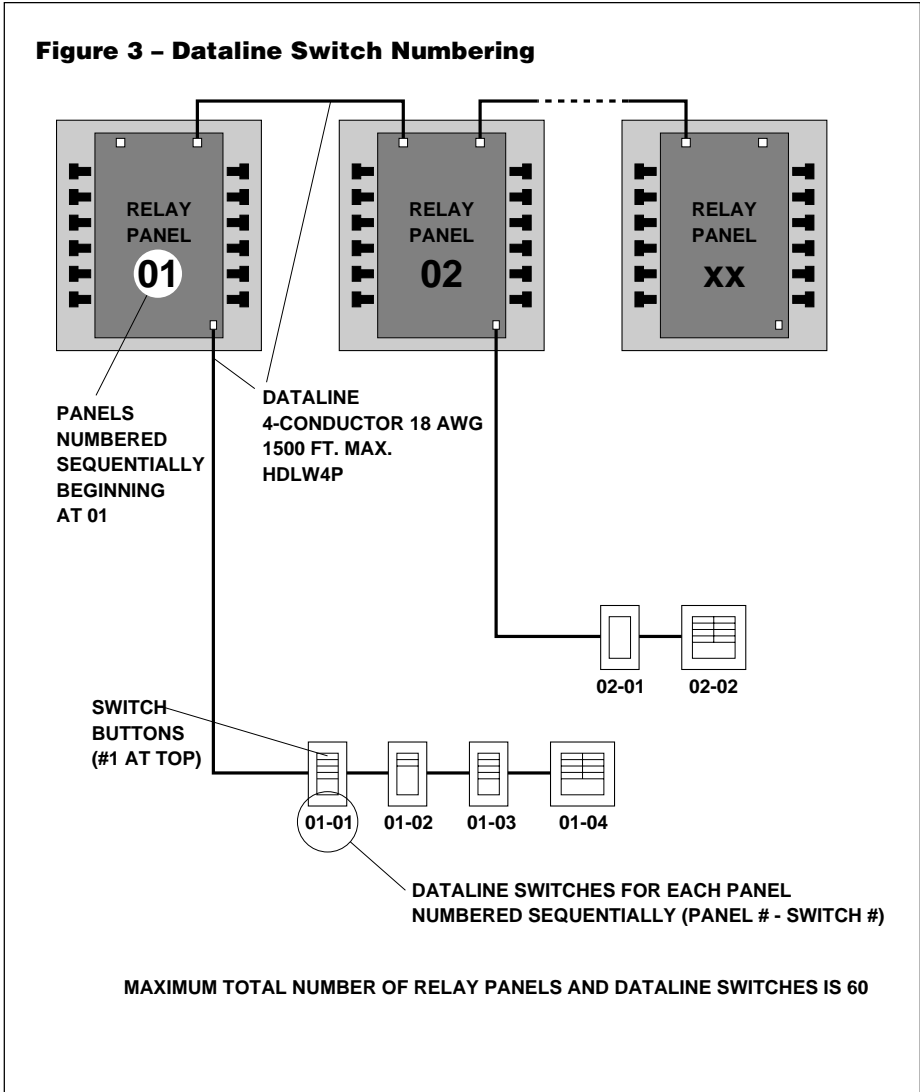


Figure 4 – Dataline Switch Documentation Form

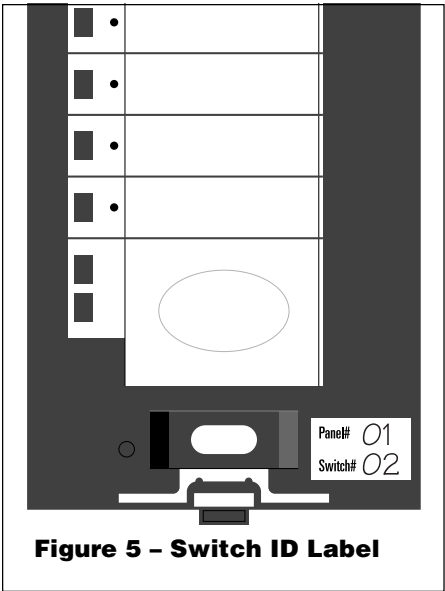


Figure 5 – Switch ID Label

Smartwired™ Switching System

Dataline Switch Documentation

PANEL NUMBER **01**

Note: Use this form for Dataline Switches and/or Universal Switch Modules connected to the Local Dataline of the Panel Number indicated above.

