



# **Application Directory**

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# Contents

<b>INTRODUCTION.....</b>	<b>IV</b>
<b>CHAPTER 1: LIGHTING CONTROL.....</b>	<b>1-1</b>
Brighten or Dim a Light over an Extended Time Period.....	1-3
Brighten or Dim a Light for a Few Minutes When Motion Detected.....	1-5
Foyer Light On for a Specified Time When the Front Door Opens, If Dark.....	1-7
Making the House Look Lived-In While on Vacation.....	1-9
Enhanced Security with X-10 Spot Lights.....	1-11
Toggling an ALC Dimmer from a 4-Button Scene Switch.....	1-13
Flashing Lights for Hearing Impaired.....	1-15
<b>CHAPTER 2: APPLIANCE CONTROL.....</b>	<b>2-1</b>
Bathroom Heater on During Cold Weather.....	2-3
Cycling a Fan (or Other Unit) On and Off.....	2-5
Automate an Electric Start Gas Fireplace.....	2-7
Zoned Sprinkler Systems.....	2-11
Interfacing to a Jandy Aqua-Link System.....	2-15
Rain8Net Sprinkler Control.....	2-18
<b>CHAPTER 3: SECURITY.....</b>	<b>3-1</b>
Disarm Security by Time Schedule.....	3-3
Disarm Security by Time Schedule.....	3-3
Connecting an ITI Quick Bridge™ Loop Receiver for Wireless Control.....	3-5
Bypassing and Restoring a Zone without Disarming the Security System.....	3-7
Using Polarity Reversal to Activate Sounders on Smoke Detectors.....	3-9
Report a Code to the Central Station When an Event Occurs.....	3-10
Report a Code to the Central Station When an Event Occurs.....	3-11
Replacing Existing Security System which Uses Different End-Of-Line Resistors.....	3-13
Using 2-Wire Smoke Detectors.....	3-14
Using 2-Wire Smoke Detectors.....	3-15
Installing a ESL 405-03 Reversing Relay Module.....	3-17
Audible Notification Based on Multiple Zone Trips.....	3-19
Integration of a Street Smart Code Encryptor For Wireless Remote Control.....	3-21
<b>CHAPTER 4: BUTTONS / MACROS / SCENES.....</b>	<b>4-1</b>
Create a Button for “Guests Arriving”.....	4-2
Create a Specialized “ALL OFF” Button.....	4-4
Programming a 6-button UPB room controller (HAI model #38A00-1) to control 4 individual loads.....	4-5
Programmable Button Timer.....	4-7
<b>CHAPTER 5: TEMPERATURE CONTROL.....</b>	<b>5-1</b>
Schedule Omnistat to Desired Temperatures Before Occupant Returns.....	5-2
Set Back Omnistat Desired Temperatures When Security Armed Away.....	5-4
Adjust Omnistat Temperatures When an X-10 Signal is Transmitted.....	5-6
Install a Remote Temperature Sensor to any HAI Omnistat.....	5-8
Turn Omnistat Off When any Window Opens, Back On When all Windows Close.....	5-11
Turn Omnistat Off When any Window Opens, Back On When all Windows Close.....	5-13

<b>CHAPTER 6: AUDIO / VIDEO / INFRARED .....</b>	<b>6-1</b>
Pause CD Player When Telephone Goes “Off – Hook” .....	6-3
Transmit Infrared Signals With a SmartLinc™ B.I.R.D. ....	6-5
Transmit / Receive Infrared Signals with an Adicon CPU-XA or Ocelot Controller .....	6-9
Interface a Philips Pronto Intelligent Remote Control with an HAI Controller .....	6-15
Interfacing the ELAN VIA Touchscreen .....	6-19
 <b>CHAPTER 7: ENERGY MANAGEMENT .....</b>	 <b>7-1</b>
Schedule Water Heater Operation to Save Energy .....	7-3
Adjust Omnistat Settings from Energy Efficient To Comfortable for 30 Minutes .....	7-5
Connecting HAI Omnistats to a Trol-A-Temp TotalZone® for Zoned Temperature Control .....	7-7
Connecting HAI Omnistats to a DuroZone® SMZ™ for Zoned Temperature Control .....	7-8
Connecting HAI Omnistats to a DuroZone® SMZ™ for Zoned Temperature Control .....	7-9
Control High Current Devices and Manage Power Consumption with a Cutler-Hammer Power Manager .....	7-10
Control High Current Devices and Manage Power Consumption with a Cutler-Hammer Power Manager .....	7-11
 <b>CHAPTER 8: TIPS AND TRICKS .....</b>	 <b>8-1</b>
Making the Console LCD Display Backlight Stay On at All Times .....	8-3
Modify Omni/OmniPro Phone Circuit to Work Without a Live Phone Line .....	8-5
Modify OmniLT Phone Circuit to Work Without a Live Phone Line .....	8-7
Multiple 54A00-1 Outdoor Access Keypads .....	8-9
 <b>CHAPTER 9: MESSAGING .....</b>	 <b>9-1</b>
Sending a Numeric Message to a Digital Pager .....	9-3
Display a Reminder Message on Console When Cold Outside .....	9-5
Children’s Room Exit Notification .....	9-7
Announcing Zones Opening and Closing Over a Speaker .....	9-9
 <b>APPENDIX A: PROGRAMMING CONVENTIONS .....</b>	 <b>A-1</b>
Programs with Multiple Conditions .....	A-3
Button Execution Order .....	A-5
About Flags .....	A-7
Using a Flag as a Timer .....	A-9
Creating a Sequencing Program .....	A-11
Toggling a Flag Using One Button .....	A-13
Timing Units .....	A-15
Odd/Even Day Programming via Sprinkler System Example .....	A-17
 <b>APPENDIX B: TROUBLESHOOTING .....</b>	 <b>B-1</b>
Troubleshooting PC Access for DOS .....	B-3
Zone Input Readings .....	B-7
Thermostat Application Guide .....	B-9
X-10 Transmission Speed When Running a Macro .....	B-13
Calculating Sunrise/Sunset for Locations East of the Prime Meridian .....	B-15
Power Requirements for RC-Series Thermostats .....	B-17



# Introduction

## HAI Applications Directory

HAI is a leading manufacturer of integrated control and security products for residential and small commercial applications. Our products offer superior performance and programming flexibility. This directory was produced to help our Authorized Dealers take advantage of that power.

The directory is divided into several sections that address the primary subject involved, such as lighting control. You can look for the individual topics within these categories. There are also some very useful Appendices that contain information on troubleshooting of systems and programming as well as the programming conventions that our systems are based upon. We strongly recommend that you start by familiarizing yourself with this information.

Our technical staff is available to help you with any questions about these applications and can be reached at our Toll Free number, 800-229-7256, during normal business hours, 9:00AM-5:00PM CST, Monday – Friday.



**The Value Leader in Home Automation**

## DO YOU HAVE AN APPLICATION IDEA?

If you have an application that you want to see addressed or have already worked out for yourself, let us know. If we use it, we will send you a **FREE** HAI T-SHIRT!!!

Just send us the application or idea along with your name, company, address, and phone number to:

[support@homeauto.com](mailto:support@homeauto.com)







# Chapter 1: Lighting Control

- [Brighten or Dim a Light over an Extended Time Period](#)
- [Brighten or Dim a Light for a Few Minutes when Motion Detected](#)
- [Foyer Light On for a Specified Time When the Front Door Opens, If Dark](#)
- [Making the House Look Lived-In While on Vacation](#)
- [Enhanced Security with X-10 Spot Lights](#)
- [Toggling an ALC Dimmer from a 4-Button Scene Switch](#)
- [Flashing Lights for Hearing Impaired](#)



## Brighten or Dim a Light over an Extended Time Period

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to brighten a light from 0-100% over 45 minutes. We use one flag to set the overall timeframe and another to trigger a 10% brighten command every 5 minutes within the overall time frame.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina or Lumina Pro controller with X-10 TW523, UPB Powerline Interface or compatible Two-Way Powerline Interface.
- b) Any X-10 or UPB compatible lamp or wall switch module capable of dimming and brightening.

**\*\*SPECIAL NOTE\*\*** When sending a brighten command to a standard X-10 module that is currently OFF, the module will respond by coming ON to 100%. This is not what we want for the following example, so we must PRESET the module to be ON, but dimmed 100%. Another option is to specify a Powerline Control Systems Module that is capable of responding to a brighten command from OFF.

#### 2. Setup:

- a) Select a name for the module and enter under "Setup, Names, Units". We will call ours "Bedroom".
- b) Select an unused unit number from the flag range (#'s 29-36 in OmniLT, 41-64 in Omni, 201-255 in OmniPro, 73-128 in Omni II/Omni IIe, and 393-511 in the OmniPro II) to be the overall timer and name it as above for clarity while programming. We will call ours "Bright Flag".
- c) Select another unused flag to be the cycle timer and name it as well. We will call ours "Timer 1".
- d) Select a user button to be the trigger for these programs and name it. We will call ours "Slow Bright".

### Programming:

The objective is to slowly brighten a light over an extended period of time. In this example we will bring a light up from Off to 100% over 45 minutes. HAI controllers are capable of sending brighten or dim commands in 10% increments so we will send one brighten command every 5 minutes for the 45 minute duration.

The process is initiated with the button "Slow Bright". The first flag, "Bright Flag" is turned on for 45 minutes when "Slow Bright" is run, followed by turning on "Timer 1" for 5 minutes. The change in state of "Timer 1" is the trigger to send a brighten command to our light. We will continue to cycle "Timer 1" on and off while the "Bright Flag" remains on. The result is that over 45 minutes, this process will send 9 brighten commands and our light will be at 100%.

Here's how the programs will look:

- ```
1) WHEN Slow Bright: Bright Flag ON FOR 45 MINUTES
   ^ (WHEN)           ^ (COMMAND)

2) WHEN Slow Bright: Timer 1 ON FOR 5 MINUTES
   ^ (WHEN)           ^ (COMMAND)

3) WHEN Timer 1 ON: Bedroom BRIGHT 1
   ^ (WHEN)           ^ (COMMAND)
```

4) WHEN Timer 1 OFF &IF Bright Flag ON: Timer 1 ON FOR 5 MINUTES  
^ (WHEN) ^ (CONDITION) ^ (COMMAND)

Now we can program the occasions when we want to use this process. Maybe as part of a Wake-Up routine or starting at Sunset to brighten an inside light while it gets steadily darker outside. An example would be:

SUNSET MTWTFSS: RUN Slow Bright  
^ (WHEN) ^ (COMMAND)

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II

While the 3-minute time delay is in effect any subsequent trips of the motion detector will NOT affect the brightness level of the light, but merely reset the time delay to the original 3 minutes. Finally, 3 minutes after the last motion is detected, the light will DIM back down to await the next command.

## Foyer Light On for a Specified Time When the Front Door Opens, If Dark

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to turn a foyer light on when the front door is opened and if it is dark (after sunset), then off a few minutes after the door is closed.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina or Lumina Pro controller with X-10 TW523, UPB Powerline Interface or compatible Two-Way Powerline Interface.
- b) Any X-10 or UPB compatible lamp or wall switch module.

#### 2. Setup:

- a) Select a name for the module and enter under "Setup, Names, Units". We will call ours "Foyer Light".
- b) Select a name for the zone and enter under "Setup, Names, Zones". We will use "Front Door".

#### 3. Installation:

- a) Connect door contact to any unused zone on HAI Controller and set up zone to be "Entry/Exit" which is a security type zone (protection when the security system is armed – lighting control when it is dark).

### Programming:

The objective is to turn on the Foyer Light when the Front Door is opened if it is dark outside (after sunset). We will have the light stay on for 5 minutes after the door closes. This can be helpful if someone is returning home with groceries and would like the light to remain on while they are carrying in the groceries. The light will then automatically turn off 5 minutes after the final trip inside and the door is closed.

Here's how the programs will look:

- 1) WHEN FRONT DOOR NOT READY &IF DARK:      Foyer Light ON  
    ^ (WHEN)                      ^ (CONDITION)      ^ (COMMAND)
- 2) WHEN FRONT DOOR SECURE &IF DARK:      Foyer Light ON FOR 5 MINUTES  
    ^ (WHEN)                      ^ (CONDITION)      ^ (COMMAND)

When the Front Door is opened and if it is dark, the Foyer Light will come On indefinitely. After the door is closed, the light will remain On for 5 minutes, then turn Off.





## Making the House Look Lived-In While on Vacation

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to turn on and off lights and appliances at different times and on different days to make the house lived in while on vacation.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina or Lumina Pro controller with X-10 TW523, UPB Powerline Interface or compatible Two-Way Powerline Interface.
- b) X-10 or UPB compatible lamp, appliance, and wall switch modules.

#### 2. Setup:

- a) Select a name for the modules and enter under "Setup, Names, Units". We will call our units as follows: "Foyer Light - Den Light - Bedroom Lamp – Hall Lamp – Den Stereo – Bedroom TV".

### Programming:

We will turn certain units on at different times on different days to give the house the appearance of someone moving about.

Note: The security mode must be set to Vacation for these programs to take effect.

Here's how the programs will look:

- 1) SUNSET -T-TF-S &IF VACATION: FOYER LIGHT ON FOR 45 MINUTES  
    ^ (WHEN)           ^ (CONDITION) ^ (COMMAND)
  - 2) WHEN FOYER LIGHT OFF &IF VACATION: DEN LIGHT ON FOR 90 MINUTES
  - 3) SUNSET M-W--S- &IF VACATION: DEN LIGHT ON FOR 3 HOURS
  - 4) 7:00 PM MTW--SS &IF VACATION: DEN STEREO ON FOR 2 HOURS
  - 5) 7:45 PM -T-TF-- &IF VACATION: HALL LAMP ON FOR 1 HOUR
  - 6) 8:15 PM M-W---S &IF VACATION: HALL LAMP ON FOR 90 MINUTES
  - 7) WHEN HALL LAMP OFF &IF VACATION: BEDROOM LAMP ON FOR 1 HOUR
  - 8) 10:00 PM ----FS- &IF VACATION: BEDROOM LAMP ON FOR 75 MINUTES
  - 9) WHEN BEDROOM LAMP ON &IF VACATION: BEDROOM TV OFF FOR 15 MINUTES
- Fifteen minutes after the Bedroom Lamp turns On, the Bedroom TV will turn On. The Bedroom TV will remain On until the next scheduled time.
- 10) 10:30 M-W---S &IF VACATION: BEDROOM TV OFF
  - 11) 11:25 ----FS- &IF VACATION: BEDROOM TV OFF



## Enhanced Security with X-10 Spot Lights

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

The best way to deter crime at night is with light. By integrating X-10 based Flood Light Motion Detectors, a system can provide a greater level of security with a small investment. The following information shows how to seamlessly integrate the X-10 Pro PHS01 Floodlight Motion Detector.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni Ile, OmniPro/OmniPro II, Lumina or Lumina Pro controller.
- b) X-10 Pro PHS01 Floodlight Motion Detector(s)

#### 2. Installation:

- a) Install the OmniLT, Omni/Omni II/Omni Ile, or OmniPro/OmniPro II controller.
- b) X-10 Pro PHS01 Floodlight Motion Detector(s)
  - 1) Set the primary control address (F1 – F4 is used below for 4 floodlights)
  - 2) Set operation mode to 'dusk'
  - 3) Set 'Time Delay' to '0.1'
  - 4) For the example below set the following (for use with 4 motion detectors)
    - (a) Set Sensor '+1' to '+3' for Out
    - (b) Set Sensor '+4' to In
    - (c) Set Dusk '+5' to '+7' to Out
    - (d) Set Dusk '+8' to In

### Programming:

The X-10 Pro floodlight has 2 mutually exclusive operating modes. The first mode, "sensor", is designed to turn the floodlights on any time motion is detected. The second selection is "dusk" which turns the light on at dusk and off at dawn. There is no selectable option for turning the light on only when dark. During cold months this can result in undesired operation during the daytime. During hotter weather this is not an issue because the motion detector is desensitized and often will not see motion. By integrating the floodlights with an OmniLT, Omni/Omni II/Omni Ile, or OmniPro/OmniPro II, the desired operation of 'only at night' can be achieved. In addition, the HAI controller gains the ability to know when it is actually light or dark which can be used in conjunction with the sunrise /sunset calculation.

The following program is designed with the following parameters:

- 1. Turn floodlights on and off when motion occurs after dark.
- 2. Provide manual operation that allows a user to turn a floodlight on. Once a light is manually turned on the 5 minute automatic turnoff is defeated. When the light is manually turned off the automatic motion sequence is reactivated.

The following lines keep track of manual operation of the floodlights. It is recommended that a Leviton 6400 series transmitter or equivalent is installed to provide convenient direct control of spotlights. In the example below Spots 1-4 are assigned addresses F1 – F4.

1. WHEN X-10 F-1 ON: Spot #1 Flag ON
2. WHEN X-10 F-2 ON: Spot #2 Flag ON
3. WHEN X-10 F-3 ON: Spot #3 Flag ON
4. WHEN X-10 F-4 ON: Spot #4 Flag ON
5. WHEN X-10 F-1 OFF: Spot #1 Flag OFF
6. WHEN X-10 F-2 OFF: Spot #2 Flag OFF
7. WHEN X-10 F-3 OFF: Spot #3 Flag OFF
8. WHEN X-10 F-4 OFF: Spot #4 Flag OFF
9. WHEN X-10 F-ALL ON: Spot #1 Flag ON
10. WHEN X-10 F-ALL ON: Spot #2 Flag ON
11. WHEN X-10 F-ALL ON: Spot #3 Flag ON
12. WHEN X-10 F-ALL ON: Spot #4 Flag ON
13. WHEN X-10 F-ALL OFF: Spot #1 Flag OFF
14. WHEN X-10 F-ALL OFF: Spot #2 Flag OFF
15. WHEN X-10 F-ALL OFF: Spot #3 Flag OFF
16. WHEN X-10 F-ALL OFF: Spot #4 Flag OFF

The X-10 command (F1 – F4) will automatically turn the appropriate light on or off. The HAI controller will see the transmission and update the “Spot Flag”. Each time motion is detected the floodlight sends an X-10 signal (F5 - F8). When motion is detected, the “Spot Flag” is viewed to determine if the 5 minute counter should start. If the flag is “on” the program line is disregarded. When the flag is “off” the panel will send an on command and start a 5 minute timer. Each time motion is sensed, an X-10 signal is sent from the floodlights and the HAI controller will reset the 5 minute timer. Once 5 minutes transpire with no motion, the floodlight is turned off.

17. WHEN X-10 F-5 ON &IF Spot #1 Flag OFF: Spot #1 ON FOR 5 MINUTES
18. WHEN X-10 F-6 ON &IF Spot #2 Flag OFF: Spot #2 ON FOR 5 MINUTES
19. WHEN X-10 F-7 ON &IF Spot #3 Flag OFF: Spot #3 ON FOR 5 MINUTES
20. WHEN X-10 F-8 ON &IF Spot #4 Flag OFF: Spot #4 ON FOR 5 MINUTES

Since the floodlights are set to “On at Dusk” they will automatically turn on and send an X-10 signal (F9 – F12) when the photocell senses dusk. Programs can be written based on reception on the X-10 On (dusk) / Off (dawn) instead of the HAI sunrise / sunset calculation if desired. The following lines will turn the spotlights back off immediately after the dusk sensor turns them on. This will result in a quick flash from each spotlight at dusk.

21. WHEN X-10 F-9 ON: Spot #1 OFF
22. WHEN X-10 F-10 ON: Spot #2 OFF
23. WHEN X-10 F-11 ON: Spot #3 OFF
24. WHEN X-10 F-12 ON: Spot #4 OFF

## Toggling an ALC Dimmer from a 4-Button Scene Switch

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

To toggle an ALC unit using a 4 button ALC scene switch and programming within the HAI controller.

### Installation:

#### 3. Equipment:

- c) OmniLT, Omni II/Omni IIe, OmniPro II, Lumina, or Lumina Pro controller set up to control ALC units.
- d) ALC Scene Switch and ALC switch.

#### 4. Setup:

- e) Select a name for the Scene Switch and enter under "Setup, Names, Units". We will call ours "Upstairs".
- f) Select a name for the switch and enter under "Setup, Names, Units". We will call ours "Bedroom".
- g) **\*\*Only for solutions 2-4\*\*** Select an unused unit number from the flag range (#'s 29-36 in OmniLT, 41-64 in Omni, 201-255 in OmniPro, 73-128 in Omni II/Omni IIe, and 393-511 in the OmniPro II) to be the overall timer and name it as above for clarity while programming. We will call ours "Toggle Flag"

### Programming:

The objective is to toggle an ALC unit on/off by pressing a single button on a 4-button scene switch. HAI controllers with firmware version 2.9 or later are capable of toggling a unit. Solution #1 will show how to use the toggle feature. Solutions 2-4 will be for firmware versions 2.8 or earlier.

Here's how the programs will look:

#### Solution #1

```
WHEN Upstairs SW1 PRESSED: TOGGLE Bedroom
^ (WHEN)                      ^ (COMMAND)
```

#### Solution #2

- 1) WHEN Upstairs SW1 PRESSED: Bedroom ON  
^ (WHEN) ^ (COMMAND)
- 2) WHEN Bedroom ON: Toggle Flag ON  
^ (WHEN) ^ (COMMAND)
- 3) WHEN Upstairs SW1 PRESSED &IF Toggle Flag ON: Bedroom OFF  
^ (WHEN) ^ (COMMAND)
- 4) WHEN Bedroom OFF: Toggle Flag OFF  
^ (WHEN) ^ (COMMAND)

### Solution #3

- 1) WHEN Upstairs SW1 PRESSED &IF Bedroom ON: Bedroom ON FOR 1 SECOND  
^       (WHEN)                                     ^       (COMMAND)
- 2) WHEN Upstairs SW1 PRESSED &IF Bedroom OFF: Bedroom ON  
^       (WHEN)                                     ^       (COMMAND)

### Solution #4

- 1) WHEN Upstairs SW1 PRESSED &IF Bedroom ON: Toggle Flag OFF  
    ^         (WHEN)                                  ^         (COMMAND)
- 2) WHEN Upstairs SW1 PRESSED &IF Bedroom OFF: Toggle Flag ON  
    ^         (WHEN)                                  ^         (COMMAND)
- 3) WHEN Toggle Flag OFF: Bedroom OFF  
    ^         (WHEN)                                  ^         (COMMAND)
- 4) WHEN Toggle Flag ON: Bedroom ON  
    ^         (WHEN)                                  ^         (COMMAND)

**Compatible Controllers:**

OmniLT  
 Omni / Omni II / Omni IIe  
 OmniPro / OmniPro II  
 Lumina / Lumina Pro

## Flashing Lights for Hearing Impaired

### Application:

This article outlines the steps necessary to create a routine which will flash the lights when an event happens. This can be very useful for a hearing-impaired customer, who can be alerted when the doorbell rings or the TTY device receives an incoming phone call. The steps shown here are for use in PC Access - similar steps can be used if programming is done on a console or touchscreen.

### Installation:

#### 1. Equipment

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina, or Lumina Pro controller.
- b) Solution #1, HLC lighting with firmware 2.15a or higher in the HAI controller.
- c) Solution #2, any lighting system that is supported by the HAI controller.

#### 2. Setup

- a) Wire a doorbell to a zone.
- b) Under Setup>>Names/Voices>>Zones, name the zone DOORBELL.
- c) **\*\*Solution 2 Only\*\*** Under Setup>>Names/Voice>>Units, name two flags:
  1. Fl duration – this will be used to determine the duration of the flashing lights.
  2. Flash – this is used to time each on and off pulse of the lights.

### Programs:

#### Solution #1

In this example the blink command that was added in the 2.15 firmware will be used. The only draw back with this feature is that you cannot blink all of the units in an entire room by simple sending a command to the room controller, you would have to select each unit individually.

The programming should be as follows:

```
WHEN Doorbell NOT READY: Hall Light BLINK (1.00) FOR 8 SECONDS
WHEN Doorbell NOT READY: Kitchen Light BLINK (1.00) FOR 8 SECONDS
```

#### Solution #2

For the purpose of this example, we will use HLC units 1 and 9 (Scene Switches named “Public Space” and “Bedrooms”). This will allow all units in rooms 1 and 2 to follow the routine, providing a better visual effect.

The minimum time per on or off state for lights is two seconds – a complete on/off cycle will take four seconds.

The remaining steps are taken in Setup>Programs, and should look like this when complete:

```
WHEN Doorbell NOT READY: Fl duration ON FOR 8 SECONDS
WHEN PHONE RINGING: Fl duration ON FOR 12 SECONDS
WHEN Fl duration ON: Flash ON FOR 2 SECONDS
WHEN Flash OFF &IF Fl duration ON: Flash ON FOR 2 SECONDS
WHEN Flash ON: Public Space TOGGLE
WHEN Flash ON: Bedrooms TOGGLE
```





# Chapter 2: Appliance Control

- [Bathroom Heater on During Cold Weather](#)
- [Cycling a Fan \(or Other Unit\) On and Off](#)
- [Automate an Electric Start Gas Fireplace](#)
- [Zoned Sprinkler Systems](#)
- [Interfacing to a Jandy Aqua-Link System](#)
- [Rain8Net Sprinkler Control](#)



## Bathroom Heater on During Cold Weather

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to specify the occasions when an electric space heater is timed to operate. The two conditions used are outdoor temperature and the occupancy of the residence based on security mode.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina, or Lumina Pro controller with X-10 TW523, UPB Powerline Interface or compatible Two-Way Powerline Interface.
- b) Any X-10 or UPB compatible appliance or split receptacle module.
- c) HAI Model 14A00 Outdoor Temperature Sensor.

#### 2. Hookup:

- a) Install the module in bathroom location and set to the proper address. Plug electric space heater into module making sure that your heater does not exceed maximum current rating of the module.
- b) Install HAI Model 14A00 Outdoor Temperature Sensor in appropriate location under eaves or other protected area outside of house. Connect to HAI Controller at AUX 12VDC for power and the "+" side of any unused zone. See Installation Manual, Page 21. (For this example we will use Zone 9, but any will do)

#### 3. Setup:

- a) Select name for module in bathroom and enter under "Setup, Names, Units".
- b) Define the zone type where the 14A00 is connected (Zone 9 in this example) as "Outdoor Temperature" under "Installer Setup, Zones".
- c) Select an appropriate outdoor temperature to serve as the low threshold for turning on the bathroom heater. Enter this value under "Temperatures" from the console. (For this example we set LOW to 45)

### Programming:

The objective here is to turn on the bathroom heater for 30 minutes on weekday mornings, but **ONLY** when there is someone home AND the outdoor temperature is cold (below 45 degrees). These are TWO separate conditions and since each program can only contain ONE condition we must use TWO PROGRAMS to accomplish the goal. In order to get from one program to the next we use a "Button". We have chosen the "NIGHT" mode of security to indicate that someone is home and will use the status of the outdoor temperature zone. When the temperature outside is below the "LOW" setting stored in the controller, then we consider the zone to be "Not Ready".

Here's how the programs will look:

- ```
1) 7:00 AM MTWTF-- &IF ZONE 9 NOT READY (outdoor temp below 45): RUN BUTTON 100
   ^ (WHEN)           ^ (CONDITION)                               ^ (COMMAND)

2) WHEN BUTTON 100 &IF NIGHT (ARMED IN NIGHT: Someone Home): UNIT 5 ON FOR 30M
   ^ (WHEN)           ^ (CONDITION)                               ^ (COMMAND)
```



## Cycling a Fan (or Other Unit) On and Off

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to create a cycle routine for a ceiling fan.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni Ile, OmniPro/OmniPro II, Lumina, or Lumina Pro controller with X-10 TW523 or compatible Two-Way Powerline Interface.
- b) Any X-10 compatible appliance or wall switch module capable of switching an inductive load.

**\*\*SPECIAL NOTE\*\*** Some manufacturers of X-10 compatible modules can supply a type that will “Dim” or “Brighten” an inductive load. These will work with low voltage lighting that uses transformers as well as to control the speed of a ceiling fan. You might want to consider one of these for this application.

#### 2. Setup:

- a) Select a name for the X-10 module and enter under “Setup, Names, Units”. We will use “Bedroom Fan”.
- b) Select an unused unit number from the flag range (#’s 29-36 in OmniLT, 41-64 in Omni, 201-255 in OmniPro, 73-128 in Omni II/Omni Ile, and 393-511 in the OmniPro II) to be the cycle timer and name it as above for clarity while programming. We will call ours “Cycle Timer”.

### Programming:

The objective is to have our bedroom fan cycle ON FOR 20 MINUTES and then OFF FOR 90 MINUTES while the system is in the AWAY mode of security to help stabilize the temperature in the home. This will also reduce the amount of time that the Heating/Cooling will run, giving increased energy savings.

The process is initiated when the system is armed in the AWAY mode of security. At that moment we turn the Cycle Flag OFF which starts the cycle sequence running. We then look at the mode of security to determine whether to continue running the cycle.

Here’s how the programs will look:

- 1) WHEN AWAY: Cycle Flag OFF  
    ^ (WHEN)      ^ (COMMAND)
- 2) WHEN Cycle Flag OFF &IF AWAY: Bedroom Fan ON FOR 20 MINUTES  
    ^ (WHEN)                      ^ (CONDITION)      ^ (COMMAND)
- 3) WHEN Bedroom Fan OFF &IF AWAY: Cycle Timer ON FOR 90 MINUTES  
    ^ (WHEN)                      ^ (CONDITION)      ^ (COMMAND)

This cycle will continue to run for as long as the security remains in the AWAY mode, but will stop after the security mode changes to something other than AWAY.



## Automate an Electric Start Gas Fireplace

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

Electronic ignition gas fireplaces are becoming very popular in new construction. During demonstration the fireplace can add a touch of sizzle to an entertainment mode. This application covers how the fireplace should be integrated and provides some tips for increasing the safety of a gas fireplace.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina, or Lumina Pro Controller, a 4-Relay or 8-Relay expansion board, and a Wall Switch designed for low voltage operation. A switch designed for 110 volt will operate correctly at the time of installation however, over time the contacts may corrode leading to a “zone trouble” condition. It is recommended to use a low voltage switch. A recommendation is the Leviton 6294 momentary slave switch. Another option is the rocker style slave switch from the Amp Lighting Control system (ALC).
- b) Gas Fireplace with wall switch activated electronic ignition.

#### 2. Hookup:

There are several variations of how to wire the switch based on the number of conductors available and the type of switch used.

- a) Momentary Rocker Switch – Momentary Up/Down – 5 conductors
  - 1) 1<sup>st</sup> conductor – Neutral - tie across the “-” of 2 zones.
  - 2) 2<sup>nd</sup> and 3<sup>rd</sup> conductors – Each goes to the “+” side 2 zones (1 per zone). A 1K resistor is wired in parallel for each zone.
  - 3) 4<sup>th</sup> and 5<sup>th</sup> conductors – control wires for the fireplace – attach to relay common (RC) and relay normally open (NO).
- b) Latching Rocker Switch – Latching Up/Down – 4 conductors
  - 1) 1<sup>st</sup> conductor – Neutral “-” side of the zone
  - 2) 2<sup>nd</sup> conductor – Positive “+” side of a zone. A 1K resistor is wired in parallel (+ and -).
  - 3) 3<sup>rd</sup> and 4<sup>th</sup> conductors – control wires for the fireplace – attach to relay common (RC) and relay normally open (NO).
- c) Momentary Switch – Push switch for 1/3 of a second – 4 Conductors
  - 1) 1<sup>st</sup> conductor – Neutral “-” side of the zone
  - 2) 2<sup>nd</sup> conductor – Positive “+” side of a zone. A 1K resistor is wired in parallel (+ and -).
  - 3) 3<sup>rd</sup> and 4<sup>th</sup> conductors – control wires for the fireplace – attach to relay common (RC) and relay normally open (NO).

