Integration Note

Manufacturer:	Aprilaire
Model Number(s):	**8870 Thermostat / 8818 Distribution Panel / 8061 TT Support Module / 8061 TrH Support Module**
Minimum Core Module Version:	4.0.1629, if using remote sensors
Document Revision Date:	2/14/2013

OVERVIEW AND SUPPORTED FEATURES

THE 8870 THERMOSTATS SUPPORT THE FOLLOWING FEATURES:

Temperature Control: Temperature control can be managed by schedules tied to house modes or by manual control based on time (Timed Temporary Hold, Temporary Hold and Permanent Hold). Temperature can be shown as either Fahrenheit or Celsius on the viewer interface.

Mode Control: The climate system can be set to run in the following heating and cooling modes: **Heat** only, **Cool** only, **Auto Heat Cool** or **Off**. In addition, systems that have a fan can be set to run in **Automatic** mode or **Continuous** mode.

History View: The history view shows the inside temperature, outside temperature, unit run and fan run times, and cooling and heating setpoints.

Schedule Control: Multiple schedules can be set using the Viewer software. The schedules are tied to the house mode.

Outside Air Temperature and Humidity Display: The outside air temperature and humidity can be obtained from the weather information on the web, or be monitored using an 8061 or 8062 Support Module. The outside air temperatures and outside humidity can be displayed in real-time or tracked in history for each thermostat in the Viewer.

Auto Time and Date: The **g!** system will automatically update the time and date on the thermostats including daylight savings time changes.

Auto Thermostat Detection: The **g!** system will automatically detect all the thermostats connected to system, along with each thermostat's ID (number).

Celsius and Fahrenheit: Aprilaire Thermostats support displaying Temperatures in whole number values for C or F both at the stat and in the **g!** system. Decimal place display and control is not supported.

THE 8870 THERMOSTATS DO NOT SUPPORT THE FOLLOWING FEATURES:

Humidity Control: Humidity control is not supported.

Celsius and Fahrenheit: Decimal place temperature value display and control is not supported. Aprilaire Thermostats support displaying Temperatures in whole number values only.

Any feature not specifically noted as "supported" is not supported.

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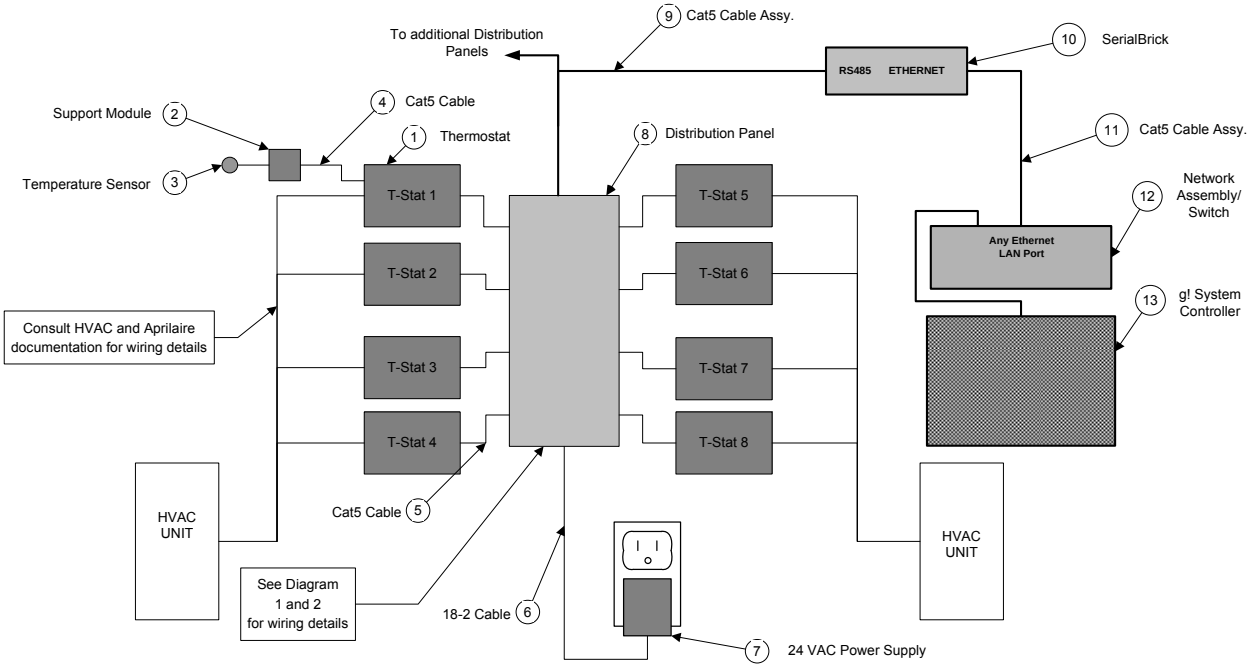
INSTALLATION OVERVIEW