SWITCH DESIGNATION	BUTTON # (8 MAX.) ¹	RELAYS ² CONTROLLED PANEL # -- RELAYS ³	DESCRIPTION	SPECIAL FUNCTION
-01	1	01-01, 01-02	OPEN OFFICE - FLR 1 NW	
-01	2	01-03, 01-04	OPEN OFFICE - FLR 1 NE	
-01	3	01-05, 01-06	OPEN OFFICE - FLR 1 SW	
-01	4	01-07, 01-08	OPEN OFFICE - FLR 1 SE	
-02	1	01-09, 01-10	HALLWAYS - NORTH	
-02	2	01-11, 01-12	RECEPTION	
-02	3	01-13, 01-14	CONFERENCE 1	
-02	4	01-15, 01-16	CONFERENCE 2	
			WASH ROOM	

Smartwiring a Dataline Switch to a Relay Group

Dataline switches are typically wired to a single relay or group of relays within a panel. Wiring to a channel is a shortcut — it provides a simple way of manually overriding all of the relays which are grouped to an automation channel (A-H) within a panel.

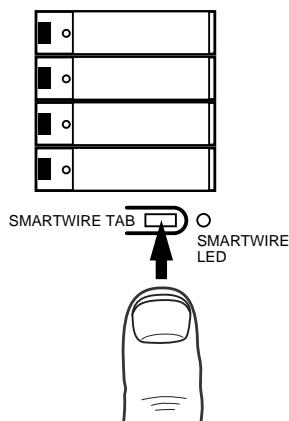


With the wallplate removed and the switch's master button flipped open as shown above ...

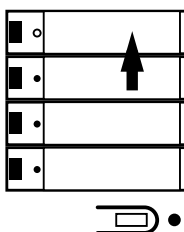
- 1 Press the SMARTWIRE tab as shown above and in **Figure 6**. The LED next to the tab will flash once, then the individual button LEDs will begin to flash on/off.
- 2 Press the switch button you want to smartwire (Master Button on an HDL1SS-x). The LED for that button will continue to flash; LEDs for the other buttons will stop flashing. LEDs for the relays currently controlled by that switch button will also begin to flash.
- 3 Select the relays to be controlled. In the relay panel, press the associated relay control button to add/delete that relay to/from the group. (To smartwire a dataline switch to a Channel, press the channel button instead of the relay control button.)

Figure 6 – Smartwiring a Dataline Switch

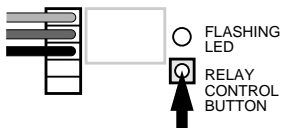
- 1 PRESS SMARTWIRE TAB ONCE
SMARTWIRE LED FLASHES ONCE
ALL SWITCH BUTTON LEDs BEGIN FLASHING



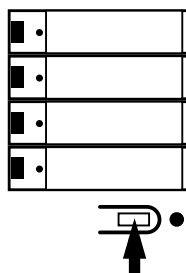
- 2 PRESS SWITCH BUTTON TO BE PROGRAMMED
SELECTED BUTTON LED CONTINUES TO FLASH
OTHER LEDS STOP FLASHING



- 3 PRESS RELAY CONTROL BUTTON TO ADD OR DELETE FROM THE GROUP



- 4 PRESS SMARTWIRE TAB AGAIN
ALL LEDS STOP FLASHING



- 4 Press the SMARTWIRE tab again. All LEDs will stop flashing. The selected switch button will now control the selected group of relays.

Test

Press the selected switch button again to toggle the relay group on/off/on. Now press each relay control button to turn the relay off. The switch button LED will go from red (all relays on) to green (mixed group) to off when the last relay in the group is turned off.

Patterns or 'Scenes'

Any dataline switch may be configured as either an On/Off Group Switch or a Pattern Switch. The Patterns mode allows the group of relays to be forced to a combination of on/off states to provide a lighting "scene." For consistency of operation, do not mix Group and Pattern buttons on the same switch unit. For more information on Patterns, refer to **Special Functions** on page 6.

Smartwiring a Dataline Switch in Patterns mode is similar to that described in **Figure 6**, with one additional step:

- 1 Press the SMARTWIRE tab.
- 2a Press the switch button.
- 2b Press the PATTERNS button in the relay panel (pictured below).
- 3 Select the relays to be controlled. This time, pressing the relay control button will toggle the relay's LED from red to green to off and back. Select relay status as follows:
LED Red: Relay is IN the group and ON (turns on when the dataline switch button is pressed)
LED Green: Relay is IN the group but OFF (forced off when the dataline switch button is pressed)
LED Off: Relay is NOT IN the group
- 4 Press the SMARTWIRE tab again.