3. Theory of Operation for each style switch:

a) Momentary Rocker Switch – Momentary Up/Down

Wired to 2 zones. Both zones are “secure” when idle and “not ready” when pressed. Pressing up turns the fireplace on and down turns the fireplace off.

b) Latching Rocker Switch – Latching Up/Down

Wired to 1 zone. The zone is “not ready” when in the up position and “secure” when in the down position. Logically this switch would be programmed to allow up to be on and down off. Unfortunately, this switch cannot be used in this manner because the controller has the ability to manually control the fireplace. This drawback provides the opportunity for the fireplace to be on with the switch in the down position and vice versa. To work around this issue, each up/down activation is treated as a toggle.

c) Momentary Switch – Push switch for 1/3 of a second

Each activation (not ready) is treated as a toggle.

4. Setup (PC Access Information)

- a) Unit 193(OmniPro) 385(Pro II) 33 (Omni) 65(Omni II/Omni Ile) 27(OmniLT): “Fireplace” (Relay - Output 1)
- b) Unit 201(OmniPro) 393(Pro II) 41 (Omni) 73(Omni II/Omni Ile) 29(OmniLT): “Firepl Flag” (1 sec buffer to allow toggle)
- c) Unit 202(OmniPro) 394(Pro II) 42 (Omni) 74(Omni II/Omni Ile) 30(OmniLT): “Firepl Cntl” (Calls for fireplace on / off)

d) 1<sup>st</sup> Zone: Firepl Up

If using a momentary Rocker Switch:

a) 2<sup>nd</sup> Zone: Firepl Dn

**Programming:**

Objective:

To provide manual and automatic control of an electronic start gas fireplace. The “Firepl Flag” is used to buffer the toggle action. Once the toggle action is complete it turns the “Firepl Cntl” flag on or off. The “Firepl Cntl” routine acts as a safety to verify that the conditions in the house are correct for the fireplace to operate. The routine is shown below.

When using a momentary rocker switch

WHEN Firepl Up NOT READY: Firepl Cntl ON

WHEN Firepl Dn NOT READY: Firepl Cntl OFF

When using a toggle switch (Each activation reverses the current state of the fireplace)

WHEN Firepl Up SECURE &IF Fireplace ON: Firepl Flag ON FOR 1 SECOND

WHEN Firepl Up SECURE &IF Fireplace ON: Firepl Cntl OFF

WHEN Firepl Up SECURE &IF Firepl Flag OFF: Firepl Cntl ON

WHEN Firepl Up NOT READY &IF Fireplace ON: Firepl Flag ON FOR 1 SECOND

WHEN Firepl Up NOT READY &IF Fireplace ON: Firepl Cntl OFF

WHEN Firepl Up NOT RDY &IF Firepl Flag OFF: Firepl Cntl ON



When using a momentary switch:

WHEN Firepl Up NOT READY &IF Fireplace ON: Firepl Flag ON FOR 1 SECOND

WHEN Firepl Up NOT READY &IF Fireplace ON: Firepl Cntl OFF

WHEN Firepl Up NOT RDY &IF Firepl Flag OFF: Firepl Cntl ON

Each routine above results in the "Firepl Cntl" flag turned on or off. The following routines control the fireplace relay. When appropriate, the fireplace is turned on or off.

Turn the fireplace off during an alarm condition:

WHEN ANY ALARM: Fireplace OFF

Turn on the fireplace only when the system is armed to away or home.

WHEN Firepl Cntl ON &IF OFF: Fireplace ON

WHEN Firepl Cntl ON &IF DAY: Fireplace ON

WHEN Firepl Cntl ON &IF DAY INSTANT: Fireplace ON

Turn the fireplace off any time the system is armed to away levels.

WHEN ARM AWAY: Fireplace OFF

WHEN ARM VACATION: Fireplace OFF

WHEN ARM NIGHT: Fireplace OFF

WHEN ARM NIGHT DELAY: Fireplace OFF

When a gas fireplace is used in a model home it is often desirable to limit the runtime to 30 seconds.

WHEN Firepl Cntl ON: Fireplace ON FOR 30 SECONDS

When a gas fireplace is integrated with an HAI controller it is often desirable to integrate the fireplace into an entertainment scene. To accomplish this action correctly it is recommended to incorporate an outdoor temperature sensor. The low point setting of the temperature sensor determines the temperature when the fireplace will operate.

WHEN Entertain &IF Outdoor Temp NR: Firepl Cntl ON



## Zoned Sprinkler Systems

**Compatible Controllers:**

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

This application shows how to set up control sprinkler valves to operate on a regular time schedule or in sequence at any time of the day, on command. The 10A07 4-Relay or 19A00 8-Relay Module is a convenient and economical way to convert voltage outputs into relays to switch the 24VAC that most sprinkler solenoids require. A desirable option is a moisture detector or rain gauge that can signal the controller not to water so that during rainfall or wet conditions, irrigation is suspended. This is yet another way to save your customers money.

### Installation:

#### 1. Equipment:

- a) OmniLT (with optional 22A00-1 Expansion Module), Omni/Omni II/Omni Ile, OmniPro/OmniPro II, Lumina, or Lumina Pro controller
- b) Model 10A07 4-Relay or 19A00 8-Relay Module
- c) Any sprinkler valves with 24VAC solenoids (most brands of valves operate the same way, so you should not have trouble finding the one that will work just right for this application)
- d) 24VAC Power Supply
- e) Optional - moisture sensor or rain gauge

#### 2. Setup:

- a) Select a name for each relay on the Relay Module and enter under "Setup, Names, Units". We will use "SPRINKLER #1, SPRINKLER #2, SPRINKLER #3, and SPRINKLER #4".
- b) Select a name for the Buttons and enter under "Setup, Names, Buttons". We will use "START SPRINK" and "END SPRINK".
- c) Select a name for the optional moisture sensor and enter under "Setup, Names, Zones". We'll say "MOISTURE SENSOR".
- d) Select a name for the sprinkler condition flag and enter under "Setup, Names, Units". We'll use "SPRINK FLAG".
- e) The zone description for the moisture sensor shall be left at its default setting of "Auxiliary".

Note: The four sprinkler valves are identified as VALVE #1, VALVE #2, VALVE #3, and VALVE #4.

#### 3. Installation:

- a) Connect the Relay Module to the voltage outputs as shown in the attached diagram.
- b) One leg of 24VAC solenoid should be connected to the NORMALLY OPEN (NO) terminal of one of the relay outputs on the Relay Module.
- c) The other leg should be connected directly to one side of the 24 VAC supply.
- d) The other side of the supply should be connected to the COMMON (C) terminal of the relay.
- e) Connect an optional moisture sensor or rain gauge into one of the zones, which has been configured as an "Auxiliary" zone type. For this example we use Zone 14.

When the relay is turned on, (i.e. SPRINKLER #1 ON), it allows current to flow through the solenoid controlling the valve; hence, turning it on and allowing water to flow through the sprinkler valve.

## Programming:

Zoned sprinkler systems can be easily configured to operate on a regular daily time schedule. Each of the zones (sprinkler valves) can be activated for a specified amount of time at a specific time of day. While this application is simple, it is also very reliable. The following schedule illustrates the programming for a four-zone sprinkler system. These programs may be modified to run only on certain days of the week.

```
2:30 PM MTWTFSS: SPRINKLER #1 ON FOR 15
2:45 PM MTWTFSS: SPRINKLER #2 ON FOR 15
3:00 PM MTWTFSS: SPRINKLER #3 ON FOR 10
3:10 PM MTWTFSS: SPRINKLER #4 ON FOR 20
```

Using advanced programming capabilities, you can also create a sequential sprinkling routine. This routine can be activated at any time of the day by running a macro. The macro can be activated by console, telephone, event, or a timed program. This schedule illustrates a sequential four-zone sprinkler routine.

```
WHEN START SPRINK: SPRINK FLAG ON
WHEN START SPRINK &IF SPRINK FLAG ON: SPRINKLER #1 ON FOR 15
WHEN SPRINKLER #1 OFF &IF SPRINK FLAG ON: SPRINKLER #2 ON FOR 15
WHEN SPRINKLER #2 OFF &IF SPRINK FLAG ON: SPRINKLER #3 ON FOR 10
WHEN SPRINKLER #3 OFF &IF SPRINK FLAG ON: SPRINKLER #4 ON FOR 20
WHEN SPRINKLER #4 OFF: SPRINK FLAG OFF
```

When the "START SPRINK" macro is activated, a Flag (SPRINK FLAG) is turned on. As long as the Flag is "ON", each line of the program will be executed.

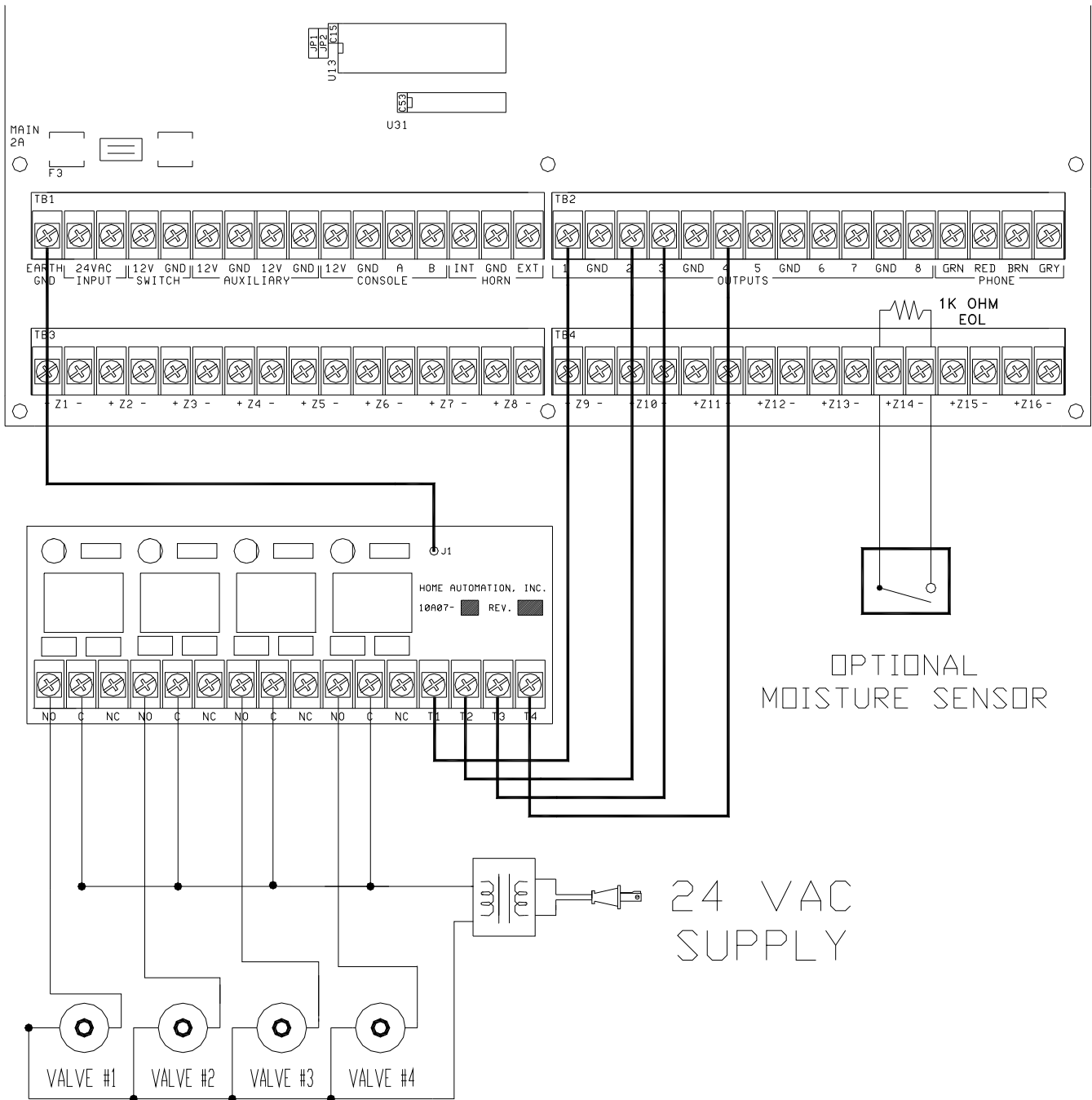
Next, SPRINKLER #1 will turn for a fifteen-minute duration. After the fifteen-minute period has expired, SPRINKLER #1 will turn off, breaking connection to VALVE #1. The valve will shut off and SPRINKLER #1 OFF will trigger SPRINKLER #2 to turn on. Similarly, SPRINKLER #3 will start when SPRINKLER #2 OFF, and SPRINKLER #4 will start when SPRINKLER #3 OFF.

If the homeowner only wants to water depending on soil moisture or amount of rainfall, this can be accomplished by using a "fixed type" moisture sensor or rain gauge. The connection should be made to a zone (Zone 14 here) that is configured as an "Auxiliary" zone type. When the moisture or rainfall exceeds a fixed point, the sensor will make the zone **not ready**. The condition should be added to the first line of the "START SPRINKLER" macro:

```
WHEN START SPRINK &IF MOISTURE SENSOR SECURE: SPRINK FLAG ON
```

If at any time, the homeowner would like to stop the sprinkler sequence, you can create an "END SPRINK" macro button. This macro will shut off the current "SPRINKLER" valve and terminate any pending programs under the "START SPRINK" macro button:

```
WHEN END SPRINK: SPRINK FLAG OFF
WHEN END SPRINK: SPRINKLER #1 OFF
WHEN END SPRINK: SPRINKLER #2 OFF
WHEN END SPRINK: SPRINKLER #3 OFF
WHEN END SPRINK: SPRINKLER #4 OFF
```



## SPRINKLER VALVE CONNECTIONS



**Compatible Controllers:**

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

## Interfacing to a Jandy Aqua-Link System

### Application:

Interfacing the Jandy Aqua-Link product to an HAI automation controller.

### Installation:

#### 1. Equipment:

- a) HAI Controller - LT, Omni Pro (firmware version 1.8 or later), Omni II, Omni Ile, Omni Pro II, Lumina, or Lumina Pro
- b) 10A17-1 Serial Interface Module (Optional) - required on the Omni Pro, but optional on any other HAI product
- c) 36A05-4 Serial Connectivity Kit or Standard Serial Cable (DB9F-to-DB9M) if using the 10A17-1 Serial interface Module
- d) PC Access Software (Optional)

#### 2. Setup:

- a) If using the 10A17-1, install on the HAI controller, following the module's instructions.
- b) Connect the 36A05-4 to the Jandy Serial Adapter, and to a built-in serial port on the HAI controller. If using the 10A17-1 Serial interface, make the connection between the module and Jandy Serial Adapter using a standard serial cable.
- c) Using a console or PC Access, go to Setup>>Installer>>Expansion and set the Serial Function of the desired serial port to Pro-Link. Note: If using the Serial Interface Module, you will set the "Module #" (based on the address jumper) to Pro-Link.
- d) Set the Serial Port Baud Rate to 9600.
- e) Using a console or PC Access, go to Setup>>Names>>Messages, and name the messages that are to be sent and/or received between the HAI controller and the Jandy system.

### Programming:

Using the build-in Pro-Link protocol into HAI controllers, you can send and receive ASCII text strings over the serial interface. Pro-Link is programmable, so you can custom build the ASCII strings based on the defined protocol(s) of other systems.

The RS-232 interface on HAI controllers is configured as DTE (data terminal equipment). The RS-232 interface on the AquaLink is DCE (data communications equipment). As such, you can use the HAI 36A05-4 Serial Connectivity Adapter for connecting the two.

The Pro-Link protocol allows you to send and receive predefined text messages through an HAI serial interface. Each message can be up to 15 ASCII characters long. Several messages can be strung together and sent as one long message. Messages can be sent using any system trigger (timed, event, or macro) just like any other item in the controller.

Pro-Link also monitors each serial interface for incoming messages. Incoming ASCII strings that match stored messages in the controller can be used to activate macros. When a message is matched, the Program Command (macro) corresponding to the matching message is activated. When receiving an ASCII message that is over 15 characters, the HAI controller only processes the last 15 characters of the message.

With that said, you can send commands to the Jandy interface to control any of its functions (see the Jandy AquaLink protocol).

To send commands to the AquaLink, simply use the command set outlined in the AquaLink protocol. For example, to turn the pool pump on:

```
#PUMP = ON^M
```

Note: When sending commands to the AquaLink, remember to use the ^M (carriage return).

To receive messages from the AquaLink, each message must be anticipated. This means that you have to create messages in the controller for each anticipated response.

Because each possible temperature value must have a unique message in the controller, when querying for temperatures, the best approach is to establish a nominal range for the water temperature. For example, if the pool temperature is typically between 65° - 80° F, you must create 16 unique messages in the controller. The reply message format is as follows:

```
!00 POOLTMP = 65 F
```

Since the message length in the HAI controller is 15 characters, you can truncate the message by dropping off the first few characters (i.e. !00).

```
POOLTMP = 65 F
```

```
POOLTMP = 66 F
```

```
POOLTMP = 67 F
```

```
POOLTMP = 68 F
```

```
POOLTMP = 69 F
```

```
POOLTMP = 70 F
```

```
POOLTMP = 71 F
```

```
POOLTMP = 72 F
```

```
POOLTMP = 73 F
```

```
POOLTMP = 74 F
```

```
POOLTMP = 75 F
```

```
POOLTMP = 76 F
```

```
POOLTMP = 77 F
```

```
POOLTMP = 78 F
```



```
POOLTMP = 79 F
```

```
POOLTMP = 80 F
```

You must also create a message that will be sent to the AquaLink to query for the pool temperature:

```
#POOLTMP ?^M
```

You can then create a program that will send the message. For example, you could use a Button (I named this one Pool Temp?) but you could also have programs that periodically send this message to check the temperature:

```
WHEN Pool Temp?: SEND #POOLTMP ?^M OUT SERIAL 2
```

Next, you have to create programs that will allow you to view the temperature. Here are two examples of how you might do this:

Example 1:

You can use a Flag Unit to retain the value for the temperature. In this case, I have named the flag Pool Temp:

```
WHEN RECEIVE POOLTMP=65 F: SET Pool Temp TO 65
```

```
WHEN RECEIVE POOLTMP=66 F: SET Pool Temp TO 66
```

```
WHEN RECEIVE POOLTMP=67 F: SET Pool Temp TO 67
```

Now, when you check the status of the Pool Temp flag, the value should reflect the temperature of the pool.

Example 2:

You can display the message on the console or touchscreen when the message is received:

```
WHEN RECEIVE POOLTMP = 65 F: SHOW POOLTMP = 65 F
```

```
WHEN RECEIVE POOLTMP = 66 F: SHOW POOLTMP = 66 F
```

```
WHEN RECEIVE POOLTMP = 67 F: SHOW POOLTMP = 67 F
```

Now, when the query command is sent to the AquaLink, the temperature will be displayed on the console or touchscreen.

You can use these principles to query for other items as well.

## Rain8Net Sprinkler Control

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

This application will demonstrate how to integrate the Rain8Net 8-zone sprinkler controller to an HAI automation system, using an RS-232 connection. Although multiple Rain8Nets can be networked together for larger applications, this documentation will apply to the use of one. This documentation will further demonstrate two of the simpler methods of application:

1. HAI controller will control On, Off, and Run Time of the sprinkler zones. **NOTE:** This method will not work on the Omni LT
2. HAI will control on the On time of the routine – the sprinkler controller can be programmed to control the run time (automatically turning off) of the individual zones, using the “Rain8MasterConfig” software. **NOTE:** This is the only method that will work on the OMNI LT.

### Installation:

#### 1. Equipment:

- a) HAI automation controller.
- b) Standard straight-thru, 4-conductor modular cable (*when using on-board serial port*) **NOTE:** Cable length can not exceed 50 feet.
- c) 10A17-1 Serial Interface Module (**Optional**)
- d) PC Access software (**Optional**)
- e) Rain8Net Sprinkler “Starter Pack” (**Recommended**) – this includes the controller, power supply, and computer interface cable.
- f) Rain8Net software:
  1. Rain8Cfg utility required for simple addressing only
  2. Rain8MasterConfig required if run time control desired.

#### 2. Installation:

- a) If the HAI automation controller has not been previously installed, you should install it according the installation documentation.
- b) Install the Rain8Net controller in the desired location, within 50 feet of the HAI controller, as per their installation instructions.
- c) Connect the Rain8Net computer interface to a computer and use the configuration utility to set the address of the controller to a value that has an ASCII equivalent. For the purposes of this application, we will set the address to 35. **NOTE:** If desired, the Rain8MasterConfig utility can be used to set both the address and each individual zone run time.
- d) Disconnect the computer interface from the controller. **NOTE:** If using the 10A17 Serial interface module, you can connect the Rain8Net computer interface directly to this module and disregard “**Step e**” below.
- e) Connect a standard straight-thru, 4-conductor modular cable from the RS-232 port on the Rain8Net controller, to the desired on-board serial port on the HAI controller.

### 3. Setup:

- a) Under Setup>>Installer>>Expansion, set the following:
  1. Serial 1 Baud Rate to 4800
  2. Serial 1 Function to Pro-Link
- b) Under Setup>>Names>>Buttons, name a button SPRINK START.
- c) Under Setup>>Names>>Units, name 15 flags as desired. For our application, we will use the following:

**NOTE:** When using the HAI Start Time Only method, the naming of flags is not required.

- |                |                 |
|----------------|-----------------|
| a. SPRINKLER 1 | i. SPRINK 1 TMR |
| b. SPRINKLER 2 | j. SPRINK 2 TMR |
| c. SPRINKLER 3 | k. SPRINK 3 TMR |
| d. SPRINKLER 4 | l. SPRINK 4 TMR |
| e. SPRINKLER 5 | m. SPRINK 5 TMR |
| f. SPRINKLER 6 | n. SPRINK 6 TMR |
| g. SPRINKLER 7 | o. SPRINK 7 TMR |
| h. SPRINKLER 8 |                 |

- d) Under Setup>>Names>>Messages, name 16 messages as follows:

**NOTE:** When using the HAI Start Time Only method is desired, the 8 off code messages do not need to be named.

Zone On Codes:

Zone Off Codes:

- |         |         |
|---------|---------|
| a. @ #1 | i. @ #A |
| b. @ #2 | j. @ #B |
| c. @ #3 | k. @ #C |
| d. @ #4 | l. @ #D |
| e. @ #5 | m. @ #E |
| f. @ #6 | n. @ #F |
| g. @ #7 | o. @ #G |
| h. @ #8 | p. @ #H |

### Programming:

Although programming can be accomplished in many different ways based on desired effect, the following are two simple applications. Since the Rain8Net controller can be configured to control the run times for each of the individual zones, the two examples will demonstrate total HAI control versus HAI start time only:

**HAI Total Control** – Using a Button Macro, we can create a simple routine to turn on each individual sprinkler zone for a determined and then turn them off. NOTE: Due to limitations, this application can not be used on the Omni LT.

```
1. WHEN SPRINK START: SPRINKLER 1 ON FOR 10 MINUTES
2. WHEN SPRINKLER 1 OFF: SPRINK 1 TMR ON FOR 1 SECOND
3. WHEN SPRINK 1 TMR OFF: SPRINKLER 2 ON FOR 10 MINUTES
4. WHEN SPRINKLER 2 OFF: SPRINK 2 TMR ON FOR 1 SECOND
5. WHEN SPRINK 2 TMR OFF: SPRINKLER 3 ON FOR 10 MINUTES
6. WHEN SPRINKLER 3 OFF: SPRINK 3 TMR ON FOR 1 SECOND
7. WHEN SPRINK 3 TMR OFF: SPRINKLER 4 ON FOR 10 MINUTES
8. WHEN SPRINKLER 4 OFF: SPRINK 4 TMR ON FOR 1 SECOND
9. WHEN SPRINK 4 TMR OFF: SPRINKLER 5 ON FOR 10 MINUTES
10. WHEN SPRINKLER 5 OFF: SPRINK 5 TMR ON FOR 1 SECOND
11. WHEN SPRINK 5 TMR OFF: SPRINKLER 6 ON FOR 10 MINUTES
12. WHEN SPRINKLER 6 OFF: SPRINK 6 TMR ON FOR 1 SECOND
13. WHEN SPRINK 6 TMR OFF: SPRINKLER 7 ON FOR 10 MINUTES
14. WHEN SPRINKLER 7 OFF: SPRINK 7 TMR ON FOR 1 SECOND
15. WHEN SPRINK 7 TMR OFF: SPRINKLER 8 ON FOR 10 MINUTES
16. WHEN SPRINKLER 1 ON: SEND @#1 OUT SERIAL 1
17. WHEN SPRINKLER 1 OFF: SEND @#A OUT SERIAL 1
18. WHEN SPRINKLER 2 ON: SEND @#2 OUT SERIAL 1
19. WHEN SPRINKLER 2 OFF: SEND @#B OUT SERIAL 1
20. WHEN SPRINKLER 3 ON: SEND @#3 OUT SERIAL 1
21. WHEN SPRINKLER 3 OFF: SEND @#C OUT SERIAL 1
22. WHEN SPRINKLER 4 ON: SEND @#4 OUT SERIAL 1
23. WHEN SPRINKLER 4 OFF: SEND @#D OUT SERIAL 1
24. WHEN SPRINKLER 5 ON: SEND @#5 OUT SERIAL 1
25. WHEN SPRINKLER 5 OFF: SEND @#E OUT SERIAL 1
26. WHEN SPRINKLER 6 ON: SEND @#6 OUT SERIAL 1
27. WHEN SPRINKLER 6 OFF: SEND @#F OUT SERIAL 1
28. WHEN SPRINKLER 7 ON: SEND @#7 OUT SERIAL 1
29. WHEN SPRINKLER 7 OFF: SEND @#G OUT SERIAL 1
30. WHEN SPRINKLER 8 ON: SEND @#8 OUT SERIAL 1
31. WHEN SPRINKLER 8 OFF: SEND @#H OUT SERIAL 1
```

Line 1 begins the routine.

Lines 2-15 turn the flags on for 10 minute periods.

Lines 16-31 send the ON and OFF commands based on the flag's On/Off condition.

**HAI Start Time Only** – If the Rain8Net controller has been programmed to control the run times of the individual zones, the HAI controller will simply need to be programmed to send the On command at the desired time. The programming below show an example of turning on the sprinkler zones every 15 minutes between 12:00 noon and 2:00 PM, on Mondays, Wednesdays, and Fridays. NOTE: This application can be used on any HAI controller.

```
1. 12:00 PM M-W-F--: SEND @#1 OUT SERIAL 1
2. 12:15 PM M-W-F--: SEND @#2 OUT SERIAL 1
3. 12:30 PM M-W-F--: SEND @#3 OUT SERIAL 1
4. 12:45 PM M-W-F--: SEND @#4 OUT SERIAL 1
5.  1:00 PM M-W-F--: SEND @#5 OUT SERIAL 1
6.  1:15 PM M-W-F--: SEND @#6 OUT SERIAL 1
7.  1:30 PM M-W-F--: SEND @#7 OUT SERIAL 1
8.  1:45 PM M-W-F--: SEND @#8 OUT SERIAL 1
```



# Chapter 3: Security

- [Disarm Security by Time Schedule](#)
- [Connecting an ITI Quick Bridge™ Loop Receiver for Wireless Control](#)
- [Bypassing and Restoring a Zone without Disarming the Security System](#)
- [Using Polarity Reversal to Activate Sounders on Smoke Detectors](#)
- [Report a Code to the Central Station When an Event Occurs](#)
- [Replacing Existing Security Systems which Uses Different End-Of-Line Resistors](#)
- [Using 2-Wire Smoke Detectors](#)
- [Installing a ESL 405-03 Reversing Relay Module](#)
- [Audible Notification Based on Multiple Zone Trips](#)
- [Integration of a Street Smart Code Encryptor For Wireless Remote Control](#)





## Disarm Security by Time Schedule

### Compatible Controllers:

OmniLT

Omni / Omni II / Omni IIe

OmniPro / OmniPro II

### Application:

How to schedule times to disarm the security for customer convenience and to prevent false alarms.

### Installation:

We will assume that the appropriate security sensors have been installed and set up correctly. This application is really a programming exercise.

### Programming:

The objective here is to turn off the security system on weekday mornings so the customer isn't caught by surprise by an interior motion detector or other security sensor. This would imply that they were already home and had the security armed. BUT we have to be careful not to turn off the security when there's nobody home, which would be VERY BAD.

The best way to do this is with a simple time schedule that takes into account the current mode of the security system. If we analyze the circumstances involved we see that the primary time that the security system poses a threat of false alarm is in the NIGHT mode when some interior zones are armed. Tripping one of these zones would result in an instant alarm and a very annoyed customer. Therefore the condition we want to verify in our program is the security mode armed in NIGHT.

By using the conditional statement IF NIGHT we also prevent this program from disarming the security if the customer is not there and the security is armed AWAY or VACATION. Pretty neat, huh?

Here's how the program will look:

```
1) 7:00 AM MTWTF-- &IF NIGHT (Security armed in the NIGHT mode): PROGRAM DISARM
   ^ (WHEN)           ^ (CONDITION)                               ^ (COMMAND)
```



## Connecting an ITI Quick Bridge™ Loop Receiver for Wireless Control

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II

### Application:

How to use the ITI Quick Bridge™ Loop Receiver to allow up to 16 unique wireless security transmitters (two per zone output) to report information to an HAI automation controller. The wireless transmitters replace wired door and window sensors, as well as wired smoke, motion, and glassbreak detectors. These transmitters report status information to the Quick Bridge™ Loop Receiver which, in turn, processes the information and reports it to the controller (up to 8 zones).

### Programming:

Follow the instructions under *Programming the Receiver* in the ITI Quick Bridge™ Loop Receiver Installation Instructions (Document Number: 466-1127) for complete programming instructions.

There is a single DIP switch (mid-left side of the board) that controls the operation mode. When the switch is in the up position, the receiver is in the program mode. When it is in the down position, the receiver is in the run mode.

When being used with an HAI controller, each output on the receiver must be configured as Normally Open (N/O). All 8 zones and trouble outputs on the Quick Bridge™ Loop Receiver default to Normally Closed (N/C), and must be changed to N/O.

To configure a zone output to N/O:

- 1) Connect a grounding jumper wire to the receiver's GND terminal
- 2) Set the DIP switch to the up (program mode) position, and press the tamper switch once. The low battery LED will turn on solid or flash, indicating the receiver is ready to be configured.
- 3) Select the zone output to be configured. Momentarily short the grounding jumper wire to the output. The output's LED should turn off indicating that output is configured as N/O. If the LED is on, it is configured as N/C. Only N/O (LED off) outputs will work with an HAI controller.
- 4) Repeat step 3 to change another output's configuration.
- 5) Set the DIP switch to the down (run mode) position.

### WARNING:

All receiver programming must be complete before connecting outputs to the HAI controller. Controller connections can interfere with the programming procedure.

There are eight zone outputs labeled 1 through 8 on the receiver. The outputs are connected to the zone inputs on the HAI controller (as shown below).

- Each zone input on the HAI controller can be configured as a burglary zone, a fire emergency zone, a tamper zone, an emergency zone, or an auxiliary input. Refer to the Installation Manual for a complete description of zone inputs.

