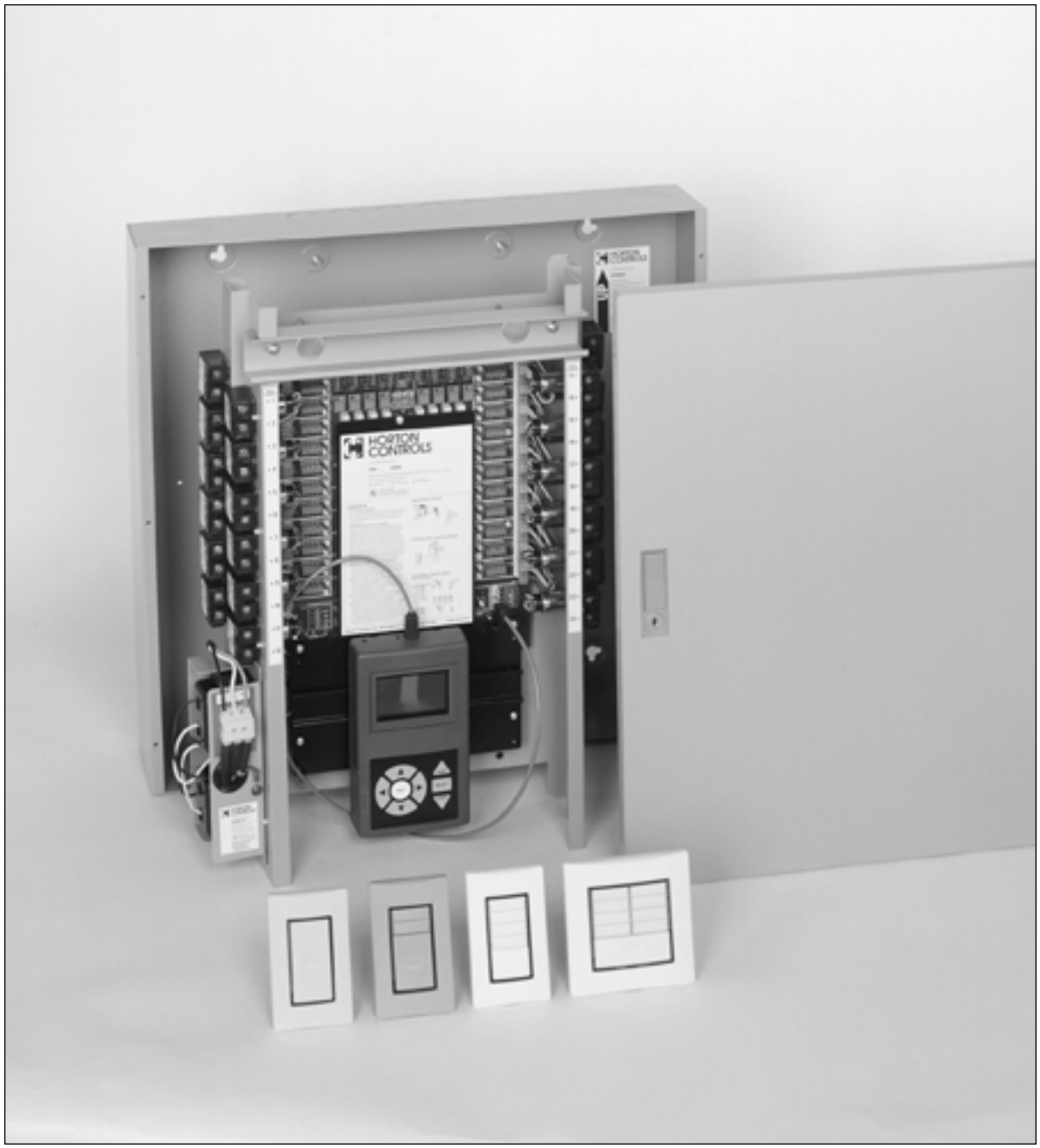
Smartwired™ Switching System
Troubleshooting



Information in this section includes diagnostic procedures for detecting dataline, switch, network clock and other system problems. If you have any questions, call our Service Team at: 888-852-2778.

Installation Instructions

the Watt Stopper®

Santa Clara, CA 95050

The Smartwired™ Switching System is a highly distributed lighting control system. Because of this, the quality of the dataline and dataline connections is key to installing a trouble-free system.

Definitions

Global Dataline

Panel-to-panel dataline provides system communications across the network.

Local Dataline

Panel-to-switch (or accessory device) dataline. All devices powered by a single panel are on its Local Dataline.

Dataline Requirements

Total Length

The entire dataline (Local *plus* Global) is not to exceed 500 meters (1640 feet).

Dataline Specification

Two separate twisted pairs, 18 AWG, non-shielded. One twisted pair should be colored red/black. This pair carries the data. The other pair should be colored blue/white. This pair carries the 24 VAC power. (Note:VAC, not half-wave or DC).