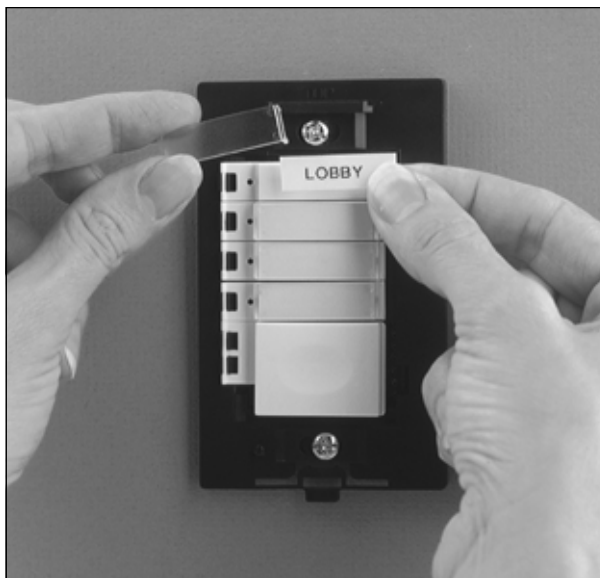
Switch Button Labeling

The individual switch buttons provide space for $\frac{3}{8}$ " wide x $1\frac{1}{16}$ " long (9mm x 30mm) label directories. The labels can be attached simply by removing the clear lenses, positioning the labels and replacing the lenses as shown at right.

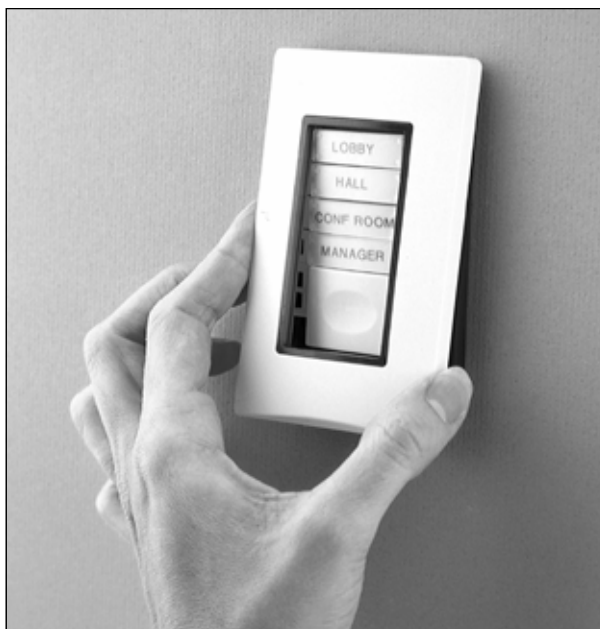
If desired, the buttons may be completely removed from the base plate and labeled separately. You may find this method easier to achieve better alignment of the labels.

To remove a button from a 1-, 2- or 4-button switch, open it out from the base until it is at a 90° angle, then gently rotate it up or down until it snaps free of the hinge bracket. To replace the button, press the hinge pin into the hinge bracket until it snaps in place, then close the button into position.

Removing buttons from an 8-button switch is slightly different. With your fingernail or small screwdriver, pry the hinge end of the button free from the hinge bracket. Lift the button out, twisting it slightly, if necessary, to free the small hook holding the center edge of the button in place. To replace the button, position the small center hook in place and press the hinge pin into the hinge bracket until it snaps in place.



The individual switch buttons on the dataline switch unit provide space for $\frac{3}{8}$ " wide x $1\frac{1}{16}$ " long (9mm x 30mm) label directories. Standard label makers, such as the Brother PT-200, shown below left, can be used to print the labels.



The screwless cover plate is easy to remove and replace.



Standard label makers can be used to make the 9mm directory labels. (Shown to the left and in the labeling examples on this page are the Brother Electronic Labeling System model PT-200 and black-on-clear label tape TZ-121.)

The following three pages offer detailed instructions on assigning special functions to the dataline switch buttons for increased flexibility and alternate lighting scenarios.

Special Functions

The Smartwired Switching System is designed to provide flexibility without compromising simplicity in installation and operation. These special functions may be used to enhance the operation of your system, but they are not required in most installations.