## Bypassing and Restoring a Zone without Disarming the Security System

### Compatible Controllers:

OmniLT

Omni / Omni II / Omni IIe

OmniPro / OmniPro II

### Application:

How to bypass a zone to allow entry/exit without disarming the security system. This application will focus on bypassing the back door when the system is armed to Night mode to allow a pet to exit, then reenter without disarming the system.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, or OmniPro/OmniPro II controller with the appropriate security sensors installed and correctly set up.
- b) An additional switch may be connected to a zone for the purpose of bypassing and restoring the door.

#### 2. Setup:

- a) Select a name for the zones and enter under "Setup, Names, Zones". We will call ours "Back Door".
- b) Select a name for the optional switch and enter under "Setup, Names, Zones". We will call ours "Unarm Back Door".

#### 3. Installation:

- a) Connect the door contact (protecting the Back Door) to any unused zone on HAI Controller and set up the zone to be "Perimeter" which is a security type zone.
- b) Connect an optional switch to any unused zone on HAI Controller and set up the zone to be "Auxiliary" which is not a security type zone or used for the purposes of security.

### Programming:

The objective here is to temporarily bypass the Back Door when the security system is armed in the Night mode.

We will start by creating 2 Buttons (macros). Button 1 (Unarm B Door) will execute a program to bypass the Back Door. Button 2 (Arm B Door) will execute a program to restore the Back Door.

Here's how the program will look:

```
1) WHEN UNARM B DOOR: BYPASS BACK DOOR
   ^ (WHEN)           ^ (COMMAND)
```

```
2) WHEN ARM B DOOR: RESTORE BACK DOOR
```

When it's time to let the pet outside, simply execute Button 1 (Unarm B Door). The Back Door will become bypassed, however, the rest of the security system will be fully armed. When it's time for the pet to return inside, simply execute Button 2 (Arm B Door).

Finally, you can install an optional switch near the door for the purposes of bypassing the Back Door if in Night mode.

3) WHEN UNARM BACK DOOR NOT READY &IF SECURITY NIGHT: RUN UNARM B DOOR  
^ (WHEN) ^ (CONDITION) ^ (COMMAND)

4) WHEN UNARM BACK DOOR SECURE: RUN ARM B DOOR

When the switch connected to the zone (Unarm Back Door) is opened and the security system is in the night mode, the Unarm B Door button is executed. When the switch is closed, the Arm B Door button is executed.

## Using Polarity Reversal to Activate Sounders on Smoke Detectors

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II

### Application:

This application shows how to use a relay to reverse the polarity of the supply voltage going to all smoke detectors, causing the sounders on the smoke detectors to activate when any smoke detector is tripped.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, or OmniPro/OmniPro II controller
- b) 2 or more 4 Wire, 12 Volt Smoke Detectors with built-in sounders
- c) Model 10A07 4-Relay Module (using 2 relays), a 12VDC DPDT Relay, or 12VDC Polarity Reversal Relay

#### 2. Setup:

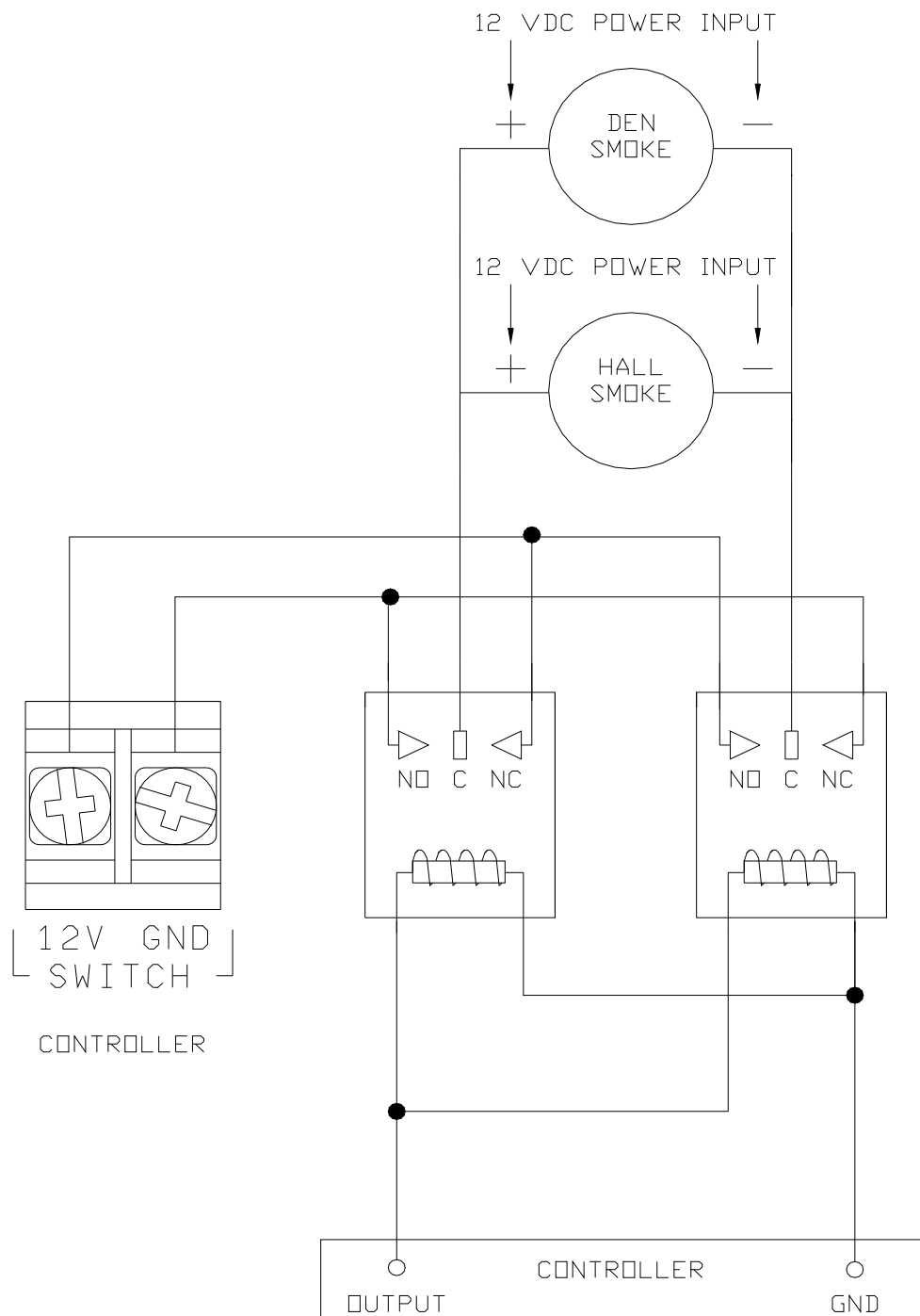
- a) Configure each zone input as a "Fire Zone" for each smoke detector being used.
- b) Select a name for each zone and enter under "Setup, Names, Zones". We will call ours "Hall Smoke" and "Den Smoke".
- c) Configure a voltage output as a "Interior Fire Output".

#### 3. Installation:

- a) Connect each smoke detector's contacts to zone input on HAI Controller.
- b) Connect each smoke detector's power input (+) to the common (C) terminal on relay 1 as shown.
- c) Connect each smoke detector's power input (-) to the common (C) terminal on relay 2 as shown.
- d) Connect the Switch 12VDC (+) to normally open (NO) of relay 1 and to normally closed (NC) of relay 2.
- e) Connect the Switch 12VDC (-) to normally closed (NC) of relay 1 and to normally open (NO) of relay 2.
- f) Connect the coil of each relay in parallel to the voltage output on the controller as shown.

When the Hall Smoke or the Den Smoke detector is tripped (due to a fire alarm), the Interior Fire Output is energized (12VDC). When energized, the relay contacts (on both relays) will change position (from normally closed (NC) to normally open (NO). This will reverse the polarity to the smoke detectors, which will activate the sounders of each smoke detector.

**(Connections Diagram on Next Page)**



CONFIGURE OUTPUT AS AN INTERIOR FIRE OUTPUT



## Report a Code to the Central Station When an Event Occurs

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II

### Application:

Explain how to force a system to report a code to the central station when an event occurs. In this application, we will show how to have the system report to the central station when a generator, using an automatic transfer switch, has failed to start.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, or OmniPro/OmniPro II controller
- b) Generator with automatic transfer switch
- c) 1K ohm, ½ watt Resistor

#### 2. Setup:

- a) Configure a zone input as a "Duress Zone". When tripped, this zone type will not give any audible indications (console beeper, sirens, etc.), however, it will call the central station to report the alarm code. Instructions should be given to the central station as how to treat this alarm condition.
- b) Select a name for the zone and enter under "Setup, Names, Zones". We will call ours "Generator Zone".
- c) Select a name for a voltage output and enter under "Setup, Names, Units". We'll use "Trip Zone".
- d) Select a name for a flag and enter under "Setup, Names, Units". We'll use "AC Flag".

#### 3. Installation:

- a) Connect a wire from the voltage output to the positive (+) side of the zone (Generator Zone) being used.
- b) Connect a 1K ohm, ½ watt resistor directly across the zone (across + and -).

### Programming:

The objective here is to report a code to the central station if the generator has failed to start.

```
1) WHEN AC OFF: AC FLAG OFF FOR 10 MINUTES
   ^   (WHEN)      ^   (COMMAND)
```

This will allow enough time for the generator to start, and get up to speed.

```
2) WHEN AC ON: AC FLAG OFF
```

```
3) WHEN AC FLAG ON: TRIP ZONE ON FOR 2 MINUTES
```

When the output (Trip Zone) is turned On, the zone (Generator Zone) is tripped. When the zone is tripped, the system will call the central station and report the code.



## Replacing Existing Security System which Uses Different End-Of-Line Resistors

<b>Compatible Controllers:</b> OmniLT Omni / Omni II / Omni Ile OmniPro / OmniPro II
---

### Application:

This application shows how to replace an existing security system, which uses a different value end-of-line resistor (other than 1K), with an OmniLT, Omni/Omni II/Omni Ile, or OmniPro/OmniPro II system.

Some security systems use a different value of end-of-line resistors. Often end-of-line resistors are buried in the walls. In this case, it isn't feasible to replace the end-of-line resistors. This application will show how to work-around using the existing resistors (as long as value is less than 3.7K).

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni Ile, or OmniPro/OmniPro II controller
- b) Resistors for each zone (value will depend on existing end-of-line resistors)

#### 2. Setup:

- a) Determine the value of existing end-of-line resistors by reading the resistance across the zone wires.
- b) Acquire resistors for each zone as determined:
  - When combined with the current value will equal approximately 3.7K
  - If the existing value is 2.2K you will need a 1.5K resistor to make 3.7K

**Note:** If the existing value is below 1K, simply add the difference to equal 1K and place in series with zone.

#### 3. Installation: (For this application we will assume the existing end-of-line resistors are 2.2K)

- a) Connect one side of the zone wire to the (+) side of a zone on the controller.
- b) Connect the other side of the zone wire to one side of the additional (1.5K) end-of-line resistor.
- c) Connect the other side of the addition 1.5K end-of-line resistor to system ground (GND).

When the zone is closed (secure), the combination of resistors will equal the value of the circuit's pull-down resistor. When connected to ground and the high side (+) of the zone, the zone will be secure. If the zone contact opens, the system detects an open circuit; hence the zone is violated.

**(Connections Diagram on Next Page)**



## Using 2-Wire Smoke Detectors

### Compatible Controllers:

Omni  
OmniPro

### Application:

This application shows how to use 2-wire smoke detectors with an Omni or OmniPro system by using an ESL 505 Module.

Omni or OmniPro controllers were designed to work only with 4-wire smoke detectors. In some retrofit installations where 2-wire smoke detectors were used and installations where only 2 wires were pulled for smoke detectors, 2-wire smoke detectors can be used by installing an ESL 505 Module.

### Installation:

#### 1. Equipment:

- a) Omni or OmniPro controller
- b) ESL 505 Module 2 to 4 Wire Input Converter
- c) 1K ohm End-Of-Line Resistor
- d) 2-Wire Smoke Detectors (Tested with ESL 521 Series, System Sensor 2100 Series, and Detection Systems 280 Series 2-Wire Smoke Detectors)

- ◆ The ESL 505 Module is UL compatibility listed with up to 20 of the ESL 521 Series Smoke Detectors

#### 2. Setup:

- a) Configure a zone input as a "Fire Zone". When tripped, this zone type will initiate a fire alarm.
- b) Select a name for the zone and enter under "Setup, Names, Zones". We will call ours "Smoke Detector".

#### 3. Installation:

- a) Install 2-wire smoke detectors in appropriate locations per that manufacturer's instructions.
- b) Connect the (+) side of each smoke detector together (if more than one is used), then connect to the J5 terminal (Loop +) of the ESL 505 Module.
- c) Connect the (-) side of each smoke detector together (if more than one is used), then connect to the J6 terminal (Loop -) of the ESL 505 Module.
- d) Connect the supplied 4.02K end-of-line resistor between the (+) and (-) terminals of the last smoke detector as shown in wiring diagram.
- e) Connect the (+) terminal of the Switched 12VDC on the controller to the J1 terminal (Power In +) on the ESL 505 Module.
- f) Connect the (-) terminal of the Switched 12VDC on the controller to the J2 terminal (Power In -) on the ESL 505 Module.
- g) Connect the J8 (Alarm NO REOL) and J9 (Alarm COM) terminals of the ESL 505 Module across the "Fire Zone" on the controller (Zone 6 Smoke Detector).
- h) Connect the controller 1K ohm end-of-line resistor between J7 (REOL) and J8 (Alarm NO REOL) terminals of the ESL 505 Module.

**(Connections Diagram on Next Page)**



## Installing a ESL 405-03 Reversing Relay Module

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II

### Application:

This application shows how to use an ESL 405-03 Polarity Reversal Relay Module to reverse the polarity of the supply voltage going to all 4-wire smoke detectors on a zone, causing the sounders in the smoke detectors to activate in a 3 pulse temporal pattern when any smoke detector is tripped.

### Installation:

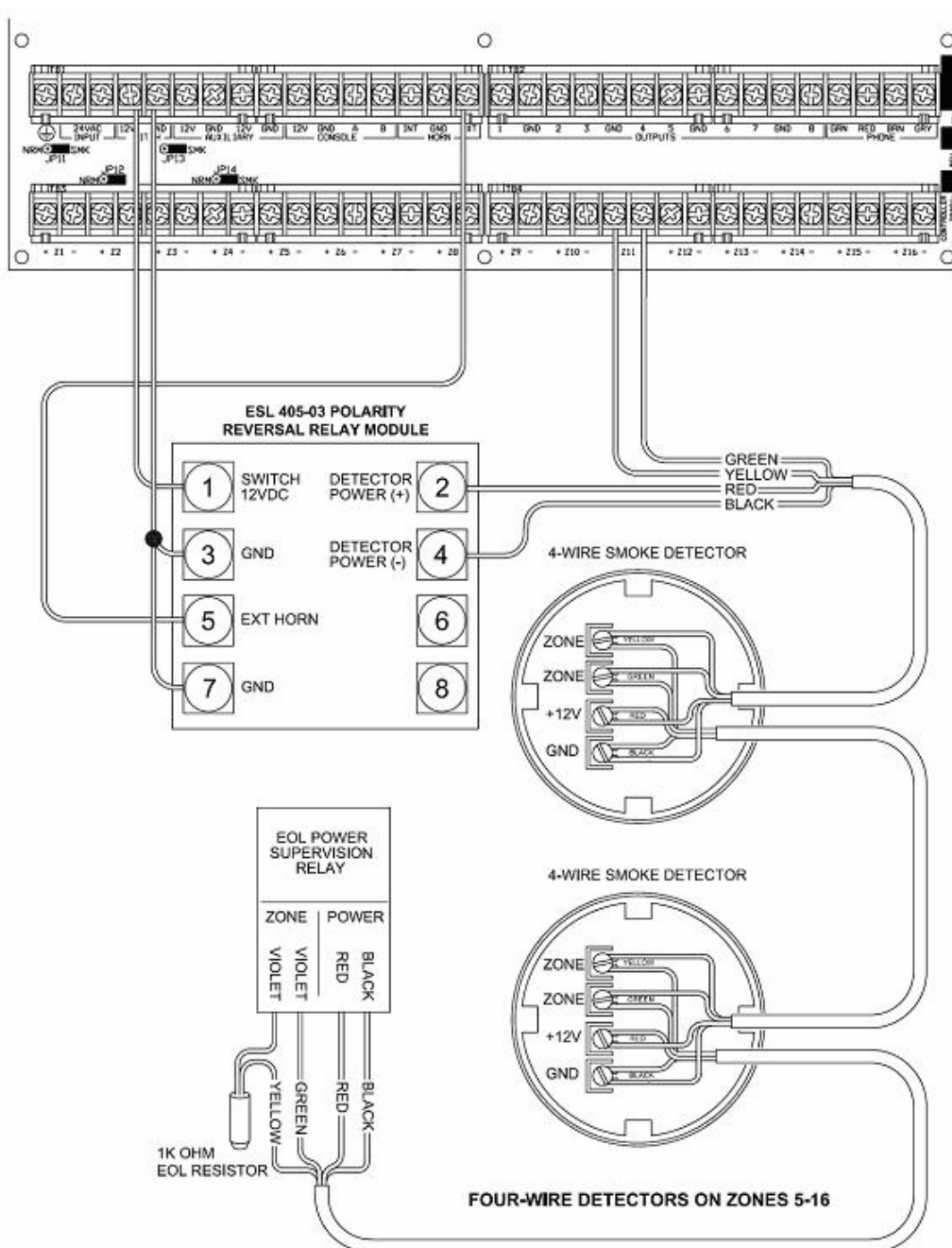
#### 5. Equipment:

- e) Omni II/Omni Ile, OmniPro II, Lumina, or LuminaPro with version 2.9 or later firmware
- f) 2 or more 4 Wire, 12 Volt Smoke Detectors with built-in sounders
- g) ESL 405-03 Polarity Reversal Relay Module

#### 6. Setup:

- h) Configure each zone in put as a “Fire Zone” for each smoke detector being used.
- i) Configure the Exterior Horn output as an “Interior Fire Sounder”.
- j) Connect each smoke detector’s contacts to zone input (Zone 5-16) on HAI Controller.
- k) Connect each smoke detector’s power input (+) to terminal “2”, marked DETECTOR POWER (+), on the ESL 405-03
- l) Connect each smoke detector’s power input (-) terminal “4”, marked DETECTOR POWER (-) on the ESL 405-03 Module as shown.
- m) Connect the Switch 12VDC (+) to terminal “1”, marked SWITCH 12VDC, on the ESL 405-03 Module as shown.
- n) Connect the Switch GND to terminal “3” and terminal “7”, marked GND, on the ESL 405-03 Module as shown.
- o) Connect the Exterior Horn output to terminal “5”, marked EXT HORN, on the ESL 405-03 Module as shown.

When a smoke detector trips (due to a fire alarm), the Interior Fire Sounder output is activated in a 3 pulse temporal pattern. This will cause the sounders in each smoke detector to activate in the 3 pulse temporal pattern.





## Audible Notification Based on Multiple Zone Trips

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II

### Application:

This application will provide details on how to provide an audible notification based on a zone tripping on multiple occasions. This application will use the decrement feature available to Flag units.

### Installation:

#### 1. Equipment:

- a) HAI Controller – Omni LT, Omni II, Omni IIe, or Omni Pro II
- b) Zone Contact – any door, window, or motion
- c) Buzzer or other audible appliance
- d) Console or PC Access (optional) – all setup and programming options can be performed from a console; however, it is much easier when using the software.

#### 2. Installation:

- a) Connect the sensor contact to a zone on the HAI controller.
- b) Connect the buzzer (or other audible appliance) to an output on the HAI controller. **NOTE:** If the device has a current draw greater than 100mA @ 12VDC, you will need to use a relay and an auxiliary power supply.

#### 3. Setup:

For the purpose of this application, there is no need to set a zone type for the sensor (leave it as auxiliary) or specific feature for the output (leave it as general purpose), as this application does not affect security. We will demonstrate two different effects based on multiple trips.

- a) Under Setup>>Names>>Zones, name the zone being used – we will name ours MOTION.
- b) Under Setup>>Names>>Units, name the following:
  1. Name one (1) output – we will name ours BUZZER.
  2. Two (2) Flags – we will name ours TRIP 5 and TRIP 10.

### Programming:

For the purpose of our example, we will be creating programming based on the desired effect of providing a distinctly audible notification when a particular zone trips five (5) times and ten (10) times. Additionally, we will want this to occur only at night, although other conditions may be desired. With the above stated, we will create the following programming:

```
SUNSET MTWTFSS: SET TRIP 5 TO 5
SUNSET MTWTFSS: SET TRIP 10 TO 10
WHEN MOTION NOT READY &IF DARK: DECREMENT TRIP 5
WHEN MOTION NOT READY &IF DARK: DECREMENT TRIP 10
WHEN TRIP 5 OFF &IF DARK: BUZZER ON FOR 5 SECONDS
WHEN TRIP 5 OF &IF DARK: SET TRIP 5 TO 5
WHEN TRIP 10 NOT READY &IF DARK: BUZZER ON FOR 10 SECONDS
WHEN TRIP 10 OFF &IF DARK: SET TRIP 10 TO 10
SUNRISE MTWTFSS: SET TRIP 5 TO 0
SUNRISE MTWTFSS: SET TRIP 10 TO 0
```

How it works:

Lines 1 & 2 set you counter flags each evening, at sunset (dark).

Lines 3 & 4 decrement your flags each time the zone trips.

Lines 5(6) and 7(8) sound the buzzer respectively and reset the counters as they turn off.

Lines 9 & 10 set the counters to 0 each morning, to ensure there is no confusion during the day.

## Integration of a Street Smart Code Encryptor For Wireless Remote Control

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II

### Application:

This application shows how to use a Street Smart Code Encryptor and wireless remote to provide a low cost alternative for adding wireless remote control to a HAI. This remote can be used to arm and disarm the security system, create a panic alarm condition, adjust temperatures, control lights, open and close an overhead garage door, and control many other functions and devices.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, or OmniPro/OmniPro II controller
- b) Street Smart Code Encryptor and Remote
- c) 1K ohm, ½ watt resistors

#### 2. Setup:

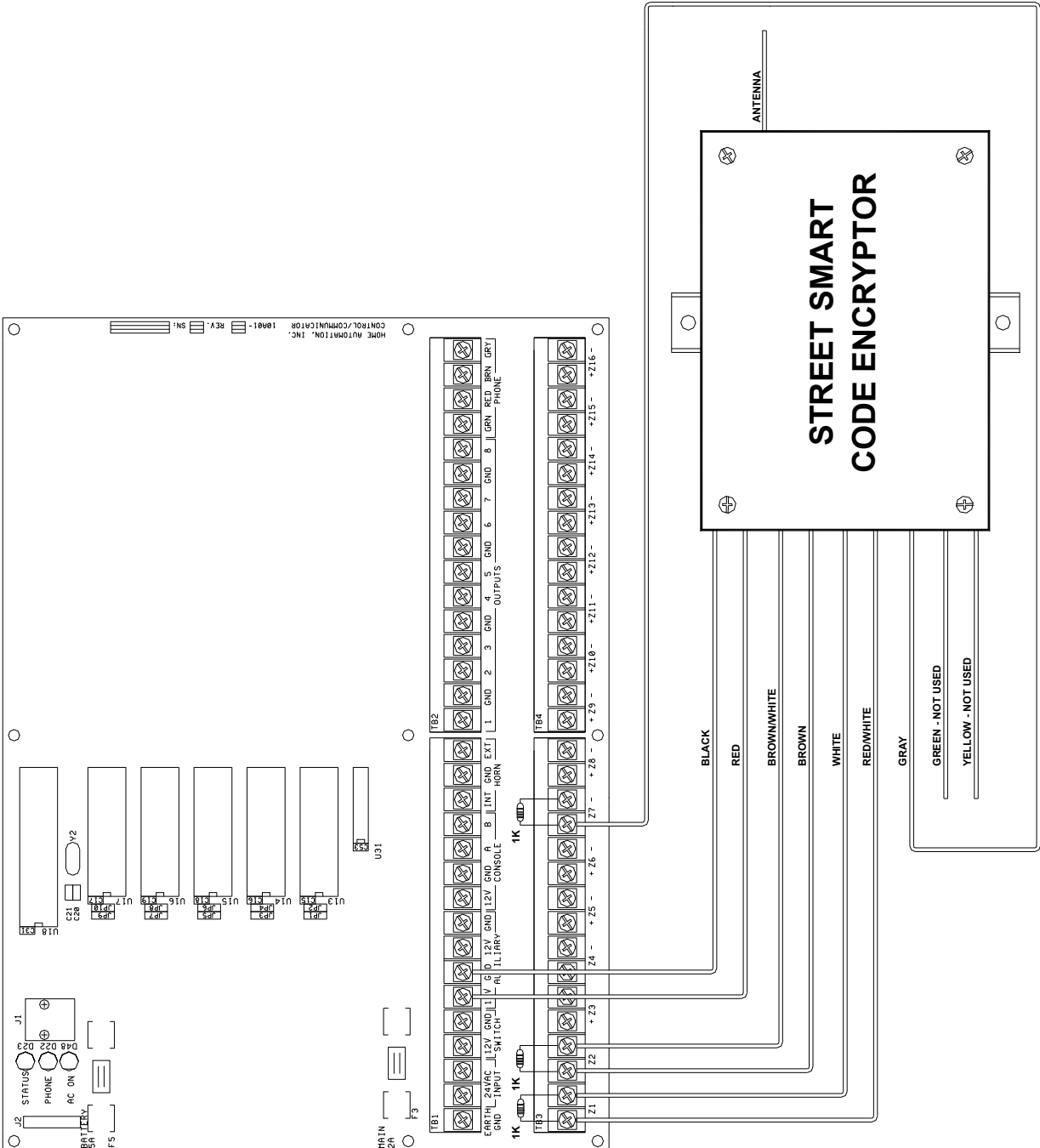
- a) Configure each zone for the specified purpose under “Setup, Installer, Zones”.
- b) Configure zones 1 and 2 as Auxiliary zones (for triggering automation events).
- c) Configure zone 7 (Button 3) as panic zone.
- d) Select a name for the zones and enter under “Setup, Names, Zones”.

#### 3. Installation:

- a) Black: Connected to Auxiliary GND (ground)
- b) Red: Connected to Auxiliary 12V (+12VDC supply)
- c) Brown/White and Brown: Connect across one of the zone inputs (zone 2)  
Button 1 Relay: The internal relay is normally open. When Button 1 is depressed, the relay is energized making zone 2 Not Ready. The relay remains energized until the button is released.
- d) Red/White and White: Connect across one of the zone inputs (zone 1)  
Button 2 Relay: The internal relay is normally open. When Button 2 is depressed, the relay is energized for a short period (temporarily making zone 2 Not Ready). The relay will always return to the normally open state (making zone 1 Secure) even when the button is held on the transmitter.
- e) Gray: Connect to the positive side of a zone input (+ zone 7)  
Button 3: Button 3 is a switched ground path. The output is activated after Button 3 is held for 3 seconds making zone 7 Not Ready. Consult the installation instructions for Button 3 activation options.
- f) Zone Inputs: Connect a 1K ohm, ½ watt resistor in parallel with each of the 3 zone inputs used (across zone 1, 2, & 7).

**(Connections Diagram on Next Page)**

## CONNECTING A STREET SMART CODE ENCRYPTOR



# Chapter 4: Buttons / Macros / Scenes

- [Create a Button for “Guests Arriving”](#)
- [Create a Specialized “All Off” Button](#)
- [Programming a 6-button UPB room controller to control 4 individual loads](#)
- [Programmable Button Timer](#)

## Create a Button for “Guests Arriving”

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to program multiple lighting, security and temperature commands to prepare house for arrival of visitors. Then homeowner can run button whenever necessary.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni Ile, OmniPro/OmniPro II, Lumina, or Lumina Pro controller with X-10 TW523 or compatible Two-Way Powerline Interface.
- b) Any X-10 compatible lamp or wall switch modules capable of dimming and brightening.
- c) HAI Omnistat Thermostat.
- d) Security contact connected from Front Door to Controller.

#### 2. Setup:

- a) Select names for the X-10 modules and enter under “Setup, Names, Units”. We will call ours “Front Porch”, “Foyer”, “Living Room” and “Accents”.
- b) Select name for Omnistat and enter under “Setup, Names, Thermostats”. We will call ours “Downstairs”.
- c) Select a name for the User Button we will program and enter under “Setup, Names, Button”. We will call ours “Guests”.
- d) Select name for security contact on the front door and enter under “Setup, Names, Zones”. We will use “Front Door”.

### Programming:

The objective is to set light levels, temperatures and the security system to welcome guests who arrive after dark. The homeowner only has to select “Guests” from the Button Menu and run it when needed.

We are going to adjust four lights, the thermostat and bypass the security sensor on the Front Door.

Here’s how the programs will look:

- 1) WHEN Guests: Front Porch BRIGHT 9  
   ^ (WHEN)           ^ (COMMAND)
- 2) WHEN Guests: Foyer DIM 2
- 3) WHEN Guests: Living Room DIM 3
- 4) WHEN Guests: Accents DIM 5
- 5) WHEN Guests: Downstairs COOL 72
- 6) WHEN Guests: Downstairs HEAT 68
- 7) WHEN Guests: PROGRAM BYPASS Front Door

Now this group of commands will execute whenever someone selects “Guests” from the Button Menu and presses the “#” key.



## Create a Specialized “ALL OFF” Button

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to program a button activated by the standard “ALL OFF” command to include some other non-X-10 functions.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina, or Lumina Pro controller with X-10 TW523 or compatible Two-Way Powerline Interface.
- b) Any X-10 compatible lamp or wall switch modules capable of dimming and brightening.
- c) HAI Omnistat Thermostat.
- d) HAI 10A07 4 Relay module with one relay connected from Controller to a contact that switches the power to an electric water heater.

#### 2. Setup:

- a) Select names for the X-10 modules and enter under “Setup, Names, Units”. We will call ours “Mud Room”, “Garage”, “Sconces” and “Accents”.
- b) Select name for Omnistat and enter under “Setup, Names, Thermostats”. We will call ours “Downstairs”.
- c) Select a name for the voltage output Unit Number that is controlling the water heater and enter under “Setup, Names, Units”. We will call ours “Water Heat”.

### Programming:

The objective is to turn OFF some lights that are X-10 controlled, but not included in the customary ALL OFF program because we set these up to be excluded. We will also set the proper operational mode for the Omnistat and turn off the water heater, which is hard-wired to the controller.

Here’s how the programs will look:

- 1) WHEN ALL OFF: Mud Room OFF  
    ^ (WHEN)            ^ (COMMAND)
- 2) WHEN ALL OFF: Garage OFF
- 3) WHEN ALL OFF: Sconces OFF
- 4) WHEN ALL OFF: Accents OFF
- 5) WHEN ALL OFF: Downstairs MODE AUTO (Sets Omnistat into Auto Heat/Cool Mode)
- 6) WHEN ALL OFF: Downstairs FAN AUTO (Sets Omnistat Fan to Automatic Operation)
- 7) WHEN ALL OFF: Water Heat OFF

Now this group of commands will execute whenever someone selects “ALL OFF” from the Main Menu on the console or a touch-tone phone.



## Programming a 6-button UPB room controller (HAI model #38A00-1) to control 4 individual loads

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to use a 6-button room controller to control 4 individual lighting loads and have the LEDs on the room controller represent the status of the lighting load.