The Watt Stopper® offers dataline for the Smartwired™ Switching System as HDLW4P (plenum-rated) or HDLW4 (non-plenum) as specified below.

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

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.

Because communication errors are time-consuming to diagnose and correct, it is unwise to substitute non-conforming dataline.

The Watt Stopper® will not warrant a system installed with dataline that does not conform to the specification.

Diagnosing Dataline Problems

Confirm Wire Type

First, verify that the dataline installed is either The Watt Stopper® HDLW4 or HDLW4P, or that it conforms to the specification as shown in the table below.

Confirm Wire Is Non-shielded

If shielded wire is installed, and the shield is grounded, noise may be injected onto the dataline. If this situation is encountered, the contractor may be able to restore proper dataline communications by clipping and taping over all shields. However, conforming to the wire specification is the best way to ensure proper dataline operation. Shielded dataline is not warranted.

Confirm Wire Has Two Twisted Pairs

The most common type of cable is four-conductor, 18 AWG. This is not acceptable, as it is not twisted-pair cable. When standard twisted pair is used, it is very common for the color codes to be different, such as one black wire in each pair. If this type of wire is used, it is quite easy to mix the power and data connections. (Note: This will not harm the dataline devices/switches, but it will keep them from working.)

Confirm Dataline Communications

The first step in testing the dataline is to quickly determine if there is communication between an end point (usually a switch unit) and the starting point at the panel. You can do this in two ways:

1. By using the Diagnostics function of the HCLK8SS Network Clock. Detailed instructions for Diagnostics can be found on page 14 of document **INHCLK-S, Network Clock – Scheduling Mode – Installation and Setup**.
2. By smartwiring a dataline switch. (refer to Figure 6 on page 4 of document INHDLS, Smartwired™ Dataline Switch Installation and Operation). If the smartwiring function will not work, there may be a problem with the dataline.

If either or both of these methods indicates a dataline problem, check dataline power and data connections as follows:

Check Dataline Power

1. Observe the power on the blue/white pair. It should be between 20VAC and 30VAC. If it is lower than 20 VAC, or missing, suspect a dataline issue (at least with the power pair).
2. Observe the locator LED of the switch. Is it glowing yellow? If not, suspect a power issue.
3. Observe the LEDs next to each switch button. Do they light up when you press that button? If not, suspect a power issue.

If there is no power to the switch, check the power connections.

Check Dataline Connections

CAUTION! Power down all devices before running the following tests. If there are any repeaters on the dataline, this test may not work.

You will not be able to measure any voltage on the red/black pair that carries data. You may want to diagnose this pair by performing a temporary loop resistance test. At the origin of the local dataline (in the relay panel), take the red wire off the screw terminal and put it under the black screw terminal, shorting out red and black. Go to the furthermost point of that local dataline and read the resistance between red/black. It should be under 30 ohms total. If it is higher, or an open circuit, then there is a bad connection or break somewhere downstream on the dataline. (Note that 18AWG twisted pair has a resistance of 13 ohms per thousand feet. The screw terminals themselves also add a small amount of resistance).

You may want to test the blue/white pair the same way (by shorting and measuring loop resistance).

If you have a long run of local dataline with many switches (30 or more), both length and resistance become issues. It is critical that all connections be perfect for a long local dataline to work. You may be able to get around sub-standard dataline by attaching another run to the end point.

We recommend that you distribute the local dataline devices relatively evenly among the available panels and accessory boxes.

Dataline Switch Issues

Check Switch Power

Is there power to the switch unit? Observe that the yellow locator light is lit. Press the "Smartwire" tab, and observe the flashing of all red LEDs. If neither item functions, suspect a wiring issue with power.

Confirm Switch Communications

Is the switch communicating over the network? When you press the SMARTWIRE tab on a switch, all panels in the network should blank-out (have no relay state indicator LEDs glowing) except for any panel that the button was previously programmed to control. While still in the Smartwiring mode, press any white Relay Control Button or gray Channel Push Button inside a panel (we recommend trying the panel whose Local Dataline the switch in question is wired to). The corresponding LED should flash red. If the LED doesn't respond, suspect a dataline issue.

Confirm Smartwiring

Is the switch smartwired to the appropriate relays or channel? Verify that the switch is smartwired as planned on the Dataline Switch Documentation form. Check as follows:

1 Press each switch button in turn and observe the relays that turn on or off in the panels.

2 If there is no response, begin to smartwire the button in question by pressing the "Smartwire" tab, then observing the flashing LEDs in the panel(s). Confirm that the relays to be controlled are flashing red. If no relays are flashing, press the white relay control button next to the relays to be controlled. If they do not flash, there may be a communication issue with the dataline, as described above. If any LEDs are flashing green, they have been smartwired as part of a Pattern (see p.6 of document INHDLS). Verify that this is what the switch should be programmed to do. Make changes as necessary by pressing the white relay control buttons in the panel. Press the "Smartwire" tab again to confirm changes. Test the button again as in step 1.