Patterns

A Pattern is a combination of ON and OFF states for a group of relays which creates a “scene.” Any button on a dataline switch may be smartwired to create such a scene by following the instructions on page 4. The example used on this page is an office with four 3-lamp fluorescent fixtures and six wall wash units (see **Figure 7**):

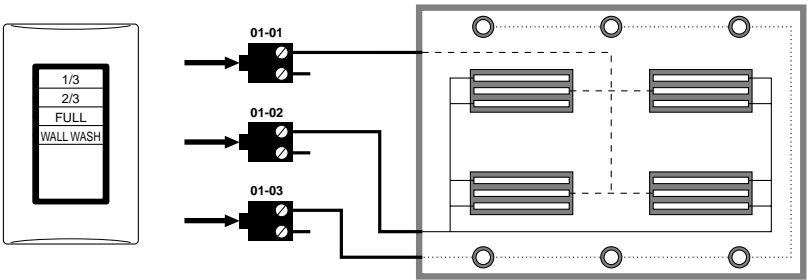
The local dataline switch will provide 1/3, 2/3 and Full On for the fluorescents, and separate control of the wall-wash units. The **Switch Documentation** form in **Figure 8** shows how the four buttons on a quad switch would be smartwired to create this switching function. Relays which are in an off state are circled.

All of the buttons are wired as Patterns. Reviewing the switch button LED status shows why this is important (**Figure 9**). When the relay pattern for a switch button is “true”, the LED for that button will be on red. If “not true” the LED will be off.

- A** When the occupant presses the top button on, relay 01-01 will turn on and relay 01-02 will turn off to give 1/3 lighting. The LED for the top button will be red.
- B** Pressing the second button causes the relay states to reverse, giving 2/3 lighting. The top button LED turns off (since its pattern is no longer “true”) and the second button LED turns red.
- C** Similarly, pressing the third button turns on both relays giving full lighting. The second button LED turns off and the third button LED turns on. Everything is as it should be.

If, on the other hand, the third button was smartwired as a standard on/off group, we would have seen an odd response. Whenever buttons 1 or 2 were turned on, the third button LED would be on green, showing a mixed state for its relays.

Figure 7 – Patterns Switch Lighting Layout



Note this simplifying rule: If ANY button of a switch unit is smartwired as a Pattern, ALL of the buttons on that switch unit should be smartwired as Patterns. See text for details.

Figure 8 – Patterns Switch Documentation

Smartwired™ Switching System

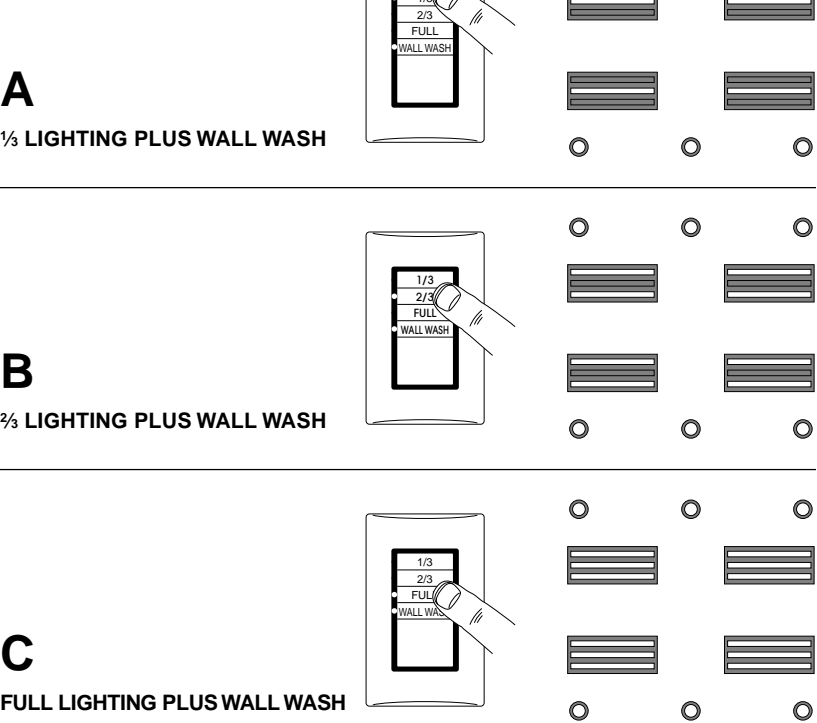
PANEL NUMBER 01

Dataline Switch Documentation

Note: Use this form for Dataline Switches and/or Universal Switch Modules connected to the Local Dataline of the Panel Number indicated above.