### Installation:

#### 1. Equipment:

- b) Lumina, LuminaPro, OmniLT, Omni II/Omni IIe, or OmniPro II controller with UPB 36A01-1 or compatible Two-Way Powerline Interface.
- b) UPB compatible wall switch modules.
- c) UPB 6 button room controller or compatible UPB control keypad.

#### 2. Setup:

- a) Change appropriate house code to UPB under: Setup > Misc > Control.
- b) Select a name for the UPB units and enter under: Setup > Names > Units.. We will call our units as follows: Keypad (6-button Controller) – Master – Closet – Hall – Bathroom.
- c) Put the Keypad in set-up mode by holding the on and off button until all the buttons blink.
- d) On a keypad console press the 6 button then the 1 button. Find the unit named “Keypad” and then press the # key twice. The switch will begin configuration.
- e) Once configuration is complete hit the \* key once.
- f) Put one of the wall switches into set up mode by tapping the rocker switch 5 times quickly.
- g) At the keypad console, find the device which you want to configure. Once found hit the # key twice. Follow steps C-E until all units have been configured.

### Programming:

Now we will begin the actually programming behind making this work. Input the following code under: Setup > Programs.

- 1. When Keypad SW3 Pressed: Master Toggle
- 2. When Master On: Keypad LED 3 On
- 3. When Master Off: Keypad LED 3 Off
  
- 4. When Keypad SW4 Pressed: Closet Toggle
- 5. When Closet On: Keypad LED 4 On
- 6. When Closet Off: Keypad LED 4 Off
  
- 7. When Keypad SW5 Pressed: Hall Toggle
- 8. When Hall On: Keypad LED 5 On
- 9. When Hall Off: Keypad LED 5 Off
  
- 10. When Keypad SW6 Pressed: Bathroom Toggle
- 11. When Bathroom On: Keypad LED 6 On
- 12. When Bathroom Off: Keypad LED 6 Off
  
- 10. When Keypad SW1 Pressed: Master On
- 11. When Keypad SW1 Pressed: Closet On
- 12. When Keypad SW1 Pressed: Hall On
- 13. When Keypad SW1 Pressed: Bathroom On
  
- 14. When Keypad SW2 Pressed: Master Off

- 15. When Keypad SW2 Pressed: Closet Off
- 16. When Keypad SW2 Pressed: Hall Off
- 17. When Keypad SW2 Pressed: Bathroom Off

## Programmable Button Timer

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

The purpose of this application is to provide a customer with a way to create a configurable timer that will provide a notification when complete. The details will provide a couple of examples on how this can be employed.

### Installation:

#### 7. Equipment:

- h) OmniLT, Omni II/Omni IIe, OmniPro II, Lumina, or Lumina Pro controller
- i) Console – LCD or OmniTouch

#### 8. Setup:

1. For Example 1, use a console or PC Access to navigate to Setup>>Names, and name the following:
  - a. Under Buttons – name Button 1 = TIMER+1 MIN
  - b. Under Units – name Unit 393 = KITCHENTIMER and Unit 394 = TIMERMINUTES
  - c. Under Messages – name Message 1 TIMER OFF
2. For Example 2, use a console or PC Access to navigate to Setup>>Names, and name the following:
  - a. Under Buttons – name Button 1 = TIMER+1 MIN, Button 2 = TIMER+5 MIN, and Button 3 = TIMER+10 MIN
  - b. Under Units – name Unit 393 = KITCHENTIMER and Unit 394 = TIMERMINUTES
  - c. Under Messages – name Message 1 = TIMER OFF

### Programming:

1. For Example 1, you would create lines of programming logic similar to:

```
WHEN TIMER+1 MIN: INCREMENT TIMERMINUTES
WHEN TIMER MINUTES ON &IF KITCHENTIMER OFF: KITCHENTIMER ON FOR 1 MINUTE
WHEN KITCHENTIMER OFF &IF TIMERMINUTES ON: DECREMENT TIMERMINUTES
WHEN KITCHENTIMER OFF &IF TIMERMINUTES OFF: SHOW TIMER OFF
WHEN KITCHENTIMER OFF &IF TIMERMINUTES ON: KITCHENTIMER ON FOR 1 MINUTE
```

#### How it works:

Lines 1 & 2 increment your counter (*TIMER+1 MIN*) and turn on your timer (*KITCHENTIMER*)

Line 3 decrements your counter, as necessary.

Line 4 shows the TIMER OFF message when both the counter has reached “0” and the KITCHENTIMER has expired.

Line 5 restarts the KITCHENTIMER for another minute if the counter value is greater than “0”.

This would be an excellent application where a variable timer of less than 5 minutes is desired. For instance, if you executed the *TIMER+1 MIN* button 4 consecutive times, you would get a 4 minute timer.

2. For Example 2, you would create programming logic similar to:

```
WHEN TIMER+1 MIN: INCREMENT TIMERMINUTES
```

```
WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES
```

```
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES
```

```
WHEN TIMER MINUTES ON &IF KITCHENTIMER OFF: KITCHENTIMER ON FOR 1 MINUTE  
WHEN KITCHENTIMER OFF &IF TIMERMINUTES ON: DECREMENT TIMERMINUTES  
WHEN KITCHENTIMER OFF &IF TIMERMINUTES OFF: SHOW TIMER OFF  
WHEN KITCHENTIMER OFF &IF TIMERMINUTES ON: KITCHENTIMER ON FOR 1 MINUTE
```

This application would work exactly the same as Example 1, but allow the flexible ability to set longer timers. For instance, you would execute TIMER+10 MIN, TIMER+5 MIN, and TIMER+1 MIN twice, to start a 17 minute timer.

### **Special Notes:**

1. Each timer greater than 1 minute would require an equal number of lines of programming (*TIMER+5 MIN uses 5 lines of programming*)
2. The lines of programming should closely follow the order as they are in the above examples – otherwise, less than desired results are likely to occur.
3. The above examples do not provide any “automated” programming for clearing the message after its display. If the message is not cleared from the display, it will not go away until manually (*or programmatically*) removed. This would also prevent the console from providing any subsequent audible notifications. One automated way to ensure that the audible notification will always work would be to additional lines of programming (see **bold underlined statments**) similar to:
  - a. Example 1:

#### **WHEN TIMER+1 MIN: CLEAR TIMER OFF**

```
WHEN TIMER+1 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER MINUTES ON &IF KITCHENTIMER OFF: KITCHENTIMER ON FOR 1  
MINUTE  
WHEN KITCHENTIMER OFF &IF TIMERMINUTES ON: DECREMENT TIMERMINUTES  
WHEN KITCHENTIMER OFF &IF TIMERMINUTES OFF: SHOW TIMER OFF  
WHEN KITCHENTIMER OFF &IF TIMERMINUTES ON: KITCHENTIMER ON FOR 1  
MINUTE
```

- b. Example 2:

#### **WHEN TIMER+1 MIN: CLEAR TIMER OFF**

```
WHEN TIMER+1 MIN: INCREMENT TIMERMINUTES
```

#### **WHEN TIMER+5 MIN: CLEAR TIMER OFF**

```
WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES
```

WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+5 MIN: INCREMENT TIMERMINUTES

**WHEN TIMER+10 MIN: CLEAR TIMER OFF**

WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES  
WHEN TIMER+10 MIN: INCREMENT TIMERMINUTES

WHEN TIMER MINUTES ON &IF KITCHENTIMER OFF: KITCHENTIMER ON FOR 1  
MINUTE  
WHEN KITCHENTIMER OFF &IF TIMERMINUTES ON: DECREMENT TIMERMINUTES  
WHEN KITCHENTIMER OFF &IF TIMERMINUTES OFF: SHOW TIMER OFF  
WHEN KITCHENTIMER OFF &IF TIMERMINUTES ON: KITCHENTIMER ON FOR 1  
MINUTE



# Chapter 5: Temperature Control

- [Schedule Omnistat to Desired Temperatures Before Occupant Returns](#)
- [Set Back Omnistat Desired Temperatures When Security Armed Away](#)
- [Adjust Omnistat Temperatures When an X-10 Signal is Transmitted](#)
- [Install a Remote Temperature Sensor to any HAI Omnistat](#)
- [Turn Omnistat Off When any Window Opens, Back On When all Windows Close](#)

## Schedule Omnistat to Desired Temperatures Before Occupant Returns

### Compatible Controllers:

OmnILT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to be sure that the Omnistats are set for the proper temperatures BEFORE a customer gets home. A simple time schedule with one condition is used.

### Installation:

1. Equipment:
  - a) OmniLT, Omni/Omni II/Omni Ile, OmniPro II, Lumina, or Lumina Pro controller.
  - b) Any HAI Omnistat Communicating Thermostat.
2. Hookup:
  - a) Install Omnistat in regular thermostat location and connect to heating/cooling equipment per that manufacturer's instructions. Confirm that everything operates correctly.
  - b) Connect Omnistat to HAI Controller at the "+" side of zone 16, the "+" side of output 8 and ground (or to the terminals marked "TSTAT" on the OmniLT). See Omnistat Installation Manual (page number varies).
3. Setup:
  - a) Select name for Omnistat and enter under "Setup, Names, Temperatures".
  - b) Define the thermostat type (Auto Heat/Cool for example) under "Installer Setup, Temperatures".

### Programming:

The objective here is to have the house temperature set properly BEFORE the occupants return, but try to avoid those occasions when that change is not appropriate. We use a simple time schedule to set the temperature, but rely on the state of the security system to tell us if we really want to make a change. For example, if the security is in the OFF or DAY mode we can assume that the house is already occupied and no changes should be made. Likewise, if the security is set to VACATION we should leave everything alone. This leaves us with AWAY which we will take to mean that someone will be back within a relatively short time, like away at work or school.

Choose the appropriate time to initiate this program along with the customer's desired temperatures. You may want to split the difference between the AWAY setback temperatures and the normal comfort temperatures, i.e. if you set back to 80 degrees for COOL, then use this program to come back down to 75 rather than all the way to 70 or 71. This way you're still saving some energy while the house is empty, but the recovery time is shorter than doing nothing.

When you have a traditional combined heating and cooling system, you must program the setpoints for HEAT and COOL separately, as these are separate commands.

Here we go:

1. 6:00 PM MTWTF-- &IF AWAY (ARMED AWAY: Out For The Day): THERMOSTAT 1 COOL 75  
    ^ (WHEN)                      ^ (CONDITION)                      ^ (COMMAND)
2. 6:00 PM MTWTF-- &IF AWAY (ARMED AWAY: Out For The Day): THERMOSTAT 1 HEAT 65  
    ^ (WHEN)                      ^ (CONDITION)                      ^ (COMMAND)





## Set Back Omnistat Desired Temperatures When Security Armed Away

**Compatible Controllers:**  
OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to be sure that the Omnistat thermostats are set for the proper temperatures to save energy and money after the house becomes unoccupied.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni Ile, OmniPro II, Lumina, or Lumina Pro controller.
- b) Any HAI Omnistat Communicating Thermostat.

#### 2. Hookup:

- a) Install Omnistat in regular thermostat location and connect to heating/cooling equipment per that manufacturer's instructions. Confirm that everything operates correctly.
- b) Connect Omnistat to HAI Controller at the "+" side of zone 16, the "+" side of output 8 and ground (or to the terminals marked "TSTAT" on the OmniLT. See Omnistat Installation Manual (page number varies).

#### 3. Setup:

- a) Select name for Omnistat and enter under "Setup, Names, Temperatures".
- b) Define the thermostat type (Auto Heat/Cool for example) under "Installer Setup, Temperatures".

### Programming:

The objective here is to have the house temperature set properly for the times when the house is unoccupied. We use the change in state of the security system to tell us when to make the change in temperatures. In this example arming the security mode to AWAY will be the event that will trigger our setback.

When you have a traditional combined heating and cooling system, you must program the setpoints for HEAT and COOL separately, as these are separate commands.

Here we go:

- 1. WHEN AWAY: THERMOSTAT 1 COOL 80  
    ^ (WHEN)      ^ (COMMAND)
- 2. WHEN AWAY: THERMOSTAT 1 HEAT 60

The same method is used for any additional thermostats in the house. Be aware that you can have totally different setpoints for each thermostat. That can be an important feature to some customers.

- 3. WHEN AWAY: THERMOSTAT 2 COOL 85  
    ^ (WHEN)      ^ (COMMAND)
- 4. WHEN AWAY: THERMOSTAT 2 HEAT 55

You can continue to program each Omnistat in the same manner.



## Adjust Omnistat Temperatures When an X-10 Signal is Transmitted

**Compatible Controllers:**  
OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to adjust Omnistat desired temperatures using a device that sends X-10 signals. This application will focus on using a Leviton (or similar) 4 button wall mounted transmitter to adjust the temperature.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro II, Lumina, or Lumina Pro controller.
- b) Any HAI Omnistat Communicating Thermostat.
- c) Any X-10 transmitter (In this application, we will use a Leviton Model 6450 Four Button Transmitter).

#### 2. Hookup:

- a) Install Omnistat in regular thermostat location and connect to heating/cooling equipment per that manufacturer's instructions. Confirm that everything operates correctly.
- b) Connect Omnistat to HAI Controller at the "+" side of zone 16, the "+" side of output 8 and ground (or to the terminals marked "TSTAT" on the OmniLT. See Omnistat Installation Manual (page number varies).
- c) Install the X-10 transmitter per that manufacturer's instructions. Confirm that everything operates correctly.

#### 3. Setup:

- a) Select name for Omnistat and enter under "Setup, Names, Temperatures".
- b) Define the thermostat type (Auto Heat/Cool for example) under "Installer Setup, Temperatures".
- c) Set up a house code and unit for the X-10 transmitter (We will use House Code F Unit Number 1).

### Programming:

The objective here is to adjust the temperature by pressing one of the buttons on the Leviton 6450 transmitter. When one of the buttons is pressed On, the temperatures are set to a more comfortable level (i.e. the Cool will be set to 76 degrees and the Heat to 73 degrees). When the button is pressed Off, the temperatures are set back a few degrees (i.e. the Cool will be set to 80 degrees and the Heat to 69 degrees).

When you have a traditional combined heating and cooling system, you must program the setpoints for HEAT and COOL separately, as these are separate commands.

The programs will look like this:

- 1) WHEN X-10 F1 ON: THERMOSTAT 1 COOL SETPOINT 76
- 2) WHEN X-10 F1 ON: THERMOSTAT 1 HEAT SETPOINT 73
- 3) WHEN X-10 F1 OFF: THERMOSTAT 1 COOL SETPOINT 80
- 4) WHEN X-10 F1 OFF: THERMOSTAT 1 HEAT SETPOINT 69

The other buttons on the Leviton 6450 transmitter (F2, F3 and F4) may be used similarly to adjust other temperature ranges, thermostats, and/or lighting.



## Install a Remote Temperature Sensor to any HAI Omnistat

### Compatible Equipment:

Any RC-Series Omnistat  
HAI Remote  
Temperature Sensor

### Application:

How to install a remote temperature sensor to your existing RC-Series Omnistat. This will allow the customer to monitor the temperature of an area without the thermostat visible. The thermostat, or group of thermostats, could be in a different location offering the customer complete control of temperatures.

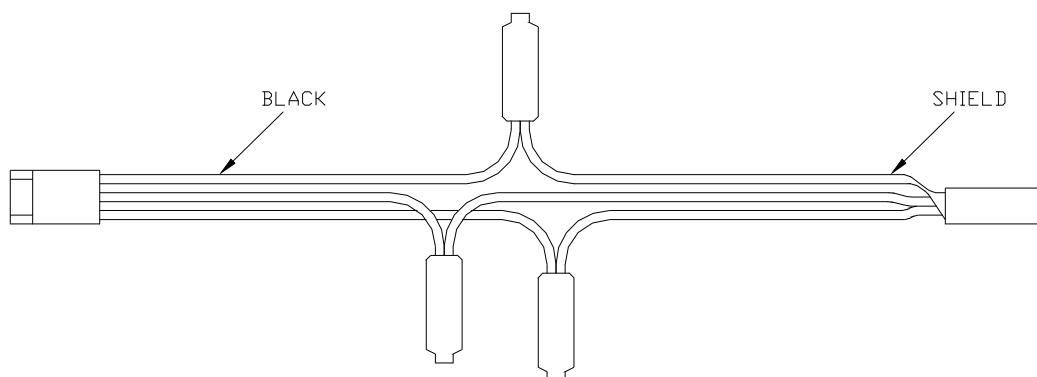
### Installation:

#### 1. Equipment:

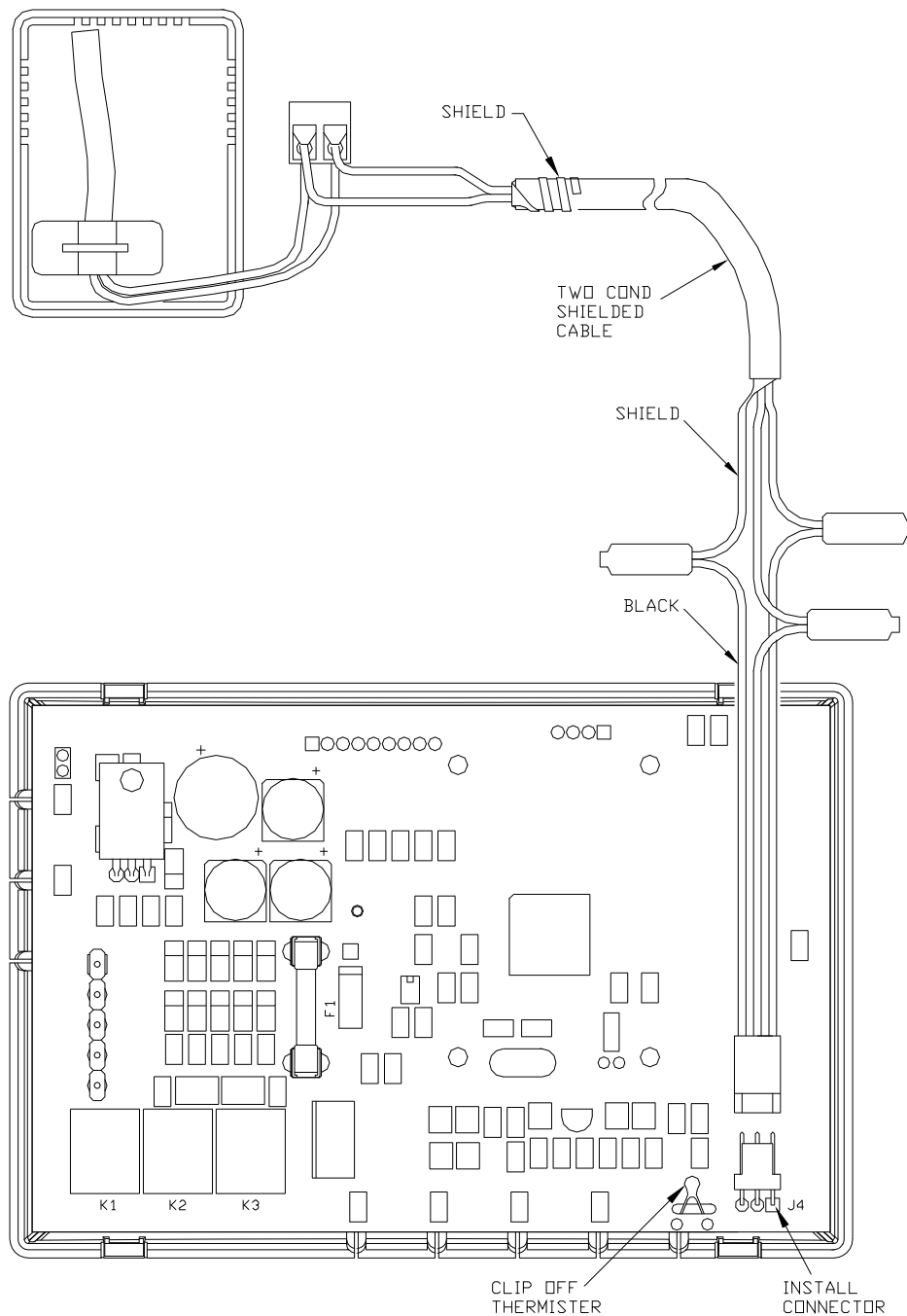
- a) Any HAI Omnistat Communicating Thermostat
- b) A Model 23A00-1 or 23A00-2 Remote Temperature Sensor
- c) 22 gauge (or better) shielded cable
- d) Soldering Iron and safety glasses
- e) Wire cutters

#### 2. Hookup:

- a) Install Omnistat base in regular thermostat location and connect to heating/cooling equipment per that manufacturer's instructions. Connect thermostat to base and confirm that everything operates correctly.
- b) Disconnect the thermostat from base. Locate the 3 solder holes on the lower right side of the thermostat PCA marked J4.
- c) Using a clean soldering iron and safety glasses, carefully solder the supplied connector to the soldering holes as shown.
- d) Run a 2 conductor, 22 gauge (or better) shielded cable from the Omnistat to the Remote Temperature Sensor location.
- e) At the Omnistat location, connect the Black conductor of the supplied cable to the shield using the supplied wire splices. Connect the Green conductors of the supplied cable to the data wires using the supplied wire splices.

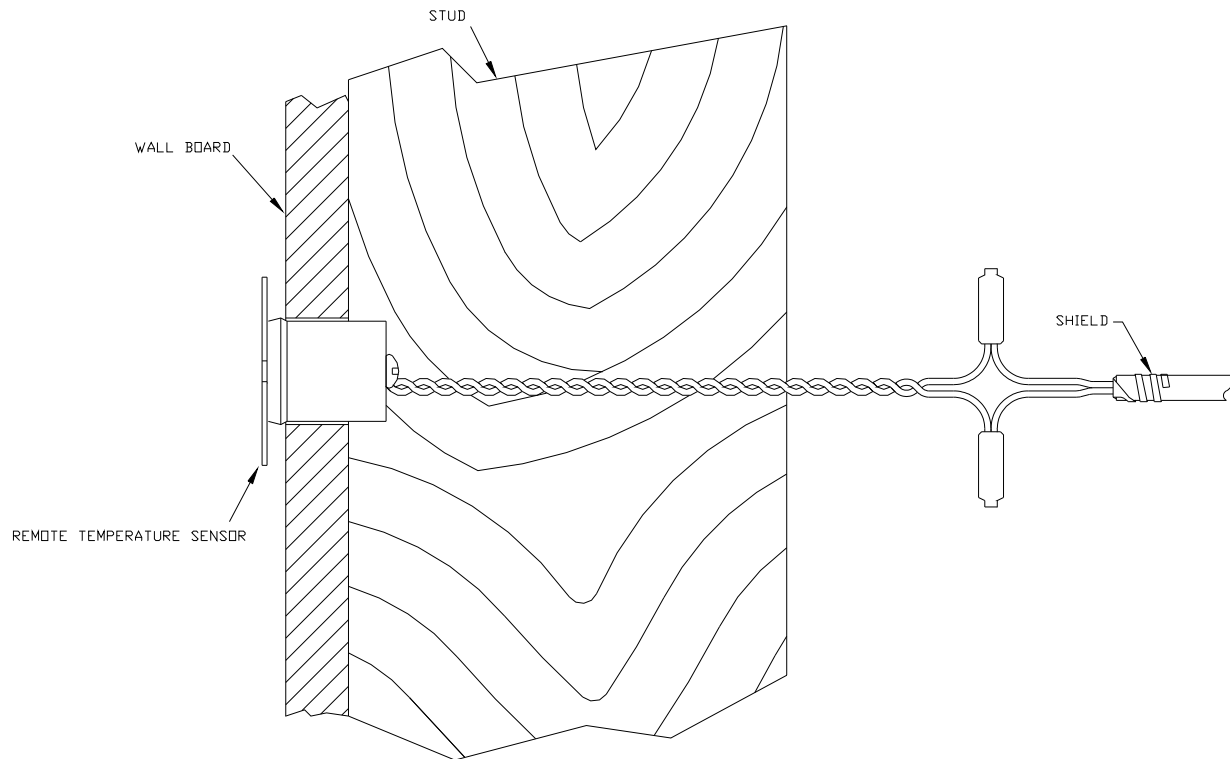


- f) When using the Model 23A00-1, open cover and connect the data wires of the shielded cable to the terminal block on the temperature sensor. Wrap the shield around the jacket of the cable and tape.



- g) Carefully clip off the existing thermistor (temperature sensing device) from the thermostat using a pair of wire cutters as shown.
- h) Connect the supplied cable to the installed connector (J4) on the Omnistat.
- i) Reconnect thermostat to the base and confirm that the thermostat is displaying the proper temperature.

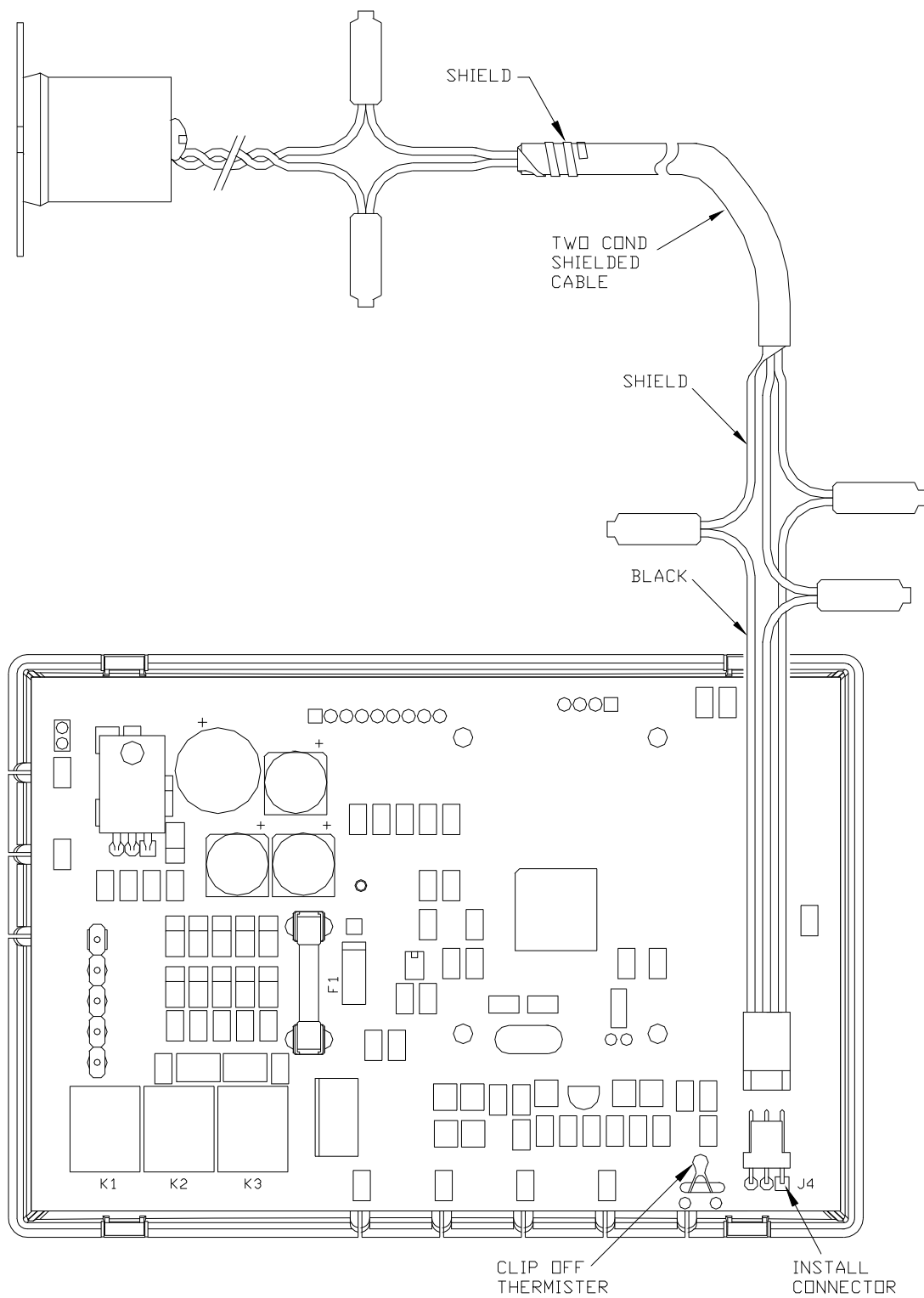
- j) When using the Model 23A00-2, select a place to mount the Remote Temperature Sensor. Be sure to avoid an area where studs, plumbing, or electrical wiring may be located behind the wallboard. Hold the base of the plastic case against the wall. Trace around the perimeter of the plastic case with a pencil. Carefully cut along the pencil line. Do not oversize this cutout! Connect the data wires of the shielded cable to the green data wires of the temperature sensor using the supplied wire splices. Wrap the shield around the jacket of the cable and tape. Insert the Remote Temperature Sensor base into the cutout in the wall.



- k) Carefully clip off the existing thermistor (temperature sensing device) from the thermostat using a pair of wire cutters as shown.
- l) Connect the supplied cable to the installed connector (J4) on the Omnistat.
- m) Reconnect thermostat to the base and confirm that the thermostat is displaying the proper temperature.

**(Connections Diagram on Next Page)**









- 4) WHEN KITCHEN WINDOW NOT READY: RUN CHANGE STATE
- 5) WHEN DINING WINDOW SECURE: RUN CHANGE STATE
- 6) WHEN DINING WINDOW NOT READY: RUN CHANGE STATE
- 7) WHEN BEDROOM WINDOW SECURE: RUN CHANGE STATE
- 8) WHEN BEDROOM WINDOW NOT READY: RUN CHANGE STATE

The next set of programs will instruct the system to set the Flag "WINDOW FLAG" On if any of the zones are Not Ready. Later we will use the state of this Flag to adjust the Mode of the thermostat.

We will begin this macro by turning Off the Flag:

- 1) WHEN CHANGE STATE: WINDOW FLAG OFF
- 2) WHEN CHANGE STATE &IF DEN WINDOWS NOT READY: WINDOW FLAG ON
- 3) WHEN CHANGE STATE &IF KITCHEN WINDOWS NOT READY: WINDOW FLAG ON
- 4) WHEN CHANGE STATE &IF DINING WINDOWS NOT READY: WINDOW FLAG ON
- 5) WHEN CHANGE STATE &IF BEDROOM WINDOWS NOT READY: WINDOW FLAG ON

So, whenever a window changes state (opens or closes) we run the "CHANGE STATE" Button. When the "CHANGE STATE" Button is executed, we turn Off the "WINDOW FLAG", then we check the state of each window. If any of the windows are open, the "WINDOW FLAG" is turned On.

Next, we issue the commands to the thermostat as follows:

- 6) WHEN CHANGE STATE &IF WINDOW FLAG OFF: THERMOSTAT 1 MODE AUTO
- 7) WHEN CHANGE STATE &IF WINDOW FLAG ON: THERMOSTAT 1 MODE OFF

If none of the windows are open when the "CHANGE STATE" button is executed, the "WINDOW FLAG" will remain Off. Thermostat 1 will change to Auto Mode.

If any of the windows are open when the "CHANGE STATE" button is executed, the "WINDOW FLAG" will turn On. Thermostat 1 will change to Off mode.

# Chapter 6: Audio / Video / Infrared

- [Pause CD Player When Telephone Goes “Off – Hook”](#)
- [Transmit Infrared Signals With a SmartLinc™ B.I.R.D.](#)
- [Transmit / Receive Infrared Signals With An Adicon CPU-XA or Ocelot Controller](#)
- [Interface a Philips Pronto Intelligent Remote Control with an HAI Controller](#)
- [Interfacing the ELAN VIA Touchscreen](#)



## Pause CD Player When Telephone Goes “Off – Hook”

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to program a CD player or other audio equipment to pause when someone answers a phone call.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro II, Lumina, or Lumina Pro controller.
- b) HAI Model 10A07 4 Relay Module
- c) Any hard-wired contact closure to IR device. Recommended: Xantech Model 590.