3 Alternatively, if the panels and switch cannot be easily checked at the same time due to their installed locations, use the Network Clock's Switch Programming function to verify that the switch was properly programmed as described below:

Problem: The switch doesn't operate after being programmed by the Clock

Verify that the switch was properly programmed. Review each step using the Clock unit, and verify the correct data by observing the screen (see document **INHCLK-P, Network Clock – Programming Mode** under the **Clock** tab).

Verify that the panel's address switches are set to the correct number (see page 4 of document **INHINSS, Smartwired™ Switching System Interior Installation and Setup** under "Panel Addressing"). If the address is correct, then verify that there is one, *and only one*, Panel #01 in the system. If all of these steps check out, then suspect a dataline problem.

Problem: The switch doesn't operate as expected

Verify the DIP switch settings on the back of the switch unit. Details on the DIP switch configurations can be found on page 7 of document **INHDLS**. The default setting for every switch unit is Master Off/Restore, where all four DIP switches are depressed towards the ON position. ON is the side of the switch that has the numbers 1 2 3 4 on it.

The first two DIP switches control the operation of the Master Button. Available options are: All Off/Restore (default), All Off/All On, Off Only or Disabled. The third DIP switch selects the Cleaning Mode when depressed towards the OFF position (see page 8 of document **INHDLS**).

If all programming has been verified and the switch still doesn't operate as expected, measure between the red and white, then black and white, screw terminals of the switch. There should be no continuity. If there is, replace the switch.

Diagnosing Clock Issues

Confirm Clock Communications

Is the Clock communicating over the dataline? Verify that the dataline is working correctly by observing that channels change state as planned and switches work properly. You can simulate Clock events by changing the time of day using the Clock setup screen. Set the Clock two minutes before occupancy begins and verify that lights turn on (if automatic ON is selected). Set the Clock two minutes before the end of occupancy and verify that lights turn off. Verify that Channel states are updated correctly on the Clock display with each actual change of state.

Problem: The Astronomical Timeclock feature is not working as expected

Verify that the day/date/time is set correctly. Verify that the location is set to the closest city in your time zone. You can see the predicted time of sunrise/sunset on the DST SETUP screen. The day/time/date and location must be set properly before that screen will be correct.

Verify the version of Clock software is at least 2.0. Press the HELP button on the keypad to see the ROM version of the Clock. If it is not at least 2.0, call service for an upgrade.

Problem: I changed the Clock time and now it's not operating as expected

Due to the way the panel and Clock are designed to power up, you may have to run the system through a day change for everything to synch up. To avoid this synching issue, simulate a day's schedule events by changing the time on the Clock. First, in the "Setup" screen, set the Clock's time to a few minutes before normal "On" (occupied), then let it run a minute past occupancy. Next, set the time to a few minutes before normal "Off" (unoccupied), and let it run a minute past unoccupancy. Finally, set the Clock back to the proper time. You should see lights turning on and off in response to the change of occupancy (again, assuming you've chosen the Auto On scenario).

Problem: Lights are turning off in the middle of the day

Verify that occupancy times are set correctly. Times must be entered in 24-hour format (military time), so 6:00 p.m. must be set to 18:00, not 06:00. Also note that the Clock permits two sets of Occupied times per day, allowing for a mid-day "unoccupied" period.

Check the Time Delay field in the Channel Scheduling Screen (Figure 16 on page 9 of document **INHCLK-S, Network Clock – Scheduling Mode – Installation and Setup**) to see if time delays have been programmed.

It may be that the panels think they are unoccupied, and are not hearing the Clock say occupied. Again suspect a communication issue. Test communications between the Clock and each panel using the Diagnostics routines, or simulate the schedules by changing times on the Clock.

Problem: Lights are turning off or on in the middle of the night, but that wasn't the plan

See the "Time Spanning" tips on page 13 of document **INHCLK-S**.

Diagnosing Panel Issues

There must be one — and only one — Panel #01 in every Smartwired™ Switching System. Verify that all panels are uniquely numbered, with no duplicates.

Check The Power Supply

Observe the power LED next to the power connector. If it is blinking, the motherboared is defective and should be replaced. If the LED is off, first verify the power supply. Do this by measuring the voltage produced by the power supply with the cable removed from the motherboard. You should read approximately 24 VAC between the upper two pins, and the same between the lower two pins. If the power supply passes this test, replace the motherboard.

Observe the "Service" LED (visible through a hole in the black cover). It should be off normally. It would light briefly if you press the push-button next to it. If it is flashing, replace the upper PC board.

Verify the correct programming of channels and operation of relays by using the white override buttons.

If you have followed these recommended procedures and are still experiencing system difficulties, call our Service Team at 888-852-2778.