SWITCH DESIGNATION	BUTTON # (8 MAX.) ¹	RELAYS ² CONTROLLED PANEL # -- RELAYS ³	DESCRIPTION	SPECIAL FUNCTION
-01	1	01-01, 01-02	1/3 LIGHTING	
-01	2	01-01, 01-02	2/3 "	
-01	3	01-01, 01-02	FULL "	
-01	4	01-03	WALL WASH	

Figure 9 – Patterns Switch Operation



Master Button Alternate Scenarios

OFF/RESTORE — The Default Setting

The Master Button on 2-, 4- and 8-button switches is pre-configured to provide an OFF/RESTORE scenario. If several individual switch buttons are on, hitting the Master turns all of those buttons off. Hitting the Master again would turn those same buttons back on.

Example: (**Figure 10**) Assume that in the previous office example, an occupant prefers a lighting arrangement with the fluorescents at 1/3 and the wall wash units on. Once the buttons on the switch are set to this combination, all the occupant needs to do from then on is to press the Master Button to turn off or restore this lighting combination.

Another example: Assume an 8-button switch is used to control eight zones in an open office space. At the end of the day, all but two zones have been turned off. Upon leaving, a conscientious employee uses the Master Button to turn off the remaining lighting, only to hear a shout from the back corner ... someone is still there. Pressing the Master Button again would restore the lighting in the two zones which had been on, without having to turn on the entire floor.

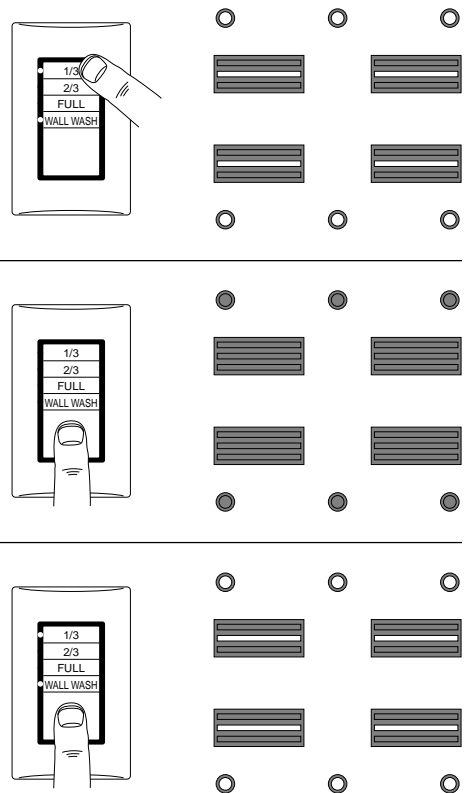
You can change the operating scenario of the Master Button using the first two

**Figure 10 –
Master Button Off/Restore**

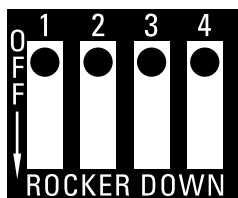
1/3 LIGHTING PLUS WALL WASH

MASTER OFF

MASTER RESTORE

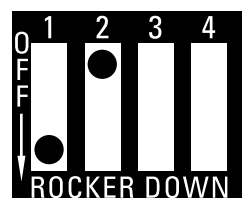


**Figure 11 –
Master Button DIP Switches**



DIP switches located on the back of the switch unit. The DIP switches are normally covered by a label to prevent accidental changes, and can be accessed by removing the gray portion in the upper right corner of the label on the back of the dateline switch as shown below left.

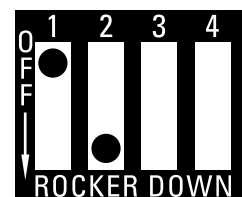
The factory default setting is all DIP switches in the ON position: each DIP switch is depressed towards the numbers along the top, indicated in **Figure 11** by the black dots.



ALL ON / ALL OFF

To convert to ALL ON / ALL OFF operation, DIP switch 1 is

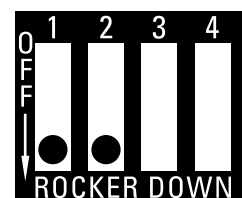
moved to the OFF position (1 OFF, 2 ON). This operation is typically used in a prison application where there is individual control of each cell with a Master ON/OFF to override a bank of switches quickly.