#### 2. Hookup:

- a) Install Model 10A07 Relay Module in Omni Series Controller enclosure following the instructions included with Module (Copy Attached). Connect common lead from module to ground on controller. Connect trigger for Relay 1 to “+” side of any hardwire output on controller.
- b) Connect one of the inputs to the Xantech 590 to “NO” and “C” terminals on Relay 1.
- c) Position IR emitter from Xantech 590 near CD or other audio device that you wish to control.

#### 3. Setup:

- a) Select name for relay output and enter under “Setup, Names, Units”. We will use “CD Pause”.
- b) “Teach” Xantech 590 to send pause command when relay input toggled. Refer to Xantech manual.

### Programming:

The objective here is to have the proper IR command sent out to pause a CD in progress when a telephone is taken off-hook. We then would need to restore play when the phone is hung up. This is a very simple programming example.

Here’s what the programs look like:

- 1) WHEN PHONE OFF HOOK: CD Pause ON FOR 1 SECOND  
    ^ (WHEN)                      ^ (COMMAND)
- 2) WHEN PHONE ON HOOK: CD Pause ON FOR 1 SECOND  
    ^ (WHEN)                      ^ (COMMAND)

There are some considerations we need to examine:

>We did not choose to pause the CD when the phone rings, because it may be a nuisance call.

>Think about the possibility of some other family member taking the call in another room.

>What if the CD player was already in Pause when someone answers the phone?





## Transmit Infrared Signals With a SmartLinc™ B.I.R.D.

### Compatible Controllers:

OmniLT  
Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

This application shows how to use a SmartLinc™ Broadband Infrared Driver (B.I.R.D.) - RS-232 to IR converter, and an HAI controller (capable of Pro Link Protocol) to control televisions, stereos, and other IR devices.

### Installation:

#### 3. Equipment:

- c) OmniLT, Omni II/Omni Ile, OmniPro II OmniPro II, Lumina, or Lumina Pro controller (with a 10A17 Serial Interface Expander).
- d) A SmartLinc™ Broadband Infrared Driver (B.I.R.D.) C 1106 - RS-232 to IR converter.

#### 4. Setup:

- a) Select a name for a Button and enter under "Setup, Names, Buttons". We will use "Clear IR".
- b) Select a name for a Message and enter under "Setup, Names, Messages". We will use "^M".

#### 5. Installation:

- c) Install the 10A17 Serial Interface Expander or utilize the on board serial port and program the port for "Pro-Link" at 9600 baud.
- d) Connect the B.I.R.D. serial cable to the 10A17 or the on board serial port. Connect the power supply and an IR flasher as per the B.I.R.D. instructions.

### Programming:

The key to successfully integrating the B.I.R.D. is the use of the "^M" command. The Pro-Link feature in the OmniPro does not send a carriage return at the end of each message. By inserting a "^M", the B.I.R.D. (and most other RS-232 devices) will interpret the "^M" as a carriage return. When RS-232 units are first connected, it is common for random characters to be stored in the buffers of both devices. To clear the random data, a carriage return needs to be sent. It is a good idea to write a simple button that sends a carriage return (^M) to the serial port.

Here's how the button will look:

```
WHEN Clear IR: SEND 1 ^M (Carriage Return Message)
^(WHEN)      ^ COMMAND (Serial Port 1)
```

Tip: Place the button and message in slot 65 so as more messages and buttons are programmed into the system, they always will show last. Although there should never be a need for the "Clear IR" button once the system is operational, it is a good idea to leave it in the system as an easy method to clear the RS-232 data stream if noise does occur.

Consult the B.I.R.D. installation manual for information on the B.I.R.D. protocol. The B.I.R.D. is both a preprogrammed and learning IR device giving compatibility with nearly any IR device.

Programming the B.I.R.D. from the control panel is technically possible but would be an inefficient process. It is recommended to attach the B.I.R.D. to a PC and use a terminal program such as HyperTerminal. Be certain to set the correct Com port to 9600 baud, 8 bit, 1 stop bit, no parity, and no flow control (most default to hardware controlled). Use the B.I.R.D. documentation to configure the unit and determine the function key address that will be accessed by the HAI controller.

After the B.I.R.D. is successfully programmed and devices are reliably controlled, connect the B.I.R.D. to the control panel and follow the following test procedure.

Send W00F (transmit the power command programmed in bank A):

1. Create a message: W00F^M  
Note: all letters are upper case and ALL messages to the B.I.R.D. MUST end with ^M.
2. Manually send the command by selecting 8 (message), 6 (send), 1# (serial 1).

Scroll down to the W00F^M message and press #. If everything is connected and programmed correctly, the "Bank A" LED on the B.I.R.D. will blink once and the unit will turn off (or On).

Use the B.I.R.D. manual to determine each command that is to be used by the system. Be certain to note which bank the correct command is located. Write a separate message for each command.

Example:

1. Message 60: W00F^M  
                  ^ Power Command for the television
2. Message 61: W20F^M  
                  ^ Power On VCR
3. Message 62: W021^M  
                  ^ Select VCR on the TV
4. Message 63: W219^M  
                  ^ VCR Play

These Messages can be combined through a Button to create a home theater scene:

1. Create a button named: Play Movie
2. Name the X-10 theater lights: Theater Lights
3. Using the above messages write the following program:

```
WHEN Play Movie: Send 1 ^M (Carriage Return Message)    * This Line is
Optional
^(WHEN BUTTON)    ^ (Serial Port 1)

WHEN Play Movie: Theater Lights Dim 5
^(WHEN BUTTON)    ^ (X-10 Lights On - Dim 5)

WHEN Play Movie: Send 1 W00F^M (Power - Television)
^(WHEN BUTTON)    ^ (Serial Port 1)

WHEN Play Movie: Send 1 W20F^M (Power - VCR)
^(WHEN BUTTON)    ^ (Serial Port 1)
```

WHEN Play Movie: Send 1 W021^M (Select VCR on the TV)  
^(WHEN BUTTON)    ^ (Serial Port 1)

WHEN Play Movie: Send 1 W219^M (VCR - Play)  
^(WHEN BUTTON)    ^ (Serial Port 1)



## **Transmit / Receive Infrared Signals with an Adicon CPU-XA or Ocelot Controller**

### **Compatible Controllers:**

OmniLT  
Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### **Application:**

This application shows how to use an Adicon™ CPU-XA or Ocelot, and a HAI controller (capable of Pro-Link Protocol) to control televisions, stereos, and other infrared devices. In addition, the CPU-XA and Ocelot have an infrared receive feature that allows a HAI controller to execute any programming routine based on receiving an infrared command.

### **Installation:**

#### **1. Equipment:**

- a) OmniLT, Omni II/Omni IIe, OmniPro II, OmniPro II, Lumina, or Lumina Pro controller with a 10A17 Serial Interface Module.
- b) A CPU-XA or Ocelot with software 8.21/10 or later

#### **2. Installation:**

- a) Install the 10A17 Serial Interface Module and configure Module 3 type in the controller for Pro-Link and 9600 baud under "Setup, Installer, Expansion" or configure the Serial Function of the on board Serial Port for Pro-Link.
- b) Using the Adicon software, set CPU-XA/Ocelot option #18 to a value of 1 (defaults as 0). This will enable ASCII based communication.

### **Programming:**

This application note focuses only on the CPU-XA/Ocelot's infrared capabilities and only refers to their ASCII protocol that uses infrared. There are additional ASCII commands which can be integrated with HAI controllers capable of Pro-Link. A copy of the complete protocol is available through Adicon ([appdig.com](http://appdig.com)) or your Adicon distributor.

Consult the CPU-XA/Ocelot installation manual for connecting the CPU-XA/Ocelot to a PC and learning infrared commands into "banks".

Programming the CPU-XA/Ocelot from the OmniPro is technically possible (it is in the protocol) but would be an inefficient process. It is recommended to attach the CPU-XA/Ocelot to a PC and use the C-Max software (revision 1.30 or greater). Create a list of each command and the "bank" it is learned into.

**Example:**

Bank 000:	Not Used (as per Adicon recommendation)
Bank 001:	Channel Digit 1
Bank 002:	Channel Digit 2
Bank 003:	Channel Digit 3
Bank 004:	Channel Digit 4
Bank 005:	Channel Digit 5
Bank 006:	Channel Digit 6
Bank 007:	Channel Digit 7
Bank 008:	Channel Digit 8
Bank 009:	Channel Digit 9
Bank 010:	Channel Digit 10
Bank 011:	Television Power
Bank 012:	VCR Power
Bank 013:	Television Source Select
Bank 014:	VCR Play

**Tip:**

Test the infrared commands while connected to the PC. Commands like power and volume often require either a longer or shorter press. For instance, if channel up is held too long it may jump up 2 channels. Simply relearn the command and hold the button for a shorter time.

After the CPU-XA/Ocelot is successfully programmed and devices are reliably controlled, connect the CPU-XA/Ocelot to the 10A17 Serial Interface and follow the following test procedure.

1. Create a message: +T000011  
Note: all letters are upper case.
2. Manually send the command by selecting 8 (message), 6 (send), 1# (serial 1).
3. Scroll down to the +T000011 Message and press #. If everything is connected and programmed correctly, the TV will turn off (or On).

Use the CPU-XA/Ocelot manual to determine each command that is to be used by the system. Be certain to note which bank the correct command is located. Write a separate message for each command.

**Example:**

1. Message 60: +T000011  
^ Power Command for the television
2. Message 61: +T000012  
^ Power On VCR
3. Message 62: +T000013  
^ Select VCR on the TV
4. Message 63: +T000014  
^ VCR Play

These Messages can be combined through a Button to create a home theater scene:

1. Create a button named: Play Movie
2. Name the X-10 theater lights: Theater Lights
3. Using the above messages write the following program:

WHEN Play Movie: Theater Lights Dim 5

^(WHEN BUTTON) ^ (X-10 Lights On – Dim 5)

WHEN Play Movie: Send 1 +T000011 (Power – Television)

^(WHEN BUTTON) ^ (Serial Port 1)

WHEN Play Movie: Send 1 +T000012 (Power – VCR)

^(WHEN BUTTON) ^ (Serial Port 1)

WHEN Play Movie: Send 1 +T000013 (Select VCR on the TV)

^(WHEN BUTTON) ^ (Serial Port 1)

WHEN Play Movie: Send 1 +T000014 (VCR – Play)

^(WHEN BUTTON) ^ (Serial Port 1)

#### **Infrared Receive:**

The CPU-XA/Ocelot is a 2-way infrared device that has the capability to transmit as well as receive commands. This feature makes it possible to add new capabilities to an infrared command.

#### **Example:**

In a home theater it may be desirable to brighten the lights when “pause” is pressed on the DVD. Often mute is pressed because the customer is going to get up and do something quickly. This routine will see the “pause” infrared command and respond by sending a “bright” command.

#### **Program:**

Bank 015: DVD pause

WHEN RECEIVE SERIAL 1 +T000015: Theater Lights BRIGHT 9

Notice the command (+T000015) is the same. When the command is received, it is coming from the CPU-XA/Ocelot. If the command is sent out the serial port, it is directing the CPU-XA/Ocelot to transmit the infrared Command.

## Notes:

### 1. Power Toggle:

In an informal experiment, an attempt was made to use the CPU-XA/Ocelot to overcome the “power toggle” issue with remote controls. Until recently, most manufacturers of televisions and other A/V components only allowed the power button to toggle power. Therefore, routines like “When a car pulls up the driveway turn on the television and turn to channel 35” becomes very difficult. If the customer is watching television and a car pulls up the driveway, the television is turned off. An attempt was made to use the 2-way feature to watch for power commands and eliminate the need for a sensor attached to the A/V component. This did not turn out to be a good application because the HAI controller and television can get out of sync and confuse the customer. In installations with infrared distribution, the issue of command feedback made programming very difficult. The best method to defeat this installation obstacle is with a current sensor, or by obtaining the exclusive on/off commands for the equipment (not always available). This limitation to infrared integration is an issue that still does not have a simple solution. The best approach is to consult an automation distributor to find a sensor or infrared code to fit the application.

### 2. Infra Red Routing:

For high end audio distribution applications it is often necessary to have the ability to “route” a command to a specific piece of A/V equipment. This most often comes into play when multiple amplifiers from the same manufacturer are used in a single installation. There might be a need to only turn the volume up on one amp. Technically this is possible with the CPU-XA/Ocelot. There has been no testing for integrating this portion of the CPU-XA/Ocelot protocol with an OmniPro.

### 3. Using the Adicon SECU16-IR Infrared Output Module:

The Adicon SECU16-IR Infrared Output Module requires two commands from the CPU-XA/Ocelot to respond with an infrared output from one of its ports. The first command from the CPU-XA/Ocelot selects the Remote IR Zone. The second command sends the learned IR to the Zone selected by the first command.

- a) Select Remote IR Zone: +Smmpp00, where mm is the Module Number 01 through 99.

Example: select Zone 2 in Module 3: +S030200.

- b) Send Remote IR: +K000xxx, sends learned IR xxx to Module and Zone selected on above command.

Example: Send IR #1: +K000001.

- c) To synchronize the CPU-XA/Ocelot and the HAI controller while running a button such as “PARTY TIME”, a flag must be set for one second between the output of the two messages:

```
WHEN PARTY TIME: SEND +S030200 OUT SERIAL 1
WHEN PARTY TIME: UNIT 201 ON FOR 1 SECOND
WHEN UNIT 201 OFF: SEND +K000001 OUT SERIAL 1
```



#### 4. Programming Tip:

On large installs with 5 or more commands, it may be difficult to remember the function of each “bank”. More importantly, during upgrades it may be even more difficult to remember what each command does. This programming method requires more typing but it makes programs far easier to read.

OmniPro Unit Number	Flag Name	CPU-XA/Ocelot Bank	Description
Unit 201	TV #1	Bank 001:	Channel Digit 1
Unit 202	TV #2	Bank 002:	Channel Digit 2
Unit 203	TV #3	Bank 003:	Channel Digit 3
Unit 204	TV #4	Bank 004:	Channel Digit 4
Unit 205	TV #5	Bank 005:	Channel Digit 5
Unit 206	TV #6	Bank 006:	Channel Digit 6
Unit 207	TV #7	Bank 007:	Channel Digit 7
Unit 208	TV #8	Bank 008:	Channel Digit 8
Unit 209	TV #9	Bank 009:	Channel Digit 9
Unit 210	TV #0	Bank 010:	Channel Digit 10
Unit 211	TV Power	Bank 011:	Television Power
Unit 212	VCR Power	Bank 012:	VCR Power
Unit 213	TV Select	Bank 013:	Television Source Select
Unit 214	VCR Play	Bank 014:	VCR Play

NOTE: When integrating the CPU-XA/Ocelot with the OmniLT, Omni II/Omni IIe, and OmniPro II, you must use the appropriate corresponding Unit numbers...

Units 29-36 for the OmniLT, 73-128 for the Omni II/Omni IIe, and 393-511 for the OmniPro II.

Place the following programming lines at the end of the system program.

```
WHEN TV #1 ON: SEND 1 +T0000001
WHEN TV #2 ON: SEND 1 +T0000002
WHEN TV #3 ON: SEND 1 +T0000003
WHEN TV #4 ON: SEND 1 +T0000004
WHEN TV #5 ON: SEND 1 +T0000005
WHEN TV #6 ON: SEND 1 +T0000006
WHEN TV #7 ON: SEND 1 +T0000007
WHEN TV #8 ON: SEND 1 +T0000008
WHEN TV #9 ON: SEND 1 +T0000009
WHEN TV #0 ON: SEND 1 +T0000010
WHEN TV Power ON: SEND 1 +T0000011
WHEN VCR Power ON: SEND 1 +T0000012
WHEN TV Select ON: SEND 1 +T0000013
WHEN VCR Play ON: SEND 1 +T0000014
```

Once a flag is assigned to a specific function it is no longer necessary to remember which function is assigned to a bank. When the flag is turned on, the command is sent.

#### Example:

```
WHEN Play Movie: Theater Lights Dim 5
WHEN Play Movie: TV Power ON
WHEN Play Movie: VCR Power ON
WHEN Play Movie: TV Select ON
WHEN Play Movie: VCR Play ON
```



## Interface a Philips Pronto Intelligent Remote Control with an HAI Controller

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

This application details the process for interfacing a Philips Pronto™ intelligent remote control with an HAI controller. For more information on Pronto, refer to the web site at <http://www.merlin.svcs.com/>.

### Installation:

Equipment:

1. Any HAI Omni series controller
2. Philips Pronto Intelligent Remote Control
3. Pronto Edit software ([www.pronto.philips.com](http://www.pronto.philips.com))
4. X-10™ IR-543: IR to X-10 mini controller

### Programming:

The Pronto is an infrared learning remote control which is designed to control audio/video devices. Touchscreens have been developed for the Pronto that can be modified and downloaded from a PC to the Pronto. The interface between the Pronto and HAI is an X-10 manufactured device called the IR-543. The IR-543 receives an infrared command and transmits X-10 commands for up to 16 addresses. HAI controllers can receive X-10 on and off commands and execute automated events. Using all 16 addresses and the on and off command for each address, the HAI controller can execute up to 32 separate actions.

One of the limitations of this interface is the use of X-10 commands. X-10 is a great technology for turning lights on and off; however, X-10 is not recommended for critical operations such as security. Typically X-10 would not be recommended for thermostat control but there are some programming techniques shown below designed to enhance the reliability of the X-10 interface. Security control is not included in the routines below.

Controlling an HAI system with the Pronto is not difficult and there is a Pronto file available on [www.homeauto.com](http://www.homeauto.com) to make the process easier.

Pronto Screens:

Program the following menus and buttons into the Pronto:

1. Main Screen
  - a) Lights On
  - b) Lights Off
  - c) Run 4 Buttons: Movie Time; Movie Over; Good Night; Dining Dim
  - d) Link to Temperature
  - e) Link to Light

## 2. Lights

- a) Control of 5 lights
- b) The first 3 lights are directly controlled. The first 2 can be dimmed.
- c) The last 2 lights send an X-10 command to the HAI. The controller sends the correct command.

## 3. Downstairs Thermostat

- a) 5 Heat temperatures
- b) 5 Cool temperatures
- c) Auto/Off
- d) Fan Auto/Off

## 4. Upstairs Thermostat

- a) Same features as the downstairs thermostat.

To incorporate a Pronto it is recommended to become familiar with the ProntoEdit software before trying to create an interface. Pronto is an extremely powerful interface designed to control audio/video systems in addition to an HAI controller. There is a manual available on the web site. Included in the dealer section of the HAI web site is a driver with the default screens shown above. Below is a map of how each X-10 address is defined within the Pronto and how the HAI controller interprets the address.

### X-10 Command Map

Unit Number	Command	Comment
1	On/Off	Table Light: No interface to HAI
2	On/Off	Entry Light – Bright / Dim Command: No interface to HAI
3	On/Off	Reading Light – Bright / Dim Command: No interface to HAI
4	On/Off	Dining Light – received by HAI: HAI Controls light
5	On/Off	Hallway Light – received by HAI: HAI Controls light
6	On	Received by HAI: HAI sends All Lights On
6	Off	Received by HAI: HAI sends All Lights Off
7	On	Received by HAI: places Downstairs thermostat in que
7	Off	Received by HAI: places Upstairs thermostat in que
8	On	Received by HAI: HAI runs the Good Night button
8	Off	Received by HAI: HAI runs the Dining Dim button
9	On	Received by HAI: HAI runs the Movie Time button
9	Off	Received by HAI: HAI runs the Movie Over button
10	On	Received by HAI: If a thermostat in que; Heat Temp 62
10	Off	Received by HAI: If a thermostat in que; Cool Temp 68
11	On	Received by HAI: If a thermostat in que; Heat Temp 64
11	Off	Received by HAI: If a thermostat in que; Cool Temp 70
12	On	Received by HAI: If a thermostat in que; Heat Temp 66
12	Off	Received by HAI: If a thermostat in que; Cool Temp 72
13	On	Received by HAI: If a thermostat in que; Heat Temp 68
13	Off	Received by HAI: If a thermostat in que; Cool Temp 74
14	On	Received by HAI: If a thermostat in que; Heat Temp 70
14	Off	Received by HAI: If a thermostat in que; Cool Temp 76
15	On	Received by HAI: If a thermostat in que; Mode Auto
15	Off	Received by HAI: If a thermostat in que; Mode Off
16	On	Received by HAI: If a thermostat in que; Fan On
16	Off	Received by HAI: If a thermostat in que; Fan Off

Sample Program for HAI Controller:

The IR-543 if set for house code "F". To use a different house code change the "F" below to the appropriate house code. The program is straightforward with the exception of the thermostat control. When designing the routine there were three main objectives. The first objective was to make the routine safe to use. All temperatures selected are well within acceptable operating ranges. Although extremely unlikely, if the controller were to incorrectly receive an X-10 command, the thermostat would not be placed at an extreme setting. The second objective was to reduce the likelihood of a false activation. This was achieved by requiring 2 complete transmissions (F7-10; F-10-On) before the operation is executed. Both transmissions must occur within 2 seconds. This programming method also satisfies the third requirement, use the X-10 addresses efficiently. Since the first thermostat command places the correct thermostat in queue and the second transmission is the temperature, there was no need for the complete temperature listing for each thermostat.

Program:

WHEN X-10 F-4 ON: Dining Light ON  
WHEN X-10 F-4 OFF: Dining Light OFF  
WHEN X-10 F-5 ON: Hall Lights ON  
WHEN X-10 F-5 OFF: Hall Lights OFF  
WHEN X-10 F-6 ON: ALL LIGHTS ON  
WHEN X-10 F-6 OFF: ALL UNITS OFF  
WHEN X-10 F-7 ON: Up Flag ON FOR 2 SECONDS  
WHEN X-10 F-7 OFF: Down Flag ON FOR 2 SECONDS  
WHEN X-10 F-8 ON: RUN Good Night  
WHEN X-10 F-8 OFF: RUN Dining Dim  
WHEN X-10 F-9 ON: RUN Movie Time  
WHEN X-10 F-9 OFF: RUN Movie Over  
WHEN X-10 F-10 ON &IF Down Flag ON: Downstairs HEAT SETPOINT 62  
WHEN X-10 F-10 ON &IF Up Flag ON: Upstairs HEAT SETPOINT 62  
WHEN X-10 F-10 OFF &IF Down Flag ON: Downstairs COOL SETPOINT 68  
WHEN X-10 F-10 OFF &IF Up Flag ON: Upstairs COOL SETPOINT 68  
WHEN X-10 F-11 ON &IF Down Flag ON: Downstairs HEAT SETPOINT 64  
WHEN X-10 F-11 ON &IF Up Flag ON: Upstairs HEAT SETPOINT 64  
WHEN X-10 F-11 OFF &IF Down Flag ON: Downstairs COOL SETPOINT 70  
WHEN X-10 F-11 OFF &IF Up Flag ON: Upstairs COOL SETPOINT 70  
WHEN X-10 F-12 ON &IF Down Flag ON: Downstairs HEAT SETPOINT 66  
WHEN X-10 F-12 ON &IF Up Flag ON: Upstairs HEAT SETPOINT 66  
WHEN X-10 F-12 OFF &IF Down Flag ON: Downstairs COOL SETPOINT 72  
WHEN X-10 F-12 OFF &IF Up Flag ON: Upstairs COOL SETPOINT 72  
WHEN X-10 F-13 ON &IF Down Flag ON: Downstairs HEAT SETPOINT 68  
WHEN X-10 F-13 ON &IF Up Flag ON: Upstairs HEAT SETPOINT 68  
WHEN X-10 F-13 OFF &IF Down Flag ON: Downstairs COOL SETPOINT 74  
WHEN X-10 F-13 OFF &IF Up Flag ON: Upstairs COOL SETPOINT 74  
WHEN X-10 F-14 ON &IF Down Flag ON: Downstairs HEAT SETPOINT 70  
WHEN X-10 F-14 ON &IF Up Flag ON: Upstairs HEAT SETPOINT 70  
WHEN X-10 F-14 OFF &IF Down Flag ON: Downstairs COOL SETPOINT 76  
WHEN X-10 F-14 OFF &IF Up Flag ON: Upstairs COOL SETPOINT 76  
WHEN X-10 F-15 ON &IF Down Flag ON: Downstairs MODE AUTO  
WHEN X-10 F-15 ON &IF Up Flag ON: Upstairs MODE AUTO  
WHEN X-10 F-15 OFF &IF Down Flag ON: Downstairs MODE OFF  
WHEN X-10 F-15 OFF &IF Up Flag ON: Upstairs MODE OFF  
WHEN X-10 F-16 ON &IF Down Flag ON: Downstairs FAN ON  
WHEN X-10 F-16 ON &IF Up Flag ON: Upstairs FAN ON  
WHEN X-10 F-16 OFF &IF Down Flag ON: Downstairs FAN AUTO  
WHEN X-10 F-16 OFF &IF Up Flag ON: Upstairs FAN AUTO

**Note:** The foundation for the X-10 operations of the interface was obtained from the Prontoedit web page. The IR codes and the Numeric Pad screen were obtained from Ivan Luk's file "quickx10.ccf". There was no contact information found. Thank you Ivan.

## Interfacing the ELAN VIA Touchscreen

### Compatible Controllers:

OmniiLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

The Elan VIA touchscreen is the only third-party product on the market that can connect to the data bus (AB) on an HAI controller. The VIA touchscreen will provide an emulation of a typical push-button console. This application note details the specific items required to perform the interface.

### Equipment:

1. HAI automation controller - LT, Omni, Omni Pro, Omni II, Omni Ile, Omni Pro II, Lumina, Lumina Pro
2. Elan VIA touchscreen, with the SC-4 processor
3. RS-485 to DB9 Converter - HAI recommends the B&B Electronics model 485SD9TB

### Installation:

1. Connect the VIA touchscreen to the SC-4, as per the Elan instructions.
2. Connect the RS-485 converter to the DB9 on the back of the SC-4.
3. Connect the "A" terminal [labeled "TD(A)"] of the RS-485 converter, to the "B" terminal on the HAI controller.
4. Connect the "B" terminal [labeled "TD(B)"] of the RS-485 converter, to the "A" terminal on the HAI controller.

### Setup:

1. There are no "setup" items to be performed in the HAI controller.
2. Connect the VIA touchscreen to a computer as per the Elan instructions, and use the Elan VIA Tools software to enable the HAI driver. NOTE: This is where the touchscreen address is set. The last available instruction set for Elan indicated the use of Address 13, although any address that will not conflict with any installed HAI consoles will be sufficient.





# Chapter 7: Energy Management

- [Schedule Water Heater Operation to Save Energy](#)
- [Adjust Omnistat Settings from Energy Efficient To Comfortable for 30 Minutes](#)
- [Connecting HAI Omnistats to a Trol-A-Temp TotalZone® for Zoned Temperature Control](#)
- [Connecting HAI Omnistats to a DuroZone® SMZ™ for Zoned Temperature Control](#)
- [Control High Current Devices and Manage Power Consumption with a Cutler-Hammer Power Manager](#)



## Schedule Water Heater Operation to Save Energy

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

How to control ELECTRIC hot water heater to lower energy use when house is not occupied. A simple time schedule with one condition is used.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina, or Lumina Pro controller.
- b) HAI Model 10A07 4 Relay Module
- c) Any hard-wired high voltage control device. Recommended: White Rodgers 24A01G-3 Level-Temp Silent Operator.

#### 2. Hookup:

- a) Install Model 10A07 Relay Module in Omni Series Controller enclosure following the instructions included with Module. Connect common lead from module to ground on controller. Connect trigger for Relay 1 to “+” side of any hardwire output on controller.
- b) Connect Secondary Circuit of Silent Operator to “NO” and “C” terminals on Relay 1.
- c) Connect or have licensed electrician connect Silent Operator to hot water heater power circuit per that manufacturer’s instructions.

#### 3. Setup:

- a) Select name for water heater and enter under “Setup, Names, Units”.

### Programming:

The objective here is to have the water heater come on in the early mornings so hot water is available to occupants when desired, but not turn it on when no one is home. We can do the same thing in the evening for washing dishes and children. We use a simple time schedule for this, but rely on the state of the security system to prevent turning the heater on when the house is empty. For example, if the security is in the AWAY or VACATION mode we can assume that the house is already empty and no hot water is needed. This leaves us with OFF, DAY and NIGHT which we will take to mean that someone is there and may need hot water. This is an example of a case where three similar programs will be needed because there are three CONDITIONS that require hot water: OFF, DAY and NIGHT.

Choose the appropriate time to initiate this program, both morning and evening. We can use an ON FOR TIME command to eliminate the need to program OFF commands for the water heater. We simply repeat the same schedule three times, one for each possible condition.

Here’s what we need:

- 1) 5:00 AM MTWTFSS &IF OFF (NOT ARMED: Some One Home): Water Heater ON FOR 3 HRS  
    ^ (WHEN)                      ^ (CONDITION)                      ^ (COMMAND)
- 2) 6:00 PM MTWTFSS &IF OFF (NOT ARMED: Some One Home): Water Heater ON FOR 5 HRS

Repeat for other modes of security: DAY & AWAY.



## Adjust Omnistat Settings from Energy Efficient To Comfortable for 30 Minutes

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

In this application, we will demonstrate how to use a switch to allow the air conditioner or heater to operate at comfortable settings for a period of 30 minutes then return to a more energy efficient settings. This can be useful in a commercial application where an employee may be in the building after hours when the thermostat is set to operate in an energy efficient mode. The employee can press the "COMFORT" button, and the thermostat will Heat or Cool at a more comfortable setting for 30 minutes. At the end of the 30-minute period, the thermostat will return to the energy efficient settings. If at any time the button is pressed again, the 30-minute timer will be reset to 30 minutes.

This application may also be desired in residential applications. The customer can send an X-10 or RF signal and the thermostat will automatically adjust to the more comfortable settings for 30 minutes. This program can also be configured to execute when the system is put into NIGHT mode. This will allow the customer to fall asleep at the comfortable temperature settings. After they are tucked in bed and have fallen asleep, the system will automatically raise the temperature to a more energy efficient setting.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni/Omni II/Omni Ile, OmniPro/OmniPro II, Lumina, or Lumina Pro controller
- b) Any HAI Omnistat Communicating Thermostat
- c) Momentary switches
- d) X-10 transmitter or wireless RF transmitter and receiver (optional)

#### 2. Hookup:

- a) Install Omnistat in regular thermostat location and connect to heating/cooling equipment per that manufacturer's instructions. Confirm that everything operates correctly.
- b) Connect Omnistat to HAI Controller at the "+" side of zone 16, the "+" side of output 8 and ground or to the terminals marked "TSTAT" on the OmniLT. See Omnistat Installation Manual (page number varies).
- c) Install the momentary switch on a wall, preferably near the Omnistat. Connect the switch to an unused zone on the controller.
- d) If used, install a Leviton 6450 4-button transmitter OR install a RF wireless receiver to the controller as described in manufacturer's instructions and configure zone.

#### 3. Setup:

- a) Select name for Omnistat and enter under "Setup, Names, Temperatures". We'll use "THERMOSTAT 1".
- b) Define the thermostat type (Auto Heat/Cool for example) under "Installer Setup, Temperatures".
- c) Select names for switch and enter under "Setup, Names, Zones". Let's say, "COMFORT".
- d) Define the switch zone type as Auxiliary under "Installer Setup, Zones".
- e) Select name for Flags and enter under "Setup, Names, Units". We'll use "30M FLAG" & "SWITCH FLAG".
- f) If used, select name for the zone used by the wireless receiver under "Setup, Names, Zones". Again, we will use "COMFORT". If using the Leviton 6450, configure switch as address C1.

## Programming:

The objective here is to use a Switch (hardwired, wireless, or X-10) to set an Omnistat to operate the air conditioner or heater for a specified period (30 minutes).

In the first group of programs, we will show how to use a switch to achieve our goal.

The programs will look like this:

- 1) WHEN COMFORT NOT READY: 30M FLAG ON FOR 30 MINUTES  
    ^ (WHEN)                      ^ (COMMAND)
- 2) WHEN 30M FLAG ON: THERMOSTAT 1 COOL SETPOINT 78
- 3) WHEN 30M FLAG ON: THERMOSTAT 1 HEAT SETPOINT 71
- 4) WHEN 30M FLAG OFF: THERMOSTAT 1 COOL SETPOINT 84
- 5) WHEN 30M FLAG OFF: THERMOSTAT 1 HEAT SETPOINT 65

Optional programming can be added so that if the switch is pressed twice within 5 seconds, the Omnistat will return to the energy efficient settings.

To accomplish this, DELETE program #1 above, and add the following three programs in this order:

- 1) WHEN COMFORT NOT READY &IF SWITCH FLAG ON: 30M FLAG OFF  
    ^ (WHEN)                      ^ (CONDITION)                      ^ (COMMAND)
- 2) WHEN COMFORT NOT READY &IF SWITCH FLAG OFF: 30M FLAG ON FOR 30 MINUTES
- 3) WHEN COMFORT NOT READY: SWITCH FLAG ON FOR 5 SECONDS

The second group of programs will show how to use an X-10 signal to change the Omnistat temperatures to more comfortable settings for 30 minutes.

- 1) WHEN X-10 C1 ON: 30M FLAG ON FOR 30 MINUTES  
    ^ (WHEN)                      ^ (COMMAND)
- 2) WHEN 30M FLAG ON: THERMOSTAT 1 COOL SETPOINT 76
- 3) WHEN 30M FLAG ON: THERMOSTAT 1 HEAT SETPOINT 73
- 4) WHEN 30M FLAG OFF: THERMOSTAT 1 COOL SETPOINT 80
- 5) WHEN 30M FLAG OFF: THERMOSTAT 1 HEAT SETPOINT 69

Finally, we will add a line that will make the same temperature setting change using a wireless transmitter.

- 6) WHEN COMFORT NOT READY: 30M FLAG ON FOR 30 MINUTES

## Connecting HAI Omnistats to a Trol-A-Temp TotalZone® for Zoned Temperature Control

<b>Compatible Equipment:</b> RC-80 Omnistat RC-100 Omnistat
---

### Application:

This application shows how to connect an HAI RC-80 Single Stage Heat/Cool Thermostat or a RC-100 Heat Pump Thermostat to a Trol-A-Temp TotalZone® Model TZ-3 Zone Control System. The TotalZone® Control Panel is a microprocessor based zoning system for automatic or manual changeover of single stage heating and cooling or heat pump systems.

The TotalZone® Control System, when used with HAI Omnistats, allows any zone thermostat to call for heating and cooling. When one of the zone thermostats calls for heat and one of the other zone thermostats calls for cool, the TotalZone® System will accept the first call. After that call is satisfied, or a maximum of 20 minutes elapses from the start of the opposite call, TotalZone® will then switch to allow the opposite call.

### Installation:

#### 1. Equipment:

- a) RC-80 Single Stage Heat/Cool Thermostats or RC-100 Heat Pump Thermostats
- b) Trol-A-Temp TotalZone® Model TZ-3 Zone Control System
- c) A 24VAC 40VA Power Transformer

#### 2. Hookup for RC-80 Thermostats for Single Stage Heat/Cool applications:

- a) Install each RC-80 Omnistat base in thermostat location for each temperature zone.
- b) Connect heating/cooling equipment to TZ-3 Control System per manufacturer's instructions and those found in the Trol-A-Temp TotalZone® Installation Instructions.
- c) Connect RC-80 Thermostat to the TotalZone® TZ-3 per the diagrams on following pages.
- d) Connect 24VAC 40VA power transformer to the TR1 and TR2 terminals on the TZ-3 Control Panel.
- e) All switches on the TZ-3 should be set to the Off position as shown in diagram.
- f) Connect thermostat to base and confirm that everything operates correctly.

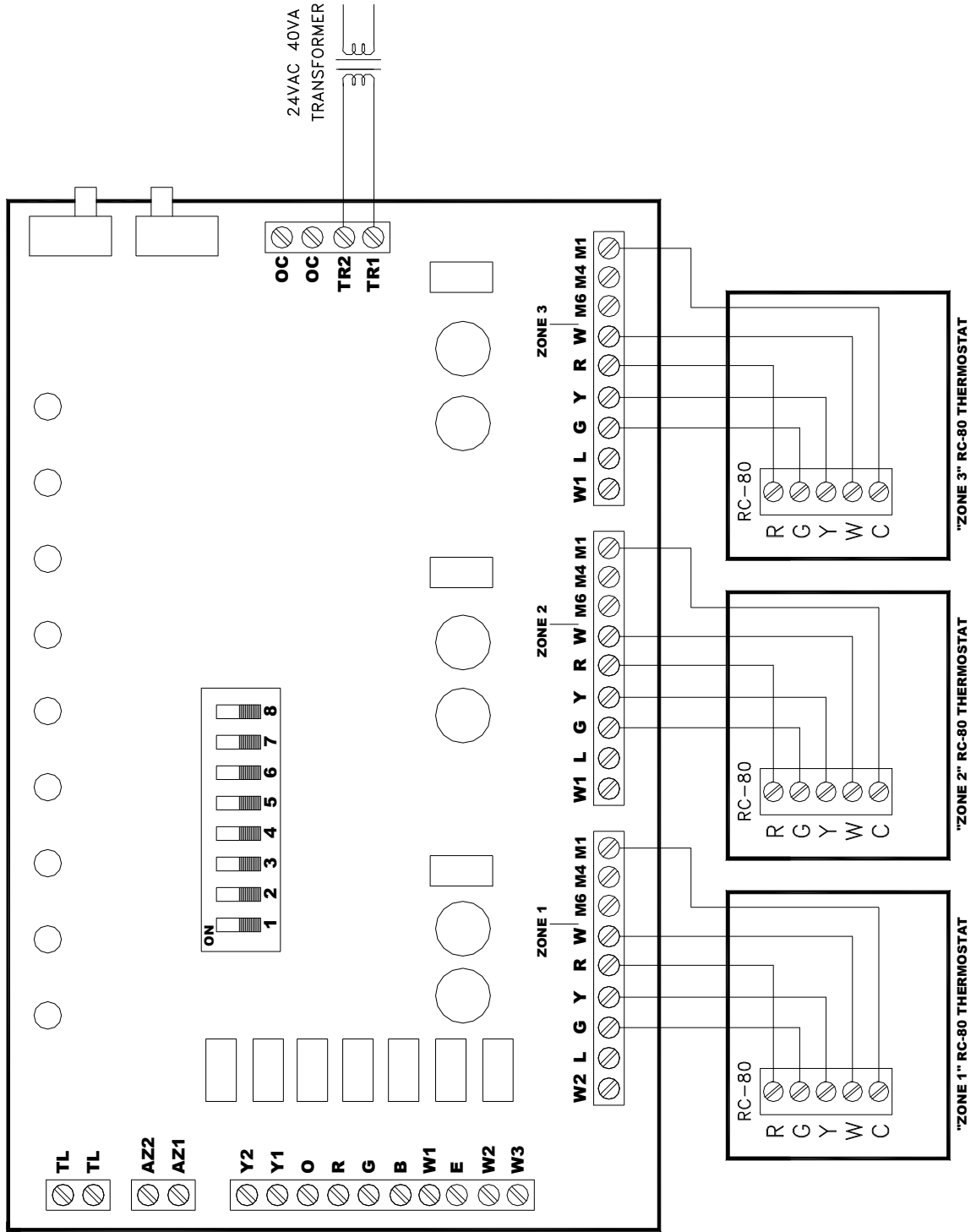
#### 3. Hookup for RC-100 Thermostats for Heat Pump applications:

- a) Install each RC-100 Omnistat base in thermostat location for each temperature zone.
- b) Connect heating/cooling equipment to TZ-3 Control System per manufacturer's instructions and those found in the Trol-A-Temp TotalZone® Installation Instructions.
- c) Connect RC-100 Thermostat to the TotalZone® TZ-3 per the diagrams on following pages.
- d) Connect 24VAC 40VA power transformer to the TR1 and TR2 terminals on the TZ-3 Control Panel.
- e) Set switch 5, 7, and 8 on the TZ-3 to the On position as shown in diagram. All other switches should be set to the Off position.
- f) Connect thermostat to base and confirm that everything operates correctly.

***For complete operation and connection instructions and diagrams to heating/cooling equipment and zone dampers, refer to the installation instructions supplied with the Trol-A-Temp Control System.***

**(Connection Diagrams on Following Pages)**

# **TROL-A-TEMP TOTAL ZONE MODEL TZ-3**



## **CONNECTING 3 RC-80 Thermostats to a TotalZone® TZ-3**



## Connecting HAI Omnistats to a DuroZone® SMZ™ for Zoned Temperature Control

<b>Compatible Equipment:</b> RC-90 Omnistat
--

### Application:

This application shows how to connect an HAI RC-90 Single Stage Heat/Cool Thermostat to a DuroZone® SMZ™ Zone Control Panel. The DuroZone® SMZ™ Control Panel is a zoning system for any typical single stage heating and cooling system.

The “Zone 1” RC-90 Thermostat acts as a single point master switch for heat/cool changeover and fan control. All other zone thermostats can then call for the mode set by the “Zone 1” Thermostat, eliminating opposite calls from the other zone thermostats.

### Installation:

#### 1. Equipment:

- a) RC-90 Single Stage Heat/Cool Thermostats for Zone Control Systems
- b) DuroZone® -MULTILINE-® Model SMZ-2 or SMZ-3 Zone Control Panel
- c) A 24VAC 40VA Power Transformer for each Zone Thermostat

#### 2. Hookup:

- a) Install each RC-90 Omnistat base in thermostat location for each temperature zone.
- b) Connect heating/cooling equipment to SMZ-2 or SMZ-3 per manufacturer's instructions and those found in the DuroZone® SMZ™ Control Panel Installation Instructions.
- c) Connect RC-90 Thermostat to the SMZ-2 or SMZ-3 per the diagram on the following page.
- d) Connect the “Zone 1” Thermostat's “C” terminal to the SMZ-2 or SMZ-3 “C” terminal (transformer common) under “EQUIP”.
- e) All other zone thermostats must be powered by a separate 24VAC 40VA power transformer connected to the thermostat's R and C terminals.
- f) Connect thermostat to base and confirm that everything operates correctly.

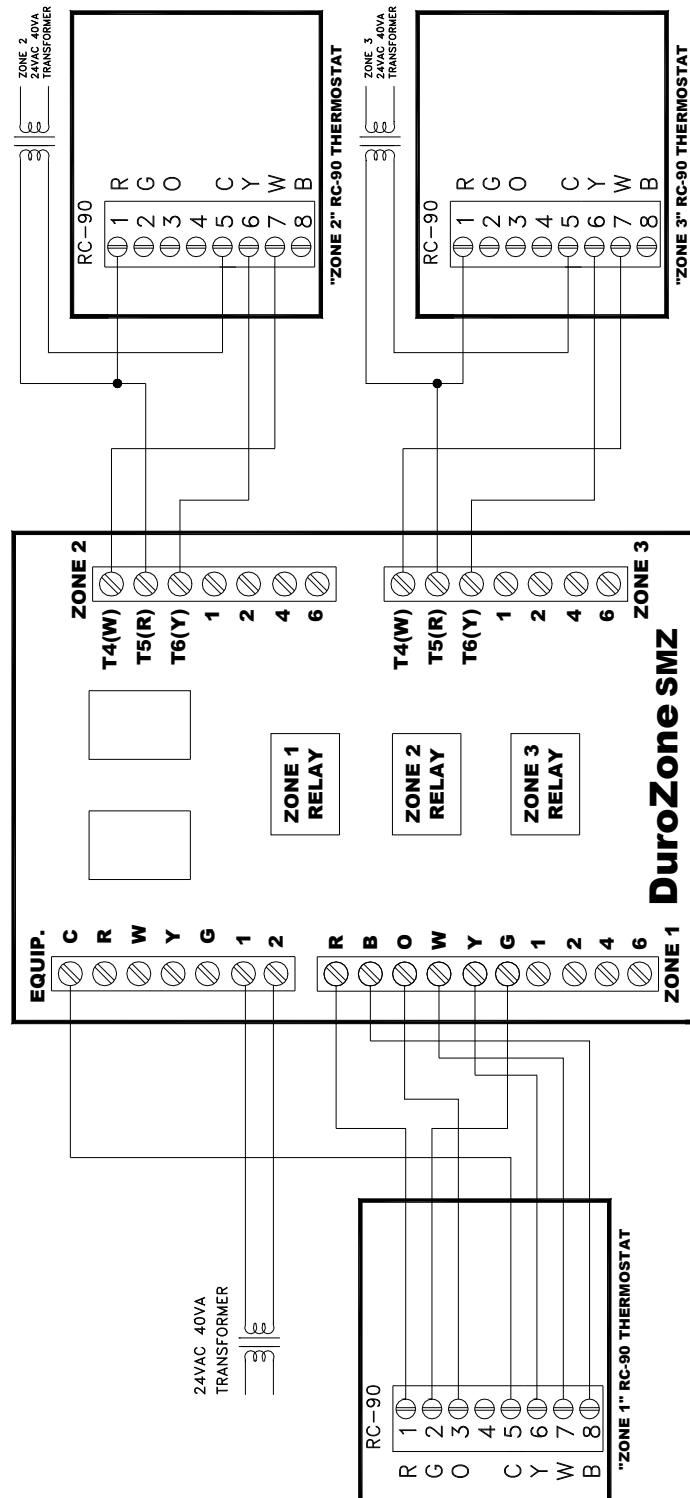
#### 3. Notes:

- a) The “Zone 2” and “Zone 3” Thermostats must be in the same mode as the “Zone 1” Thermostat for the system to operate properly.
- b) The Fan keys on the “Zone 2” and “Zone 3” Thermostats are inoperative.

***For complete operation and connection instructions and diagrams to heating/cooling equipment and zone dampers, refer to the installation instructions supplied with the DuroZone® Control System.***

**(Connection Diagrams on Following Pages)**

## CONNECTING 3 RC-90 Thermostats to a DuroZone® SMZ-3



## Control High Current Devices and Manage Power Consumption with a Cutler-Hammer Power Manager

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

Controlling high current loads in an automated home has always been a difficult application. Until the Cutler-Hammer Power Manager was released, high current loads were controlled with a relay or a remote control breaker. This approach often was not a UL listed application and required a high level of electrical expertise. With the Power Manager, high current loads are easily controlled with a simple X-10 command.

### Installation:

#### 3. Equipment:

- c) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina, or Lumina Pro controller.
- d) Cutler-Hammer Power Manager mounted in an Advanced Power Center (APC).
- e) One or more circuits (up to 8) controlled by a Cutler-Hammer Power Circuit Interrupter

#### 4. Installation:

- c) Install the HAI controller.
- d) Set the Power Manager to an address compatible with the Omni or OmniPro

### Programming:

Assign the text description for the controlled load. For instance, if the HAI controller is set to house code 'B', set the Power Manager to address 'B'. Unit 1 in the HAI controller will signal the 1<sup>st</sup> load on the Power Manager on and off. Under the 'names' section of the HAI controller assign the proper description. For example, Unit 1 'Hot Water'.

Test the X-10 transmissions in the house by turning the 'Hot Water' breaker on and off from the HAI controller. If the test fails, check house code and unit number assignments. If the problem persists, reference the HAI Integration 101 technical information for tips on X-10 amplification and troubleshooting tips.

With the HAI controller and Power Manager communicating, the control over interfaced branch circuits is limitless.

Some examples:

### Electric Hot Water Heater Control:

Please note that automated electric hot water applications are not applicable in installations where the electrical hot water heater is being used to provide heat to the home.

In many homes hot water is not needed when a customer is on vacation. To save energy, power can be removed from the hot water heater when the system is armed to Vacation.

WHEN ARM VACATION: Hot Water OFF

WHEN ARM VACATION: Vacation Flag ON (used for scheduled operation in next section)

WHEN OFF: Hot Water ON

WHEN OFF: Vacation Flag OFF

In many cases it is more economical to shut down the hot water heater during the day when the homeowner is at work. The most common uses of hot water are the morning shower and the dishwasher and clothes washing late in the evening. This leaves long periods of time during the day and at night when the water is kept at operating temperature. Money can be saved by allowing the temperature to fall during non-operating time windows. The insulation of the hot water heater will keep the temperature of the water high for long periods of time.

WHEN 8:00 AM MTWTF-- &IF Vacation OFF : Hot Water Off

WHEN 5:30 PM MTWTF-- &IF Vacation OFF: Hot Water On

WHEN 10:00 PM MTWTF-- &IF Vacation OFF: Hot Water Off

WHEN 5:00 AM MTWTF-- &IF Vacation OFF: How Water On

### **Life Safety:**

In a fire situation the biggest enemy is smoke. In most residential installations the fire system is independent from the HVAC. By controlling a breaker with the Power Manager, the HVAC system can be shut down in the event of a fire. This eliminates the spread of smoke throughout the home and prevents the fresh oxygen from being brought in to feed the flames.

WHEN FIRE ALARM: HVAC OFF

As a backup it is a good practice to incorporate a routine to reapply power after a predetermined time. This eliminates the possibility of shutting down the temperature control for a long period of time after a fire activation.

WHEN FIRE ALARM: HVAC OFF

WHEN FIRE ALARM: Fire timer ON FOR 45 MINUTES

WHEN Fire timer OFF: HVAC ON

**Power Management:**

In many municipalities across the US power companies are beginning to offer tiered pricing schedules. This approach to load management offers customers a financial incentive to using power on 'off peak' times. Major appliances like the dishwasher and hot water heater can easily be powered down during peak times. In most cases, the client will not be inconvenienced by the adjusted operating times but they can take advantage of the financial benefits.

WHEN 6:00 AM MTWTF--: Peak time ON  
WHEN 9:00 AM MTWTF--: Peak time OFF  
WHEN 6:00 PM MTWTF--: Peak time ON  
WHEN 8:00 PM MTWTF--: Peak time OFF  
WHEN Peak time ON: Dishwasher OFF  
WHEN Peak time ON: Hot Water OFF  
WHEN Peak time OFF: Dishwasher ON  
WHEN Peak time OFF: Hot Water ON

Most hot water heaters hold enough water to carry through the morning showers. The ambient temperature is restored after the peak time ends. The dishwasher can be loaded during the peak time and set to run. When power is restored after the peak time the dishes are washed at a more economical rate.



# Chapter 8: Tips and Tricks

- [Making the Console LCD Display Backlight Stay On at All Times](#)
- [Modify Omni/OmniPro Phone Circuit to Work Without a Live Phone Line](#)
- [Modify OmniLT Phone Circuit to Work Without a Live Phone Line](#)
- [Multiple 54A00-1 Outdoor Access Keypads](#)





## Making the Console LCD Display Backlight Stay On at All Times

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

This application is a modification to a HAI console that will keep the LCD display backlight on at all times. This may be desirable for console locations that don't have enough light to see the display when the backlight is off. Also, it is good for demonstration systems and model homes, so that the display is always brightly lit and visible.

Remember that the keypad backlight can be set to be on always, off always, or timed with the LCD display. These options are selected in Console Setup Mode at the console. However, there is not an adjustment to change the setting for the LCD backlight. Currently, the LCD display backlight only comes on and is timed to stay on for 3 minutes whenever there is any activity at the keypad.

### Installation:

#### 1. Equipment:

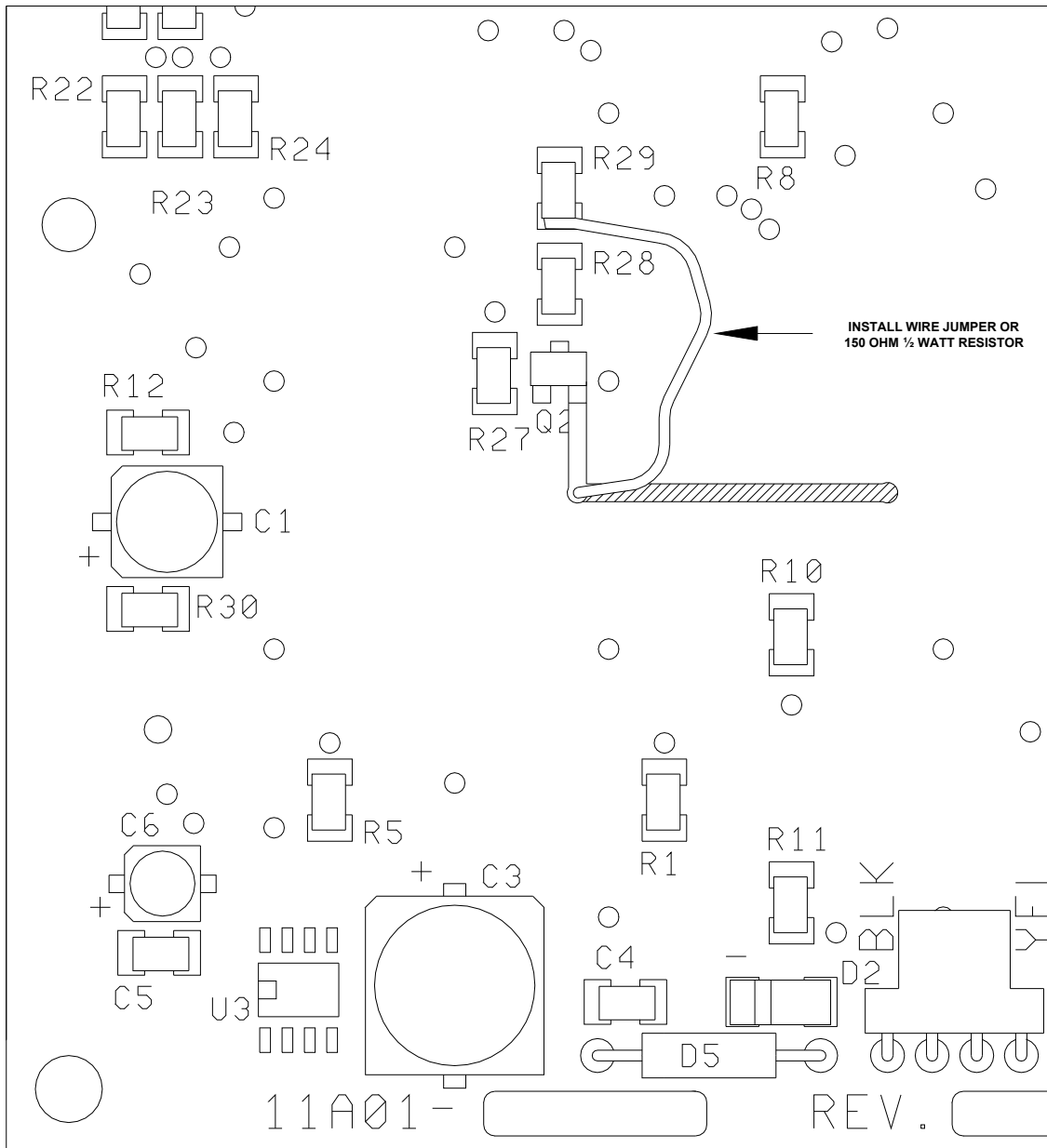
- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II, Lumina, or Lumina Pro console
- b) Soldering Iron and safety glasses
- c) Wire jumper
- d) Optional – 150 ohm, ½ watt (or larger) resistor

#### 2. Installation:

- a) Disconnect the console
- b) Use anti-static techniques: Put all components on a table. Be seated during the procedure with your elbows on the table.
- c) Use a clean soldering iron and safety glasses
- d) Connect the wire jumper exactly as shown
- e) Reinstall the console

[Option] You can make the LCD display backlight dim after three minutes instead of going off. Install the 150 ohm ½ watt (or larger) resistor in the place of the wire jumper. The display will be dimmed when there is no keypad activity.

**(Connections Diagram on Next Page)**



## Modify Omni/OmniPro Phone Circuit to Work Without a Live Phone Line

### Compatible Controllers:

Omni  
OmniPro

### Application:

This application is a modification to an Omni or OmniPro controller that will allow you to access the voice menu with a telephone or computer modem without a live phone line. This may be desirable for installations where a phone line hasn't been installed yet, however, you need to test and program the system.

This application shows how to make a temporary modification using alligator clips. A permanent modification can be made by soldering the wire in the designated location. A permanent modification may be desirable for demo units in a showroom or at a trade shows where a live phone line isn't feasible, however, you must have the capability of demonstrating phone access.

### Installation:

#### 1. Equipment:

- a) Omni or OmniPro controller
- b) 12 inch 18-22 AWG wire with alligator clips on both ends
- c) 23 inches of 18-22 AWG wire
- d) 1K ohm, ½ watt resistor
- e) RJ11 phone jack

#### 2. Setup:

- a) Disconnect power (AC and battery) to the controller.
- b) Cut about 3 inches of wire and strip both ends.
- c) Cut the remaining wire in half and strip all ends.

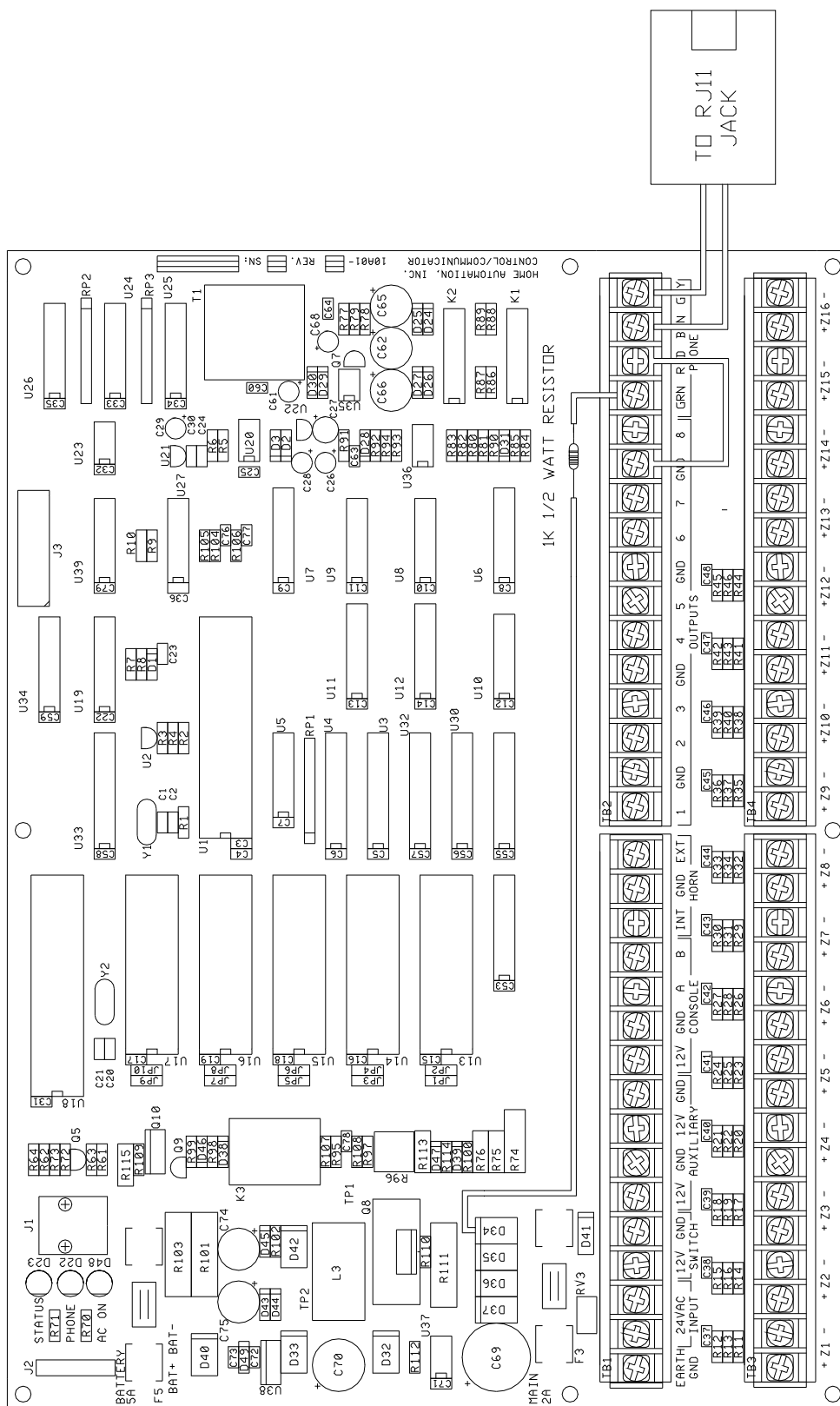
#### 3. Installation:

- a) Connect one end of the 1K resistor to one of the alligator clips.
- b) Connect the other alligator clip to the banded end of D34 located on the mid left of the controller as shown.
- c) With one end of the wire now connected to D32, and the other end connected to the resistor, connect the opposite end of the resistor to the GRN terminal in the section marked PHONE on the controller.
- d) Connect the 3-inch wire between the RED terminal in the section marked PHONE and the GND terminal in the section marked OUTPUTS.
- e) On the RJ11 jack, connect one of the wires to the Red terminal and the other wire to the Green terminal.
- f) Connect the two wires from the RJ11 jack to the BRN and GRY terminals in the section marked PHONE on the controller.
- g) Reconnect power to the controller.

Plug any telephone into the RJ11 jack. Pick up the handset on the phone and within 3 seconds, press the # key. The system should speak the voice menu.

**Note:** When the telephone handset is picked up, there will be no dial tone.

**(Connections Diagram on Next Page)**



## Modify OmniLT Phone Circuit to Work Without a Live Phone Line

### Application:

This application is a modification to an OmniLT controller that will allow you to access the voice menu with a telephone or computer modem without a live phone line. This may be desirable for installations where a phone line hasn't been installed yet, however, you need to test and program the system.

This application shows how to make a temporary modification using alligator clips. A permanent modification can be made by soldering the wire in the designated location. A permanent modification may be desirable for demo units in a showroom or at a trade shows where a live phone line isn't feasible, however, you must have the capability of demonstrating phone access.

### Installation:

#### 4. Equipment:

- f) OmniLT controller
- g) 12 inch 18-22 AWG wire with alligator clips on both ends
- h) 23 inches of 18-22 AWG wire
- i) 1K ohm, ½ watt resistor
- j) RJ11 phone jack

#### 5. Setup:

- d) Disconnect power (AC and battery) to the controller.
- e) Cut about 3 inches of wire and strip both ends.
- f) Cut the remaining wire in half and strip all ends.