OFF ONLY

To convert to OFF ONLY, DIP switch 1 is ON and switch 2 is OFF. This is an

energy-efficient setting, but not very occupant friendly. For example, in our office application, this would make the occupant reset the desired lighting combination every morning. **Don't use this configuration with Pattern switches.**



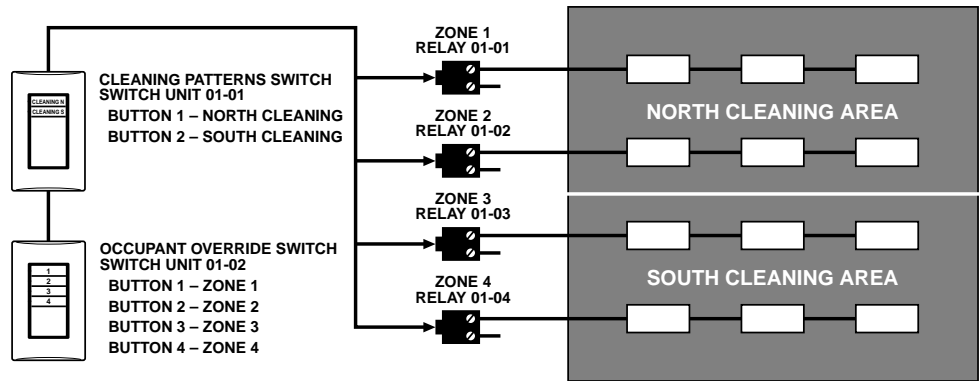
DISABLED

To disable the Master button, both DIP switches are set to OFF. This

configuration may be preferred when there is concern about someone "accidentally" turning on all of the lights in an area.

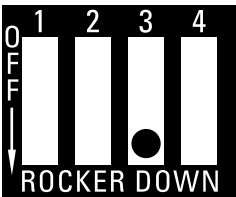


Figure 12 – Cleaning Switch Smartwiring and Lighting Layout



Cleaning Switch

The third DIP switch, when set in the OFF position as shown below, changes the operation of the entire switch unit to provide a Cleaning scenario. The intent



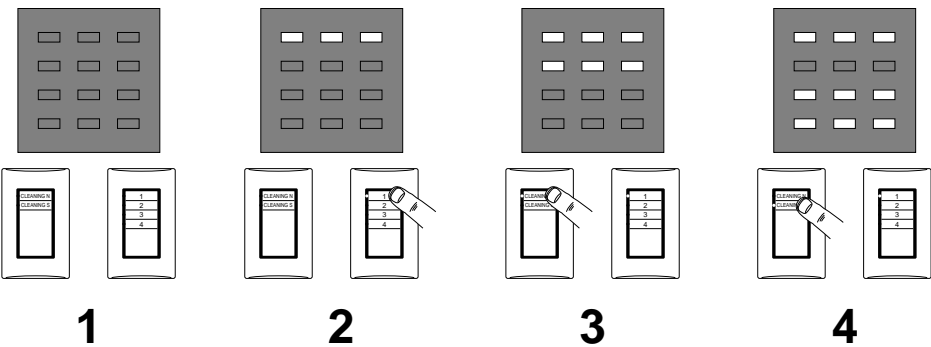
of the cleaning scenario is to allow the cleaning staff to turn on or off a large area without negatively affecting occupants who may be staying late.

When in the cleaning mode, any button on the switch unit will turn on the relays smartwired to that switch button, similar to a standard switch. However, when the button is toggled off, any relays which are on because of an occupant override will remain on. Combining the Cleaning scenario with Pattern operation can provide an elegant solution to control of cleaning lights (see **Figures 12 and 13**).

Let's assume that switch 01-01 has been configured as a cleaning switch with the top button (button 1) controlling a Pattern in which the north half of the

floor is on and south half is off. The second button does just the reverse. With this combination, whenever the cleaners turn on one half of the floor, the other half turns off automatically, saving half the lighting. Furthermore, since switch 01-01 has been configured as a cleaning switch, the cleaning crew cannot accidentally put an occupant in the dark. For instance, if an occupant has used switch 01-02 to turn on relay 01-01, as shown in step 2 below, the cleaning switch does not turn off that relay, as shown in step 4.

Figure 13 – Cleaning Switch Scenario with Occupant Override Switch



- 1 After hours, all lights are off.
- 2 A late-working occupant enters and turns on the lights in Zone 1.
- 3 The cleaning crew arrives and presses Button 1 on the Cleaning Switch to turn on the North Cleaning lights.
- 4 When finished in the north area, the cleaning crew presses Button 2 on the Cleaning Switch. The South Cleaning lights turn on and the North Cleaning lights turn off, except for Zone 1.