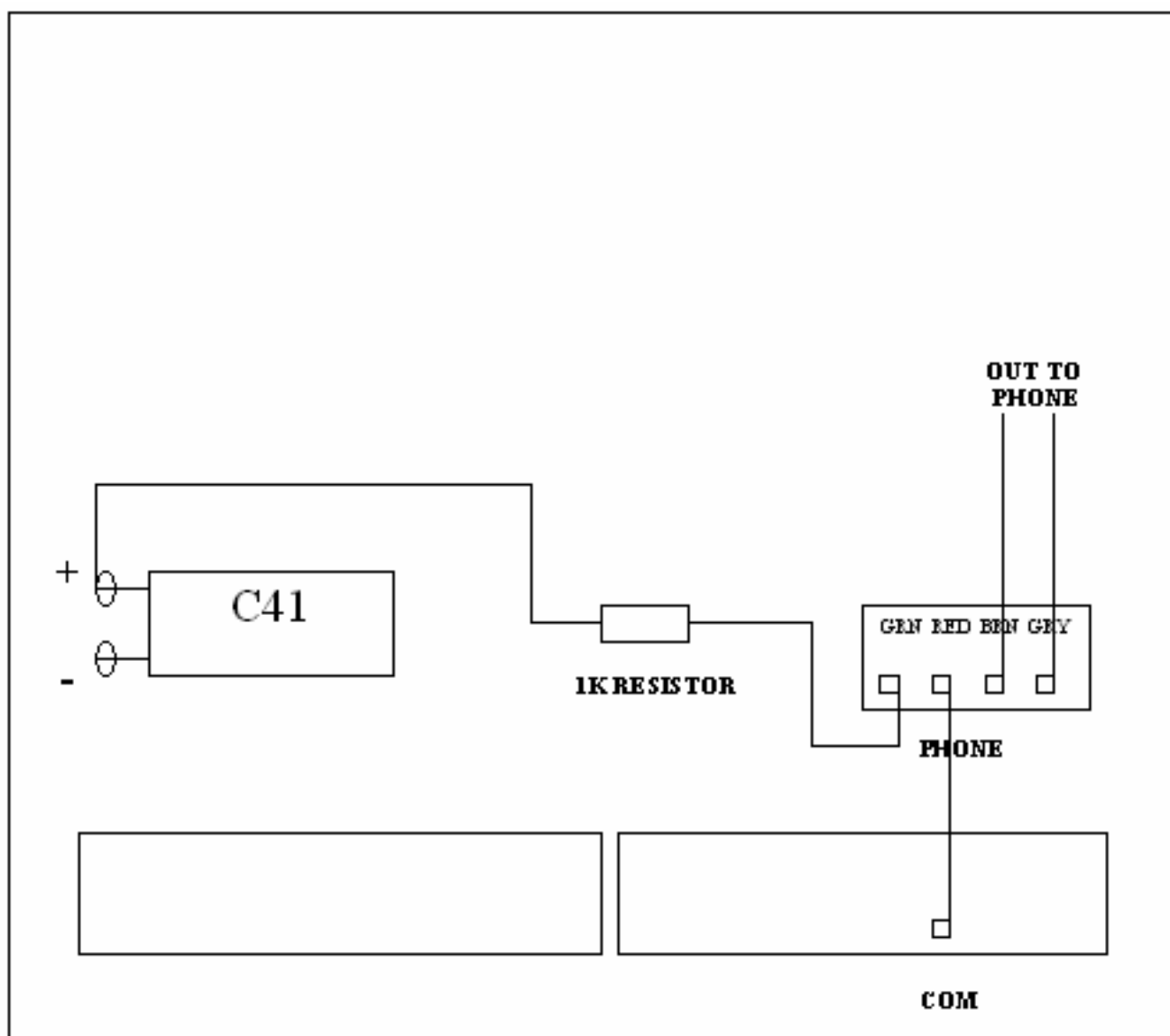
#### 6. Installation:

- h) Connect one end of the 1K resistor to one of the alligator clips.
- i) Connect the other alligator clip to the positive (+) side of C41 located on the left of the controller as shown.
- j) With one end of the wire now connected to C41, and the other end connected to the resistor, connect the opposite end of the resistor to the GRN terminal in the section marked PHONE on the controller.
- k) Connect the 3-inch wire between the RED terminal in the section marked PHONE and the COM terminal below.
- l) On the RJ11 jack, connect one of the wires to the Red terminal and the other wire to the Green terminal.
- m) Connect the two wires from the RJ11 jack to the BRN and GRY terminals in the section marked PHONE on the controller.
- n) Reconnect power to the controller.

Plug any telephone into the RJ11 jack. Pick up the handset on the phone and within 3 seconds, press the # key. The system should speak the voice menu.

**Note:** When the telephone handset is picked up, there will be no dial tone.

**(Connections Diagram on Next Page)**



## Multiple 54A00-1 Outdoor Access Keypads

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

This application will allow you to connect multiple access keypads to a single serial port via a serial repeater. This application can also be used to extend the length of the distance between the access keypad and the Omni controller.

### Equipment:

1. HAI Controller – Omni LT, Omni II/IIe, or OmniPro II controller
2. HAI Model #54A00-1 Outdoor Access Keypad(s) - The Keypad(s) should be setup according to the installation manual that is included with them. The only change to the installation is to not plug the keypad into the Omni serial port.
3. ReSmith Model #RS232HUB
4. A serial cable for the master port and serial cable(s) for each slave port.

### Cable Construction:

A cable with an 8-pin modular connector on one side and a 4-pin modular connector on the other is required for the master port.

The repeater has 3 slave ports. 2 are RJ25 jacks and will require a cable with a 4-pin modular connector on one side and the other side will connect to the 54A00-1. The other is a RJ45 jack and will require a cable with an 8-pin modular connector on one side and the other side will connect to the 54A00-1. You can make these cables as follows:

1. Master-Omni - Pin 3 of an 8-pin connector will connect to Pin 1 of a 4-pin connector. Pin 8 of an 8-pin connector will connect to pin 4 of a 4-pin connector.
2. Keypad-RJ25 Slave - Pin 2 of a 4-pin connector will connect to the black wire of the 54A00-1. Pin 3 of a 4-pin connector will connect to the white wire of the 54A00-1. Note: The 4-pin connector on the 54A00-1 will have to be cut off in order to make this connection.
3. Keypad-RJ45 Slave - Pin 4 of an 8-pin connector will connect to the white wire of the 54A00-1. Pin 8 of an 8-pin connector will connect to the black wire of the 54A00-1. Note: The 4-pin connector on the 54A00-1 will have to be cut off in order to make this connection.

### Setup:

1. Connect cable Master-Omni from the master port on the serial repeater to the serial port on the Omni which is set to pro-link and is set up to receive the messages.
2. Connect cable(s) Keypad-RJ25 Slave and/or Keypad-RJ25 Slave to the slave port(s) on the serial repeater.
3. You can power the repeater from a separate power supply (provided you ground the supply to the controller), or you can connect to the controller's auxiliary power by:
  - a) Cut off the end of the adapter that would normally plug into the wall.
  - b) Connect the tip "+" to Aux 12VDC "+" on the Omni panel.
  - c) Connect ring "-" to Aux 12VDC "-" on the Omni panel.





# Chapter 9:    Messaging

- [Sending a Numeric Message to a Digital Pager](#)
- [Display Reminder Message on Console When Cold Outside](#)
- [Children's Room Exit Notification](#)
- [Announce Zones Opening and Closing Over a Speaker](#)



## **Sending a Numeric Message to a Digital Pager**

### **Compatible Controllers:**

OmniLT

Omni / Omni II / Omni IIe

OmniPro / OmniPro II

### **Application:**

This application shows how to program a HAI controller to send a numeric message that will be displayed on a digital pager in the event of an alarm. When an alarm is activated, the system will call a digital pager and leave a numeric message.

### **Installation:**

#### **1. Equipment:**

- a) OmniLT, Omni/Omni II/Omni IIe, OmniPro/OmniPro II controller with the appropriate sensors installed and correctly configured.
- b) HAI console (or PC Access software)

#### **2. Setup:**

The HAI Controller can call up to 8 numbers in the event of an alarm. When the number is dialed, the system will leave a voice alarm message.

If you choose to leave a numeric message on a pager, enter the numeric digits in the Dial Number as follows:

- a) Select one of the 8 Dial Out Numbers that are stored in the system. In the event of an alarm, these numbers are dialed in the order that is set in the Dial Out Order (phone numbers can be up to 24 digits).
- b) Enter the number of the digital pager. Follow the number with two or three 2-second pauses (each T will cause the system to pause for two seconds between digits), then enter the numeric message to be displayed on the digital pager.

### **Example:**

The pager number you want to call is 736-9810 and the message you want to display is 736-9810 001:

DIAL OUT NUMBER 1:

736-9810-TT-736-9810-001

When an alarm is activated, the voice dialer looks at the Dial Order to determine which numbers to dial and in what order (in this case the system will call Dial Out Number 1).

The in-house phones are disconnected from the telephone lines and the system begins to dial the number. After the number is dialed (736-9810), there is a 4-second pause (TT). This allows the pager to answer the call. After the pager answers, it is then ready to receive the numeric DTMF tones (736-9810-001).

If the system is monitored by a central station, it will be notified first. Then, the voice dialer will dial out as described above.

**When used with an OmniPro II controller, the following option may be used:**

The OmniPro II controllers are equipped with 60 custom phrases. Using a phone, you can record any audio message including DTMF tones.

To access OmniPro II from an in-house phone, pick up the receiver, then press the # key on the phone.

You will hear the OmniPro II 's voice read the menu.

Press 8 from the MAIN MENU to get to the MESSAGE menu.

"MESSAGE - PLEASE CHOOSE:  
1 PLAY MESSAGE, 2 RECORD MESSAGE,  
3 INTERIOR, 6 PLAY PHRASE, 7 RECORD PHRASE,  
8 PLAY ADDRESS, 9 RECORD ADDRESS, \*: CANCEL."

*To record one of the custom phrases, press the 7 key.*

" RECORD PHRASE: ENTER PHRASE NUMBER, THEN POUND."

*Press the phrase number (1-60) you wish to record, then press #.*

"RECORD PHRASE - [BEEP]

At the [BEEP], enter the numeric message on the phone keypad that you want to display on the pager (press quickly, or set up a speed dial number which contains the message).

After recording the message, OmniPro II will say:

"PHRASE IS: (OMNIPRO II PLAYS PHRASE)."

You can the associate each custom phrase with a Message by giving each a Message a voice description which contains the custom phrase.

Example:

Voice description for Message 1: 29 (Pause), 29 (Pause), 29 (Pause), 246 (Phrase 1)

Notice that the beginning of the message starts with three pauses. This allows the pager to answer (and give a greeting if applicable) before the message is played.

Next, create a program that will initiate the Dial Out:

```
WHEN ANY ALARM: PHONE 736-9810 AND SAY MESSAGE 1  
                  ^One of the Dial Out Numbers
```

OmniPro II will call the pager number (Dial Out Number 1 – 736-9810) and wait for an answer. When the pager answers, OmniPro II will pause briefly, then play the message (OmniPro II will play back the recorded DTMF tones).

**Compatible Controllers:**  
OmniLT  
Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

How to program an OmniLT, Omni II/Omni IIe, OmniPro/OmniPro II to display (on the console) a reminder message to take a jacket when it's cold outside (below 45 degrees).

1. Equipment:

- ### Programming:

The objective here is to have the reminder message “REMEMBER !!! TAKE A JACKET IT’S COLD OUT” displayed on the console when the outdoor temperature falls below 45 degrees. .

Assuming that Message 1 has been programmed with the text description of “REMEMBER !!!”, Message 2 as “TAKE A JACKET”, and Message 3 as “IT’S COLD OUT”, here’s what the program look like:

- ```

1) WHEN OUTDOOR TEMP (ZONE 6) NOT READY: SHOW REMEMBER !!! (MESSAGE 1)
   ^ (WHEN) ^ (COMMAND)

2) WHEN OUTDOOR TEMP (ZONE 6) NOT READY: SHOW TAKE A JACKET (MESSAGE 2)

3) WHEN OUTDOOR TEMP (ZONE 6) NOT READY: SHOW IT'S COLD OUT (MESSAGE 3)

```

Whenever the Outdoor Temperature falls below 45 degrees, the console will display the reminder message. The message will be displayed on 3 separate lines of the display. It will look something like this:

```
Sun Feb 16, 97    7:01 AM
REMEMBER !!!
```

```
Sun Feb 16, 97    7:01 AM
TAKE A JACKET
```

```
Sun Feb 16, 97    7:01 AM
IT'S COLD OUT
```

You may also add an additional program with the message "PRESS 6 THEN 3".

```
4) WHEN OUTDOOR TEMP (ZONE 6) NOT READY: SHOW PRESS 6 THEN 3 (MESSAGE 4)
   ^ (WHEN)                                ^ (COMMAND)
```

This will give them the option to view the Outdoor Temperature by pressing 6 (Status), then 3 (Sun). That screen will look something like this:

```
SUNRISE  5:58    TEMP
SUNSET   6:13    42
```

You will also have to create a series of programs to clear each message from the display when the Outdoor Temperature rises above 45 degrees. These programs will look like this:

```
5) WHEN OUTDOOR TEMP (ZONE 6) SECURE: CLEAR REMEMBER !!! (MESSAGE 1)
   ^ (WHEN)                                ^ (COMMAND)
```

```
6) WHEN OUTDOOR TEMP (ZONE 6) SECURE: CLEAR TAKE A JACKET (MESSAGE 2)
```

```
7) WHEN OUTDOOR TEMP (ZONE 6) SECURE: CLEAR IT'S COLD OUT (MESSAGE 3)
```

```
8) WHEN OUTDOOR TEMP (ZONE 6) SECURE: CLEAR PRESS 6 THEN 3 (MESSAGE 4)
```

When used with an OmniLT, Omni II/Omni IIe, or OmniPro II controller, the following option may be used:

[Option] Give voice descriptions to 3 of your messages. These will be used to audibly notify you when it's cold outside. To accomplish this, create the following programs:

```
WHEN ARM AWAY &IF OUTDOOR TEMP NOT READY: SAY OUTDOOR TEMPERATURE IS COOL
```

```
WHEN ARM AWAY &IF OUTDOOR TEMP NOT READY: SAY (Pause) (Pause) (Pause) (Pause)
```

```
WHEN ARM AWAY &IF OUTDOOR TEMP NOT READY: SAY TO CHECK PRESS SIX THEN THREE
```

## Children's Room Exit Notification

### Compatible Controllers:

OmniLT  
Omni / Omni II / Omni Ile  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

At certain times, it is desirable to create an audible notification of a child leaving their room, such as during naptime. The notification system can be easily turned on and off with a Leviton scene switch.

### Installation:

#### 1. Equipment:

- a) Leviton 16400 Uni-Base Wall Mounted Controller Body with a 16450-4 Controller Face.
- b) OmniLT, Omni II/Omni Ile, OmniPro II, Lumina, or Lumina Pro controller by itself or an Omni controller with an X-10 PRO PHH02 Remote Chime.

#### 2. Installation:

- a) A standard door contact is required on the monitored room's door. When using an Omni, a Remote Chime module will need to be configured for a compatible house code and unit number.
- b) Install the Leviton scene switch in a central point in the home (i.e. the kitchen). One of the four on/off switches will be used to control the notification mode on and off. For this example the 16400 is set to D-1. The bottom rocker switch becomes D-4.

#### 3. Setup:

- a) OmniLT, Omni II/Omni Ile, OmniPro/OmniPro II:
  - 1) Create a flag named "Alert" under "Setup, Names, Units" (Omni LT – Unit 29, Omni II/Omni Ile – Unit 73, OmniPro – Unit 201, OmniPro II – Unit 393).
  - 2) Program the zone input as an "auxiliary" zone.
  - 3) Create a message to be displayed on the console under "Setup, Names, Messages". We will call ours "Child is up!".
- b) Omni:
  - 1) Create a flag named "Alert" under "Setup, Names, Units" (Omni – unit 41).
  - 2) Program the zone input as an "Auxiliary" zone.
  - 3) Create a name for the chime unit number under "Setup, Names, Units". We will call ours "Child Chime".

### Programming:

OmniLT, Omni II/Omni Ile, OmniPro/OmniPro II: Use the following program:

```
WHEN D-4 ON: Alert ON
WHEN D-4 OFF: Alert OFF
WHEN Child Door NR &IF Alert ON: SHOW Child is up!
WHEN Alert OFF: CLEAR Child is up!
```

The result is 3 successive beeps from the console when the child's door is opened. When the user turns the 16450 switch off, the LED turns off and the message is cleared from the console.

Omni: Use the following program:

WHEN D-4 ON: Alert ON  
WHEN D-4 OFF: Alert OFF  
WHEN Child Door NR &IF Alert ON: Child Chime ON

The result is a doorbell-like chime played from the X-10 PRO Remote Chime each time the door is opened. For larger homes, multiple X-10 PRO Remote Chimes can be used. Each chime is set to the same house code and unit number. When the user turns the 16450-4 switch off, the LED turns off and the command will no longer be sent to the Remote Chimes.



## Announcing Zones Opening and Closing Over a Speaker

|                                                                                                     |
|-----------------------------------------------------------------------------------------------------|
| <b>Compatible Controllers:</b><br>OmniLT<br>Omni II / Omni Ile<br>OmniPro II<br>Lumina / Lumina Pro |
|-----------------------------------------------------------------------------------------------------|

### Application:

How to program an OmniLT, Omni II/Omni Ile, or OmniPro II to audibly announce (over a speaker) when a zone opens or closes. In this application, it will announce “Front Door Not Ready” when the Front Door opens.

### Installation:

#### 1. Equipment:

- a) OmniLT, Omni II/Omni Ile, OmniPro II, Lumina, or Lumina Pro controller
- b) HAI console
- a) HAI Speaker/Microphone Module and Model 10A11 Audio Module
- b) Security contact on the Front Door

#### 2. Hookup:

- a) Install Model 10A11 Two-Way Audio Module in the enclosure following the instructions included with Module.
- b) Connect the speaker and microphone to the Model 10A11 Audio Module.
- c) Connect the security contact from the Front Door to any unused zone on the controller.

#### 3. Setup:

- a) Select a voice description for the message played over the console when the Front Door opens under “Setup, Voice, Message”. We will use “Front Door Not Ready” {85 69 122 148}.
- b) Select a name for the zone and enter under “Setup, Names, Zones”. We will use “Front Door”.

### Programming:

The objective here is to have the controller make an announcement when the Front Door Opens. Assuming that a message has been programmed to have a voice description of “Front Door Not Ready” here’s what the program look like:

```
1) WHEN FRONT DOOR NOT READY: SAY FRONT DOOR NOT READY  
   ^ (WHEN)                ^ (COMMAND)
```

When the Front Door opens, the controller is instructed to say a message. Since the voice description for this message is “Front Door Not Ready”, the console will annunciate that phrase.



# Appendix A: Programming Conventions

- [Button Execution Order](#)
- [Programs with Multiple Conditions](#)
- [About Flags](#)
- [Using a Flag as a Timer](#)
- [Creating a Sequencing Program](#)
- [Toggling a Flag Using One Button](#)
- [Timing Units](#)
- [Odd/Even Day Programming via Sprinkler System Example](#)



## Programs with Multiple Conditions

**Note:** With Omni II/Omni IIe and OmniPro II, two (2) conditions may be specified in each program line. However, when programming from the console, only 1 condition can be selected. If 2 conditions must be specified for a single program line, it must be entered using the PC Access Software. When 2 conditions are part of a single program, the conditions are not displayed on the console. Instead, "&MULTI" is displayed to let you know that this program line contains 2 conditions. To view or edit the program, you must use the PC Access Software.

This programming convention demonstrates how to create a program with multiple conditions.

For instance: If you want to turn On the Den Lights when the Front Door opens IF:

- 1) The security system is in the Away mode
- 2) It is dark outside (after Sunset)

The way to do this is to nest macros. In simpler terms, have a button (macro) run another button.

WHEN FRONT DOOR NOT READY &IF AWAY: RUN BUTTON 100

WHEN BUTTON 100 &IF DARK: DEN LIGHTS ON

The first program line should contain the **When** (Front Door Opened), the first **Condition** (if Away), and the **Command** (Run Button 100).

When the Front Door opens, if the condition from the first program is met (if the Security system is in the Away mode), the second program will be executed. The second program line will execute the button command from the first program (Run Button 100).

The second program should contain the **When** (Button 100 is executed), the second **Condition** (if dark), and the **Command** (Den Lights On).

When Button 100 is executed, if the condition is met (if dark), the Den Lights will turn On.

If either condition is not met, the program will terminate and the Den Lights will not turn On.

### NOTE ON OMNILT:

There are a possible 255 buttons that can be programmed (Buttons 1-255), 16 of which can be named, given a voice description, and executed by the user through a console, telephone or PC Access Software.

Buttons 17-255 cannot be named or given a voice description, and can only be executed through a program such as:

WHEN AWAY: RUN BUTTON 17  
WHEN ZONE 1 NOT READY: RUN BUTTON 50  
WHEN BUTTON1: RUN BUTTON 200  
SUNSET MTWTFSS: RUN BUTTON 255

**NOTE ON OMNI:**

There are a possible 255 buttons that can be programmed (Buttons 1-255). The first 32 buttons (Buttons 1-32) can be named, given a voice description, and executed by the user through a console, telephone or PC Access Software.

Buttons 33-255 cannot be named or given a voice description, and can only be executed through a program (as shown above).

**NOTE ON OMNI II / OMNI IIe:**

There are a possible 255 buttons that can be programmed (Buttons 1-255). The first 64 buttons (Buttons 1-64) can be named, given a voice description, and executed by the user through a console, telephone or PC Access Software.

Buttons 65-255 cannot be named or given a voice description, and can only be executed through a program (as shown above).

**NOTE ON OMNIPRO:**

There are a possible 255 buttons that can be programmed (Buttons 1-255). The first 64 buttons (Buttons 1-64) can be named, given a voice description, and executed by the user through a console or telephone.

Buttons 65-255 cannot be named or given a voice description, and can only be executed through a program (as shown above).

**NOTE ON OMNIPRO II:**

There are a possible 255 buttons that can be programmed (Buttons 1-255). The first 128 buttons (Buttons 1-128) can be named, given a voice description, and executed by the user through a console or telephone.

Buttons 129-255 cannot be named, given a voice description, and can only be executed through a program (as shown above).

## Button Execution Order

Commands within a button are executed in the order they are programmed.

When a button is activated within another button, such as:

WHEN BUTTON 1: RUN BUTTON 2

All commands in the first button are executed in order and then the commands in the second button follow in order.

WHEN BUTTON 1: RUN BUTTON 2  
WHEN BUTTON 1: UNIT 1 ON  
WHEN BUTTON 1: UNIT 2 ON

**BUFFER:**  
RUN BUTTON 2

WHEN BUTTON 2: UNIT 3 ON

The RUN BUTTON 2 command is put into a buffer and is executed after all the commands (UNIT 1 ON – UNIT 2 ON) in BUTTON 1 have been executed.

As more buttons are activated, they fall in behind the others.

WHEN BUTTON 3: RUN BUTTON 4  
WHEN BUTTON 3: RUN BUTTON 5  
WHEN BUTTON 3: UNIT 5 ON  
WHEN BUTTON 3: RUN BUTTON 6

**BUFFER:**  
RUN BUTTON 4  
RUN BUTTON 5  
RUN BUTTON 6

In this example, “UNIT 5 ON” is executed, followed by the execution of BUTTON 4:

WHEN BUTTON 4: RUN BUTTON 7  
WHEN BUTTON 4: UNIT 6 ON

**BUFFER:**  
RUN BUTTON 5  
RUN BUTTON 6  
RUN BUTTON 7

“UNIT 6 ON” is executed, followed RUN BUTTON 5:

WHEN BUTTON 5: UNIT 7 ON

**BUFFER:**  
RUN BUTTON 6  
RUN BUTTON 7

“UNIT 7 ON” is executed, followed by RUN BUTTON 6:

WHEN BUTTON 6: UNIT 8 ON

**BUFFER:**  
RUN BUTTON 7

“UNIT 8 ON” is executed, followed by RUN BUTTON 7:

WHEN BUTTON 7: UNIT 9 ON

“UNIT 9 ON” is executed.





## About Flags

### Flags

The easiest way to define a flag is to refer to it as a "virtual relay". A flag can be in one of three separate states: On, Off, or set to a value between 0 and 255.

- If a flag has a value of 1-255, it is considered "On".
- If a flag has a value of 0 it is considered "Off".

Flags are a powerful programming tool that can be used in several ways to accomplish advanced programming routines. Any Flag can also be used as a counter. Counters can be incremented, decremented, or set to a specific value (0 to 255).

When a counter is decremented to zero, the "When Unit Off" macro is executed. A counter will not decrement below zero. The counter will, however, roll over from 255 to 0 when incremented. The "When Unit Off" macro will be executed when the counter rolls over. This allows two counters to be cascaded to form a larger counter.

When the counter is incremented from 0 to 1, the "When Unit On" macro will execute. This will allow you to execute a command when the Flag is incremented (counting up) from zero.

The Set command is used to set the counter to a value from 0 to 255. No macros are executed when the counter is set to zero or when the counter is changed from zero using the set command. This allows a counter to be reset without executing macros or programs associated with the counter counting to zero. Turn the Flag On or Off to have the associated macro execute. When the Flag is turned Off, its value is set to zero (0). When the Flag is turned On, its value is set to one (1). The counter is considered On for program conditions if it is nonzero (1-255).

The context in which a flag is used within a routine determines how the flags function. The designated units that can be used as flags are as follows:

OmniLT 29-36  
Omni 41-64 (cannot be used as counter)  
Omni II/Omni IIe 73-128  
OmniPro 201-255  
OmniPro II 393-511

If all flag units are used, unused voltage output units can be used as flags:

OmniLT 17-24 and 28-28  
Omni 33-40  
Omni II/Omni IIe 65-72  
OmniPro 129-200  
OmniPro II 257-392



## Using a Flag as a Timer

Flag designations:

OmniLT: Units 29-36

Omni: Units 41-64

Omni II/Omni IIe: Units 73-128

OmniPro: Units 201-255

OmniPro II: Units 393-511

A flag can be used as a timer to control the timeframe for a routine. A Flag output can be set just as you would set a wind-up timer. The flag may be turned On or Off for 1-99 seconds, 1-99 minutes, or 1-18 hours.

At the end of the designated time, the flag can be used to trigger a button (macro). A popular use of a timer is for controlling lights. An outdoor motion detector can be used to turn on spotlights for a period of time. As long as motion continues the lights remains on.

1. WHEN OUTDOOR PIR NR: FLOOD FLAG ON FOR 5 MINUTES
2. WHEN FLOOD FLAG ON: FLOOD LIGHT ON
3. WHEN FLOOD FLAG OFF: FLOOD LIGHT OFF

This routine will turn the lights on when motion is first detected. Each time motion occurs, the timer resets to the full 5 minutes. After 5 minutes without motion, the light is turned off.

Another example:

1. WHEN DEN PIR NOT READY: FLAG 1 ON FOR 20 MINUTES
2. WHEN DEN PIR NOT READY: THERMOSTAT 1 COOL 76

When the someone walks in front of the Den PIR and it detects motion, the Flag is turned on and will remain on for 20 minutes (in this case, every time the PIR is tripped, the timer is reset to 20 minutes). Twenty minutes after the last time the PIR detected motion, the Flag is turned Off.

Secondly, when the PIR detects motion, the Thermostat Cool Setting will be lowered to 76 for comfort.

3. WHEN FLAG 1 OFF: THERMOSTAT 1 COOL 80

When the Flag turns Off (twenty minutes after the PIR last detected motion), the Thermostat Cool Setting is raised to 80 for energy savings.

In some instances it may be desirable to defeat a timer without turning the timer off (because you don't want the "When Flag Off" program is executed). The flag can be set to "0" which defeats the timer but keeps the "When Flag Off" program from executing.

**The status of a Flag (On or Off), can also be used as a condition in a program.**

For Example:

1. WHEN DEN PIR NOT READY &IF FLAG 1 OFF: UNIT 1 DIM 5
2. WHEN DEN PIR NOT READY &IF FLAG 1 OFF: UNIT 1 ON FOR 5 MINUTES
3. WHEN DEN PIR NOT READY: FLAG 1 ON FOR 5 MINUTES

When someone walks in front of the Den PIR and it detects motion, and if Flag 1 is Off (the normal state of Flag 1 is Off), Unit 1 will Dim 5 Steps. The next command tells Unit 1 to stay On for 5 minutes (with the same condition "if Flag 1 Off").

Secondly, when the PIR detects motion, a 5 minute timer is started (Flag 1 On for 5 minutes).

If motion is detected for a second time within the 5 minutes (Flag 1 is still On), then the first two programs will not be executed.

## Creating a Sequencing Program

Flag designations:

OmniLT: Units 29-36

Omni: Units 41-64

Omni II/Omni IIe: Units 73-128

OmniPro: Units 201-255

OmniPro II: Units 393-511

You can create a sequential programming routine that can turn on several units sequentially.

In this example, the program will turn a unit on when the previous unit turns off.

```
WHEN BUTTON 1: FLAG 1 ON
WHEN BUTTON 1: UNIT 1 ON FOR 5 MINUTES
WHEN UNIT 1 OFF &IF FLAG 1 ON: UNIT 2 ON FOR 10 MINUTES
WHEN UNIT 2 OFF &IF FLAG 1 ON: UNIT 3 ON FOR 30 MINUTES
WHEN UNIT 3 OFF &IF FLAG 1 ON: UNIT 4 ON FOR 10 MINUTES
WHEN UNIT 4 OFF: FLAG 1 OFF
```

This routine is activated by a button that we created called BUTTON 1. This button can be executed from the console, telephone, or by event. An additional program line may be written to activate BUTTON 1, such as:

```
7:30PM M--T-S- &IF VACATION: RUN BUTTON 1
```

or

```
WHEN AWAY: RUN BUTTON 1
```

When the button is activated, FLAG 1 is turned ON. This is a very important step because it sets the condition for the sequence. Without the FLAG, whenever UNIT 1 is turned ON, the sequencing will start. This means that you will not be able to give an individual command to turn UNIT 1 ON without turning ON the rest.

The second line in the routine turns UNIT 1 ON for 5 minutes. Five minutes after UNIT1 turns ON, it will turn OFF. When UNIT 1 turns OFF, AND IF FLAG 1 IS ON (step #1), UNIT 2 will turn ON for 10 minutes, and so on...

Whenever UNIT 4 is turned OFF, the sequencing will automatically end (FLAG 1 is turned OFF).

### Turning units on in sequence, then off...

Using a combination of flags as timers and flags as conditions, you can create a programming routine that turns a unit on for a specified amount of time after the previous unit turns on. This can give the desired effect of someone turning on lights as they walk throughout the house.

```
WHEN BUTTON 2: FLAG 2 ON
WHEN BUTTON 2: UNIT 5 ON FOR 10 MINUTES
WHEN BUTTON 2: FLAG 3 ON FOR 30 SECONDS
WHEN FLAG 3 OFF &IF FLAG 2 ON: UNIT 6 ON FOR 1 HOUR
WHEN FLAG 3 OFF &IF FLAG 2 ON: FLAG 4 ON FOR 10 SECONDS
WHEN FLAG 4 OFF &IF FLAG 2 ON: UNIT 7 ON
WHEN FLAG 4 OFF &IF FLAG 2 ON: FLAG 5 ON FOR 2 MINUTES
WHEN FLAG 5 OFF &IF FLAG 2 ON: UNIT 8 ON
```

Again, when the routine (BUTTON 2) is activated, a flag (FLAG 2) is turned on to set the condition. Then, UNIT 5 is turned ON for 10 minutes. In the final command of BUTTON 2, FLAG 3 is turned ON for 30 seconds.

After 30 seconds have elapsed, FLAG 3 will turn OFF. When FLAG 3 turns OFF & IF FLAG 2 is ON, unit 6 will turn ON for 1 hour, and FLAG 4 is turned ON for 10 seconds. When FLAG 4 turns OFF step #6 and #7 will execute, and so on...

The whole idea here is when we turn on a unit, we also turn on a flag for a specified amount of time (1-99 seconds, 1-99 minutes, or 1-18 hours). When the flag turns off, the next unit turns on.

Next, we can reverse the process. Starting with step #4, one hour after UNIT 6 turns ON, we can set the other units to turn off in sequence.

WHEN UNIT 6 OFF & IF FLAG 2 ON: UNIT 7 ON FOR 10 MINUTES  
WHEN UNIT 7 OFF & IF FLAG 2 ON: UNIT 8 ON FOR 5 MINUTES  
WHEN UNIT 8 OFF: FLAG 2 OFF

## Toggling a Flag Using One Button

This application shows how to toggle a flag (or any unit) using one button. This can be helpful if you want to easily change the condition of a program using one button or to toggle any unit on and off using one button.

For instance: When Den Motion & IF Den PIR On: Den Lights On

Name Flag 1 "Den PIR"

Name Flag 2 "Den Flag"

Name Button 1 "PIR On/Off"

The object of this program is to have the Den Lights turn On when the Den PIR detects motion but only if the Den PIR (Flag 1) is On. We then can control the state (on/off) of that Flag with the Button "PIR On/Off". Each time this Button is executed, it changes the state of the "Den PIR".

Create the following two programs:

```
WHEN PIR On/Off & if Den PIR ON: Den Flag OFF
WHEN PIR On/Off & if Den PIR OFF: Den Flag ON
```

When the "PIR On/Off" button is executed, it checks the state of the "Den PIR", then another button is executed.

Create the following two programs:

```
WHEN Den Flag OFF: Den PIR OFF
WHEN Den Flag ON: Den PIR ON
```

The purpose of this is to actually change the state of the flag to the opposite of what it currently is.

When used with an OmniLT, Omni II/Omni Ile, OmniPro, or OmniPro II controller, the following 2 options may be used:

[Option 1] Create two messages: "DEN PIR IS ON" and "DEN PIR IS OFF" that are used for reporting the state of the flag when the button is executed. To accomplish this, create the following programs:

```
WHEN Den Flag OFF: SHOW DEN PIR IS OFF
WHEN Den Flag OFF: CLEAR DEN PIR IS ON
WHEN Den Flag ON: SHOW DEN PIR IS ON
WHEN Den Flag ON: CLEAR DEN PIR IS OFF
```

[Option 2] To have the statements from Option 1: "DEN PIR IS ON" and "DEN PIR IS OFF" displayed for only 3 seconds after the user runs the button, create the following programs:

```
WHEN Den Flag OFF: SHOW DEN PIR IS OFF
WHEN Den Flag OFF: FLAG 5 ON FOR 3 SECONDS
WHEN FLAG 5 OFF: CLEAR DEN PIR IS OFF
WHEN Den Flag ON: SHOW DEN PIR IS ON
WHEN Den Flag ON: FLAG 6 ON FOR 3 SECONDS
WHEN FLAG 6 OFF: CLEAR DEN PIR IS ON
```





## Timing Units

All Units including X-10 Units, ALC Units, Voltage Output Units, Relay Units, and Flag Units can be turned on or off for a specified amount of time. When any of these units are timed, the following 6 observations should be made:

1. Any Unit can be turned on or off for 1-99 seconds, 1-99 minutes, or 1-18 hours.
2. Additionally, any X-10 Unit or ALC Unit can be dimmed or brightened for 1-99 seconds, 1-99 minutes, or 1-18 hours.

At the end of the designated time, the exact opposite command will be executed.

For Example:

DEN LIGHTS ON

DEN LIGHTS DIM 5 FOR 10 MINUTES (The Den Lights will dim 5 steps for 10 minutes)

Ten (10) minutes after the Den Lights were dimmed, the system will issue a bright 5 command, bringing the light back up to the previous level.

3. Whenever a timer is running (counting down the specified amount of time), it can be canceled by turning the unit either on or off.

FOYER LIGHT ON FOR 10 MINUTES (Light turns on and a 10 minute countdown begins)

FOYER LIGHT ON (The On command is issued and the timer is set to 0)

FOYER LIGHT ON FOR 10 MINUTES (Light turns on and a 10 minute countdown begins)

FOYER LIGHT OFF (The Off command is issued and the timer is set to 0)

4. Whenever an All Off or All On command is issued, the timer is not affected (the timer will continue to count).

BEDROOM LAMP ON FOR 30 MINUTES (Lamp turns on and a 30 minute countdown begins)

ALL ON (All X-10 and/or ALC Units are turned on, however, the timer continues to countdown from the previous command)

ALL OFF (All X-10 and/or ALC Units are turned Off, however, the timer continues to countdown from the previous command – Although the Bedroom Lamp was turned off by the All Off command, 30 minutes after the original Bedroom Lamp On for 30 minutes command was issued, a Bedroom Lamp off command is issued)

5. Whenever a timer is set below (less than) a previously set timer, no change will be made to the original timer (original timer continues to countdown).

FLAG 1 ON FOR 20 MINUTES (Flag turns on and a 20 minute countdown begins)

FLAG 1 ON FOR 10 MINUTES (Flag continues to countdown from the original 20 minutes)

6. Whenever a timer is set above (greater than) a previously set timer, the timer is reset to the new time (will countdown from the longer time).

FLAG 2 ON FOR 30 MINUTES (Flag turns on and a 30 minute countdown begins)

FLAG 2 ON FOR 40 MINUTES (Flag is reset and will begin to countdown from 40 minutes)



## Odd/Even Day Programming via Sprinkler System Example

### Compatible Controllers:

OmniLT  
Omni II / Omni IIe  
OmniPro / OmniPro II  
Lumina / Lumina Pro

### Application:

The purpose of this application is to demonstrate how set up a routine on odd days that occur on Monday, Wednesday, and Friday. For this example a sprinkler routine is used to demonstrate this application. This example will work on any HAI controller. This article will also includes notes on the same application using HAI automation controllers that have version 2.9 or later firmware.

### Installation:

#### 1. Equipment:

- a) HAI automation controller - LT, Omni, Omni Pro, Omni II, Omni IIe, Omni Pro II, Lumina, and Lumina Pro
- b) 10A07 - 4-Relay Module
- c) Any sprinkler valves with 24VAC solenoids
- d) Moisture Sensor - Optional
- e) PC Access – Optional

#### 2. Setup:

- a) Connect the relay module to the voltage outputs as shown in the attached diagram.
- b) One leg of the 24VAC solenoid should be connected to the NORMALLY OPEN (NO) terminal of the relay outputs on the relay module.
- c) The other leg should be connected directly to one side of the 24VAC power supply.
- d) The other side of the power supply should be connected to the COMMON (C) terminal of the relay.
- e) If desired, connect a moisture sensor to an unused zone on the HAI controller. For our example, we will use Zone 14.
- f) Under Setup>>Names>>Zones, name Zone 14 MOISTURE SENSOR
- g) Under Setup>>Names>>Units, name the 4 outputs - SPRINKLER 1, SPRINKLER 2, SPRINKLER 3, and SPRINKLER 4.
- h) Under Setup>>Names>>Units, name two flags - ODD DAY and ODD FLAG.
- i) Under Setup>>Names>>Buttons, name two buttons - ODD TOGGLE and SPRINKLER



8:00 AM M-W-F-- &IF ODD DAY ON: RUN SPRINKLER (to water on odd days)  
8:00 AM M-W-F-- &IF ODD DAY OFF: RUN SPRINKLER (to water on even days)  
WHEN SPRINKLER: SPRINKLER 1 ON FOR 15 MINUTES  
WHEN SPRINKLER 1 OFF: SPRINKLER 2 ON FOR 15 MINUTES  
WHEN SPRINKLER 2 OFF: SPRINKLER 3 ON FOR 15 MINUTES  
WHEN SPRINKLER 3 OFF: SPRINKLER 4 ON FOR 15 MINUTES

If a moisture sensor is being used, you can modify Line 3 above to incorporate the sensor into the routine:

WHEN SPRINKLER &IF MOISTURE SENSOR SECURE: SPRINKLER 1 ON FOR 15 MINUTES



# Appendix B: Troubleshooting

- [Troubleshooting PC Access for DOS](#)
- [Zone Input Readings](#)
- [Thermostat Application Guide](#)
- [X-10 Transmission Speed When Running a Macro](#)
- [Calculating Sunrise/Sunset for Locations East of the Prime Meridian](#)
- [Power Requirements for RC-Series Thermostats](#)





## Troubleshooting PC Access for DOS

### Installation:

Create a subdirectory on your hard drive for the PC Access programs. Copy all of the program files from the installation disk to the PC Access subdirectory on your hard drive.

When you start PC Access for the first time it will create a file called PCA.CFG. This file contains the configuration information of your computer and modem. It also contains the security stamp that you enter when you first install the program. The program, configuration, and account files are encrypted. When you back up your program and account files, be sure to include the PCA.CFG file, and put the disk in a secure place.

The program and configuration files take about 500K of hard disk space. Account files always have the extension .PCA. Each account file (for each HAI system) is about 28K. Be sure that you have sufficient disk space.

### Modem Configuration:

Most of the problems that people experience with the PC Access software are caused by improper modem setup. If you are experiencing problems communicating using the PC Access software, please follow these steps to insure that your modem is properly configured for use with the PC Access software.

1. First, insure that your modem is compatible with the PC Access software. Generally, most modems that purport to be "Hayes-compatible" will work with the software. The modem must be capable of operating at 300 bps using Bell 103 protocol. The modem must not require special communications drivers, such as modems which are designed for Windows use only (commonly called WinModems), or use RPI.

2. Next, insure that your modem is properly installed in your computer. External modems generally connect to your system's built-in COM1 or COM2 port. Internal modems require more attention to avoid address and interrupt conflicts. Internal modems should usually be set to COM3 or COM4. They should not be set to COM1 or COM2 unless the system's built-in COM1 or COM2 port has been disabled.

The modem must be set to use an interrupt request line (IRQ) that is not being used by another device. Commonly used IRQ assignments for serial ports are:

|      |      |
|------|------|
| COM1 | IRQ4 |
| COM2 | IRQ3 |
| COM3 | IRQ4 |
| COM4 | IRQ3 |

If a serial mouse is being used, it is normally connected to the system's built-in COM1 or COM2 port and uses either IRQ4 or IRQ3, respectively. An internal modem must not use the same IRQ as a serial mouse. Therefore, unless a non-standard IRQ is set in Configure | Modem, if a serial mouse is connected to COM1, an internal modem should not be set to COM3 (since they would both use IRQ4). Similarly, if the serial mouse is connected to COM2, the modem should not be set to COM4.

Many times, an internal modem is included in a pre-configured computer system. These modems are often set to COM3/IRQ5. If this is the case, in Configure | Modem set the port to COM3, then change the IRQ from 4 to 5.

### Windows 95

When operating under Windows 95, you must first go into Control Panel | System | Device Manager | Modem | then select the Modem Tab and check which Communications Port the modem is assigned to. Next, select the Resources Tab (if applicable) and check which Interrupt Request Line the modem is assigned to.

Often, Plug&Play Modems do not use a standard IRQ. If there is no Resources Tab to select, your modem is not a Plug&Play and should be assigned to a standard IRQ.

Always remember to set the correct port and IRQ in Configure | Modem when setting up your PC Access software.

To configure your modem in PC Access, start PC Access and select CONFIGURE | MODEM. Tab over to PORT and select the communications port that your modem is assigned to. Next, tab to IRQ and select the interrupt request line that your modem is assigned to. Select OK (or press Enter).

To verify that your modem is working, first open a file (select FILE | NEW, then type in a filename like TEST, enter). Select MODEM | INITIALIZE. "Initializing Modem" should appear on your screen for a few seconds, then disappear. If you have an external modem, you should see some activity on the indicator lights on the modem. If there is no activity or if the "Initializing Modem" screen does not disappear, chances are that there is a COM port problem. Recheck the modem COM port and reset it as described above. A further check is to select ANSWER-CALLBACK. You should hear the modem pick up the phone line and make a tone. Select HANG UP to stop it.

If these checks don't work, check to ensure that there are no other programs currently running that utilizes the modem. Also be sure that you do not have two versions of the PC Access software open simultaneously or any other memory resident programs loaded in your computer.

3. Finally, make sure the modem initialization string is set properly in Configure | Modem. The default string will work for most modems:

ATX0S0=0S10=20&C1&D2

|        |                                                           |
|--------|-----------------------------------------------------------|
| AT     | Modem attention, starts all modem commands                |
| X0     | Use basic result codes / Enable dialing without dial tone |
| S0=0   | Disable auto answer                                       |
| S10=20 | Set carrier loss wait time to 2 seconds                   |
| &C1    | Report true sense of carrier detect                       |
| &D2    | Hang up modem when DTR dropped                            |

If the modem fails to work with the software, it may be necessary to modify the initialization string. The commands for your modem will be listed in the owner's manual that came with your modem. Find the AT commands and add it to the end of the existing Initialization Command.

***(Refer to the manual that came with your modem for the proper AT commands)***

Usually, the factory default settings for the modem will work well. These defaults are usually invoked by an &F command, but it can differ from modem to modem. It is generally a good idea to insert the &F (or equivalent) command at the start of the initialization string, after the "AT".

For example:

AT&FX0S0=0S10=20&C1&D2.

This insures that the modem is in a known state before PC Access issues the few commands (mainly the &C1) that really matter to the software.

Next, make sure that the modem is not set to do software handshaking (sometimes called software flow control). Hardware (RTS/CTS) handshaking or no handshaking is fine. On some modems, &H0&I0&R1 disables all flow control. On other modems &K0\G0\Q0 is used.

Force the modem to Bell 103 300 bps mode. On some modems, B1N0S37=3 does this. On other modems B1&N1 or %B300 does this.

### ***Here are some common problems:***

#### **ON LINE**

The "ON-LINE" indicator in lower right corner always says "ON-LINE".

The ON-LINE indication comes from the modem's data carrier detect signal. The default setting for many modems is to always report that carrier detect is on. In PC Access, the modem should report the true state of carrier detect. In older external modems, this may be a switch setting. Most modems can be configured in software.

#### **MOUSE PROBLEMS**

PC Access supports the use of a mouse. Before running PC Access, your mouse driver should be loaded. If the PC Access program is properly detecting a mouse driver, you will see a black rectangle (cursor) in the upper left corner of your screen. If there is no cursor, your mouse driver is not properly loaded. The usual command to load a mouse driver from the C: > prompt is MOUSE. Then start PC Access.

If the cursor is present but doesn't move when you move your mouse, it is likely that the modem COM port setting is wrong. Select CONFIGURE | MODEM and set COM port to the setting for your modem.

#### **LOCAL ACCESS PROBLEMS**

First, be sure that you can successfully get the system voice on the line that your computer modem is on. Use a phone and access the system (using # or # and your master code if in high security mode). You should hear the "Welcome to..." menu. Then press #, #, 1. The system says, "enter code number". Enter your master code. You should hear a tone. If this works, the controller is properly configured and ready to work with PC Access.

Once you have the tone from the controller, select ON LINE from the MODEM menu. You should see "Accessing System". The indicator in the lower right corner should change to ON-LINE. Hang up the phone and select SHOW | STATUS to verify that the computer and the controller are linked.

When using the Local Access command, the computer attempts to dial the #, #, #, 1, master code... automatically for you. If your master code is different from the default 1111, then you must change the last 4 digits of the Local Access string under CONFIGURE | MODEM to your master code. If your system is in High Security mode, you need to put the master code after the first # as well.

#### **REMOTE ACCESS PROBLEMS**

When calling the controller from a remote telephone, first start PC Access and open a new or existing file. Select the MODEM menu, but not ON LINE yet. Call the controller and enter the PC Access code when the controller answers the phone (See your Owner's Manual for methods of remote access). You should hear a tone. Select ON-LINE from the MODEM menu. When the indicator changes to ON LINE, hang up the phone. Select SHOW | STATUS to verify that you are communicating with the controller.

If the controller doesn't give a tone after entering the PC Access code, and sounds like it hung up on you, there may be a number programmed in "CALLBACK PHONE NUMBER" in the controller. In this case, the only computer that can do a remote access is the one at the phone number programmed in the controller. When the controller calls back, select MODEM | ANSWER CALLBACK to answer the call.

#### ***UPLOAD / DOWNLOAD FAILED***

If the controller has trouble uploading or downloading the information to the computer, you will get a "Upload / Download Failed" message. Often, this can be corrected by disabling all error correction and data compression. Find the AT commands in the modem's manual and add it to the end of the existing Initialization Command.

## Zone Input Readings

HAI controllers feature a comprehensive diagnostic test. All zone inputs are constantly scanned for excess loop resistance and other potential troubles. The status display can be accessed from the console or when online with a PC using the PC Access software.

To access the comprehensive diagnostic test from a console, from the top-level display or from the main menu, press 6 (STATUS), 4 (TEST), ↓ ↓.

1=147    2=148    3=147  
4=146    5=146    6=147 ↓

Each reading should be changing only by two or three counts from its average steady reading. When a door or window is opened, the reading will go up to a value that represents that zone is open.

This feature can be used to monitor the quality of the zone wiring and contacts. If the numbers begin to deviate from their original values when the system was new, wiring problems that will eventually lead to trouble or false alarms may be developing.

The following tables show the values that may appear in the status display and their meaning.

### OmniLT Controllers

| STATE OF THE ZONE INPUT | MINIMUM | MAXIMUM | BURG    | NO EOL  | FIRE    |
|-------------------------|---------|---------|---------|---------|---------|
| CLOSED                  | 0       | 20      | ALARM   | SECURE  | ALARM   |
| TROUBLE                 | 21      | 35      | TROUBLE | TROUBLE | TROUBLE |
| END OF LINE (SECURE)    | 36      | 60      | SECURE  | SECURE  | SECURE  |
| TROUBLE                 | 61      | 200     | TROUBLE | TROUBLE | TROUBLE |
| OPEN                    | 201     | 255     | ALARM   | ALARM   | TROUBLE |

### Omni and OmniPro Controllers

| STATE OF THE ZONE INPUT | MINIMUM READING | MAXIMUM READING | NOMINAL READING |
|-------------------------|-----------------|-----------------|-----------------|
| HIGH SIDE GROUND FAULT  | 0               | 20              | 0               |
| TROUBLE                 | 21              | 35              | -               |
| LOW SIDE GROUND         | 36              | 80              | 69              |
| TROUBLE                 | 81              | 110             | -               |
| CLOSED                  | 111             | 136             | 126             |
| END OF LINE (SECURE)    | 137             | 157             | 146             |
| TROUBLE                 | 158             | 200             | -               |
| OPEN                    | 201             | 255             | 250             |

## Omni II and OmniPro II Controllers

| STATE OF THE ZONE INPUT | MINIMUM | MAXIMUM | BURG    | NO EOL  | FIRE    |
|-------------------------|---------|---------|---------|---------|---------|
| HIGH SIDE GROUND FAULT  | 0       | 20      | ALARM   | ALARM   | TROUBLE |
| TROUBLE                 | 21      | 35      | TROUBLE | TROUBLE | TROUBLE |
| LOW SIDE GROUND         | 36      | 80      | ALARM   | ALARM   | TROUBLE |
| TROUBLE                 | 81      | 110     | TROUBLE | TROUBLE | TROUBLE |
| CLOSED                  | 111     | 136     | ALARM   | SECURE  | ALARM   |
| END OF LINE (SECURE)    | 137     | 157     | SECURE  | SECURE  | SECURE  |
| TROUBLE                 | 158     | 200     | TROUBLE | TROUBLE | TROUBLE |
| OPEN                    | 201     | 255     | ALARM   | ALARM   | TROUBLE |

## 2-Wire Fire Zones (OmniLT, Omni II, and OmniPro II)

| STATE OF THE ZONE INPUT | MINIMUM | MAXIMUM | FIRE    |
|-------------------------|---------|---------|---------|
| OPEN                    | 0       | 20      | TROUBLE |
| TROUBLE                 | 21      | 25      | TROUBLE |
| END OF LINE (SECURE)    | 26      | 43      | SECURE  |
| TROUBLE                 | 44      | 55      | TROUBLE |
| CLOSED                  | 56      | 255     | ALARM   |

## Thermostat Application Guide

When choosing a thermostat for a particular job or application, consider the following:

All HAI Omnistat Communicating Thermostats have:

- Auto changeover (will switch from heat to cool automatically - this feature can be disabled if desired)
- Programmable (if used stand alone, thermostat can be programmed for weekdays, Saturday, and Sunday - 4 times per day) - this feature can be disabled if not desired
- High and Low setting limits - installer can configure how high or low settings can go.
- Outdoor temperature display (when connected to Omni or OmniPro, or other system)
- Time display - time is set automatically when connected to Omni or OmniPro, or other system
- Filter reminder (reminds you to change or clean the intake filter after 240 hours of operation)
- Adjustable cycle times
- Multi-drop, Opto-isolated RS-232 communications
- Day/Night mode (a simple way to set preprogrammed temperatures by remote switch or system)
- Work with HAI's PC-Stat program for personal computers
- Operate from 20 – 30 VAC, require less than 15 mA current to operate
- Relay contacts rated 2 A - true relays used in all models
- No batteries - all memory is non-volatile
- UL, UL-C, FCC, EPA Energy Star listed
- Celsius or Fahrenheit, 24 hour or AM/PM time format
- Large, easy to read display
- Separate sub base is not required

### RC-80

- Single stage conventional heating and cooling systems (not for heat pumps)
- 1 stage heat, 1 stage cool
- Can be set to heat only or cool only
- Adjustable anticipator
- Use for: forced air, radiant heat, hydronic heat, steam, electric, gas, oil, etc.
- Can power steal for retrofitting heat/cool systems with only 4 wires
- Terminals:

R - transformer hot

G - fan

Y - cool

W - heat

C - transformer common (C connection is usually not required for retrofits on 4 wire systems, because the RC-80 can power steal from W, Y and G) - C is recommended for new installations and when feasible

### RC-90

- Single stage conventional heating and cooling systems (not for heat pumps) with B and O terminals
- Used for zoned damper control systems, which require a "Master" thermostat with the additional outputs B and O. These outputs are used to set the operational mode (cool, heat, or off) of the entire system, even if the master zone is not calling for heating or cooling at the time.
- 1 stage heat, 1 stage cool
- Can be set to heat only or cool only
- Adjustable anticipator
- Use for: forced air systems with a zone (damper) system

- Non power stealing – requires common wire at the thermostat
- Terminals:

R - transformer hot  
 G - fan  
 Y - cool  
 W - heat  
 C - transformer common  
 B - system in heat mode (off in off mode)  
 O - system in cool mode (off in off mode)

## **RC-100**

- Single stage heat pumps with auxiliary heating
- 2 stage heat, 1 stage cool
- Energy Efficient Control of auxiliary heat to save energy (EEC can be turned off if desired)
- Automatic anticipator
- Use for: water source heat pumps, ground source heat pumps, or air to air heat pumps with electric, hot water, or other source of auxiliary heat
- Terminals:

R - transformer hot  
 G - fan  
 O - energized on cooling (for reversing valve)  
 B - energized on heating (for reversing valve)  
 C - transformer common  
 Y - compressor (heating and cooling)  
 W2 - auxiliary heating (stage 2 heat)  
 X2 - fault indicator LED

## **RC-112**

- Used for Two Speed (or two stage) heat pumps with auxiliary heat
- 3 stage heat, 2 stage cool
- Energy Efficient Control of auxiliary heating (EEC can be turned off if not desired)
- automatic anticipator
- Use for two speed heat pumps, two stage heat pumps, WaterFurnace heat pumps with Premier control
- Terminals:

R - transformer hot  
 G - fan  
 O - energized on cooling (for reversing valve)  
 B - energized on heating (for reversing valve)  
 C - transformer common  
 Y - low speed / stage 1 compressor (heating and cooling, both stages)  
 W2 - auxiliary heating (stage 3 heat)  
 Y2 - high speed / stage 2 compressor (heating and cooling, stage 2)  
 X2 - fault indicator LED

## **RC-122**

- Two Stage conventional heating and cooling systems (not for heat pumps)
- 2 stage heat, 2 stage cool
- Energy Efficient Control of second stage (EEC can be turned off if not desired)



- Automatic anticipator
- Use for: forced air systems with two speed furnace, two speed air conditioner, two stage furnace and/or two stage air conditioner, electric, gas, oil, or other fuel.
- Terminals:

R - transformer hot  
 G - fan  
 C - transformer common  
 Y1 - stage 1 cooling  
 Y2 - stage 2 cooling  
 W1 - stage 1 heating  
 W2 - stage 2 heating

## **Other Models**

HAI has other models with specific features for a Real Time Pricing display, which is used in utility control systems; and PESM mode, which is used for compatibility with previous HAI products. These are not recommended for general distribution, and should be ordered only on special request.

- RC-81 - 1 stage heat/1 stage cool with Real Time Pricing, no PESM mode
- RC-91 - 1 stage heat/1 stage cool for Zone Control Systems with Real Time Pricing
- RC-101 - 2 stage heat/1 stage cool with Real Time Pricing, no PESM mode
- RC-120 - 2 stage heat/2 stage cool with PESM mode, no EEC
- RC-121 - 2 stage heat/2 stage cool with Real Time Pricing, no EEC

## **HAI Thermostat Accessories**

### **RC-200 PCStat software and Cable**

Software for IBM PCs and compatibles that communicates with up to 127 HAI thermostats. The thermostats are connected to the PCs serial port. The software allows set-up, programming and status monitoring of the features in all HAI thermostat models. Includes RC-201. Runs under dos, Win 3.1, and Win 95.

### **RC-201 Serial Cable**

A ten-foot cable to connect a DB-9M serial port to an HAI thermostat. Although instructions for making this cable are included with PCStat software, this cable is conveniently ready-made.

### **RC-202 Signal Booster**

A typical serial port on a PC can communicate with 1 to 4 HAI thermostats over 500 feet of wire. When communicating with more than 4 thermostats or over wiring distances greater than 500 feet, use the RC-202 Signal Booster to provide additional signal strength and surge protection for the PC serial port. The RC-202 connects to the PC serial port using a standard modem cable (not supplied) and to the thermostats with a DB-9M serial port. The RC-202 has indicator lights for power, transmit and receive to show the status of communications with the thermostats. It is provided with a plug in power transformer.

### **RC-210 Promotional Software Package**

This package includes: PCStat software, manual and the Serial Protocol Description for the HAI communicating thermostats on 3.5 inch diskette. Instructions are included for making thermostat cables.



## X-10 Transmission Speed When Running a Macro

This application describes the performance of X-10 based lighting control with HAI automation controllers

All HAI controllers feature two-way X-10 as standard equipment. The term "two-way" means that the controllers can both transmit and receive X-10 signals for use in automation programming. Further, the controller uses the receiver to make sure that signals transmitted by the controller go out cleanly, that is, without being interrupted by noise or a transmission from another controller.

The X-10 protocol is fully defined in X-10's documentation for the TW-523 Two-Way Power Line Interface, and won't be discussed in detail here. However, basic facts of the protocol are that it can send 60 bits of information per second, and that an on or off command to a single light or appliance requires about 55 bit times (including required pauses between words, etc.). Therefore, it takes about a second to send the required message.

The X-10 protocol requires the message to be sent twice, although the module may switch on the first message. Therefore, the light may appear to come on faster than the 1 second that it takes to send a complete message.

In HAI controllers, X-10 commands can come from the console, telephone, computer, or the controller's internal programs. The commands go into a buffer inside the controller, and are then transmitted at the maximum speed that X-10 allows. The programming in the controller allows "buttons" or macros to be programmed, which can execute many X-10 commands at once. In an example, assume that a button is programmed to turn on 10 individual lights using X-10. When the button is activated the controller finds all of the X-10 commands for that button and loads them in the X-10 buffer in a matter of milliseconds. The X-10 driver software in the controller then begins transmitting the X-10 commands as fast as X-10 allows.

In the event that noise or a collision corrupts the transmitted signal, the HAI controller will wait a random period of time between one half and two seconds, and then transmit again. If the noise or collision persists, the controller will try again up to 4 times. In this manner, two HAI controllers trying to send at the same time will get through, although at greatly reduced speed.

Here are some guidelines for speeds of different commands:

| Command                        | Typical | Maximum – no retries | Typical – with retries |
|--------------------------------|---------|----------------------|------------------------|
| Individual light On or Off     | 0.5 s   | 1.0 s                | 0.5 – 8 s              |
| All On or Off (per house code) | 0.25 s  | 0.5 s                | 0.25 – 8s              |
| Dim or Brighten 50%            | 2.5 s   | 2.5 s                | 2.5 s                  |
| 10 individual lights on        | 10 s    | 10 s                 | 10 – 100 s             |



## Calculating Sunrise/Sunset for Locations East of the Prime Meridian

The HAI OmniLT (prior to firmware Version 2.1), Omni or OmniPro controllers use the date, latitude, longitude, and time zone to calculate the times of sunrise and sunset for any location north of the equator and west of the prime meridian at Greenwich, England. It is possible to calculate the times of sunrise and sunset for locations east of the prime meridian, but north of the equator, by adjusting the values entered into the system for longitude and time zone. It is currently not possible to calculate these times for locations south of the equator.

Make the following adjustments for eastern longitudes:

1. Set the time zone to 6.
2. Add 6 to the number of hours local-standard time precedes the standard time at Greenwich, England.
3. Multiply this by 15, then subtract the eastern longitude. Enter this value for longitude.

Examples:

For Haifa, Israel located at 33N 35E time zone -2 (that is local standard time precedes the standard time at Greenwich, England by two hours):

$$\text{Adjusted Longitude} = ((2 + 6) \times 15) - 35 = \mathbf{85}$$

For Paris, France located at 49N 2E time zone -1:

$$\text{Adjusted Longitude} = ((1 + 6) \times 15) - 2 = \mathbf{103}$$

**Note:** OmniLT (with firmware Version 2.1 and later), Omni II/Omni Ile, and OmniPro II has global sunrise and sunset calculations incorporated. You can now enter your latitude for locations north or south of the equator, and longitude for location east or west of the Prime Meridian.



## Power Requirements for RC-Series Thermostats

All HAI RC-Series communicating thermostats require 20 to 30 volts AC to operate. This power must be on continuously. Any momentary dip or cut out of power will be seen as a power failure and cause the thermostat to reset and wait the minimum off time to restart.

Version 1.5 and earlier thermostats are AC only. They must be powered by an AC circuit, which is standard for HVAC systems. Versions 1.6 and later can operate from AC or DC power supplies - 20 to 30 volts.

If power problems are suspected, use a good voltmeter set to AC VOLTS and measure between the R wire and any of the other wires (C, W, Y, or G). You should read between 20 and 30 volts AC. Higher or lower voltages will cause problems.

Another test would be to connect a 24-volt light bulb between R and C on the thermostat, or at the HVAC system if transformer common (C) is not wired to the thermostat. Route the wires through the air vents on the thermostat mounting plate, and install the thermostat. If this light blinks or goes off during a call for heating or cooling, the furnace is cutting power to the thermostat and causing it to reset.

Most HVAC systems are designed to provide continuous power to the thermostat, since many modern thermostats require continuous power. Cut outs, sags, etc. in the 24-volt thermostat circuits are not normal. Check the furnace door switch, wiring connections, transformer, and HVAC controller for possible trouble.