1. Install the Aprilaire RS-485 thermostat network and control cables during the rough-in phase. Consult the HVAC unit manual for control cabling requirements.
2. Each Model 8818 Distribution Panel supports up to 8 thermostats. If you have more than 8 thermostats, install additional Distribution Panels and daisy-chain a Cat5 cable from one to the next. Up to 4 Distribution Panels can be daisy chained together to provide access to 32 thermostats.
3. Run a Cat5 wire from one of the Distribution Panels back to the Network Assembly of the **g!** system.
4. If using, mount a **Serial**Brick with the Network Assembly (or appropriate location) to connect to the Aprilaire RS-485 network.
5. Mount the Distribution Panel(s) and terminate the wires, as per diagrams and jigs provided. Make sure all the power and communication switches are in the off position.
6. Mount and connect the thermostats bases using the diagrams and jigs provided
7. Wire up **one** 24VAC transformer to **each** Model 8818 Distribution Panel. **Do not plug it in** until the wires between the transformer and the Distribution Panel are correctly terminated and all the power switches are in the **Off** position. The transformer has a non-replaceable fuse that will blow if the wires are shorted.
8. **Recheck the wiring on both at the thermostat and the Distribution Panel using the wiring jigs provided.**
9. Install and power up the thermostats one at a time, while noting the thermostat locations on the inside of the cover for the corresponding Distribution Panel. Program the thermostats as outlined in the thermostat programming section. Use the individual power switch in the Distribution Panel to send power to the thermostats. **Do not** turn on the A and B switches at this time.
10. Test the thermostat and climate system to ensure that the thermostats correctly turn on the appropriate heating or cooling equipment, and open or close the appropriate valves / dampers.
11. Connect the **g!** system to the Aprilaire thermostats electrically. See the wiring diagrams for more information.
12. Turn on all the A and B switches to the connected thermostats.
13. Configure the **g!** system for the thermostats and confirm communication between the thermostats and the controller. Use the auto detect (Discover Devices) feature to find the thermostats on the network.
14. Test the system by changing the set points, modes and schedules on the viewer and various thermostats, confirming that the various components in the system are communicating with each other.

CONNECTION DIAGRAMS

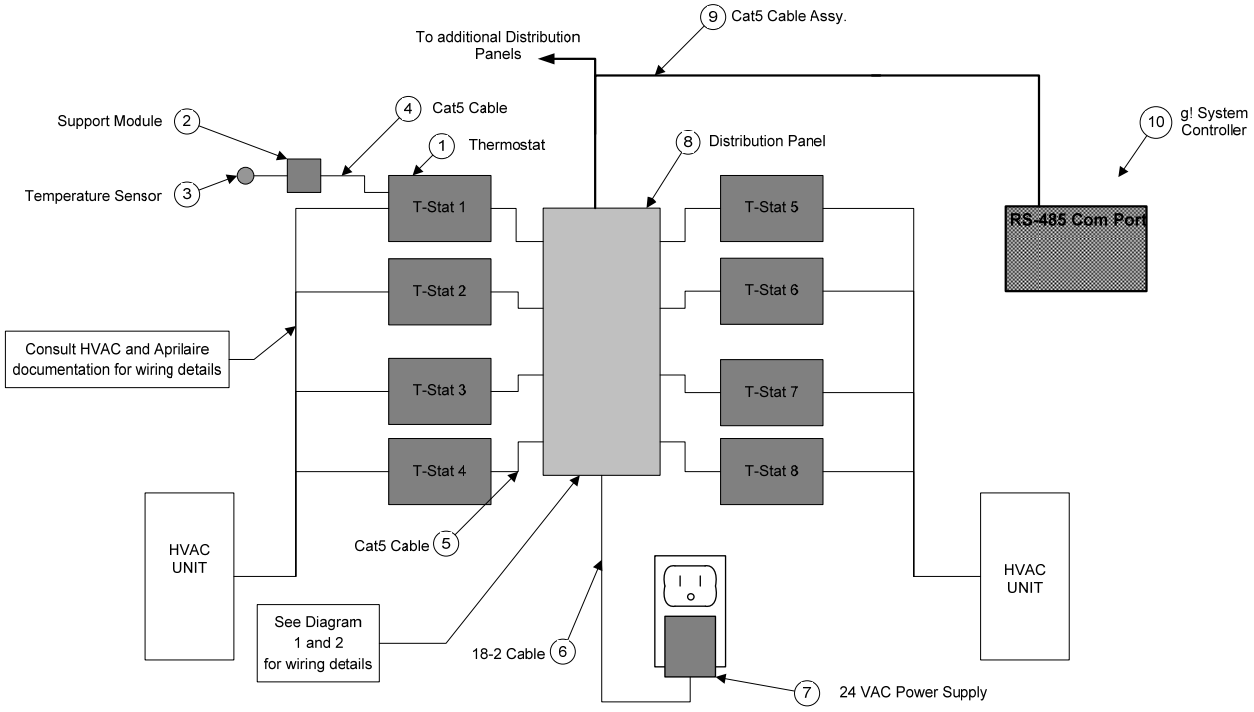
OPTION 1: ANY CONTROLLER WITH SERIAL BRICK



BILL OF MATERIALS

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Thermostat	Aprilaire	8870	RS-485	Screw terminal	
2	Support Module (Choose One)					
	TT Support Module	Aprilaire	8061TT	RS-485	Screw terminal	Optional
	TrH Support Module	Aprilaire	8062TrH	RS-485	Screw terminal	Optional
3	Temperature Sensor (Choose One)					
	Duct Mount Sensor	Aprilaire	8052	Analog	2 wires	Optional
	Flush Mount Sensor	Aprilaire	8051	Analog	2 wires	Optional
4	Cat5 Cable	Installer	N/A	RS-485	None	
5	Cat5 Cable	Installer	N/A	RS-485	None	
6	18/2 Cable	Installer	N/A	24V AC	None	
7	Plug-In Transformer	Aprilaire	8027	24V AC	Screw terminal	Run and teminate wires before plugging in
8	Distribution Panel	Aprilaire	8818	RS-485	Screw terminal	
9	Cat5 Cable Assy.	Installer	N/A	RS-485	RJ-45 Male X Wire	
10	SerialBrick	ELAN	HW-EB-100	RS-485 X IP	RJ-45 Female X RJ-45 Female	
11	Cat5 Cable Assy.	ELAN	N/A	IP	RJ-45 Male X RJ-45 Male	1Ft patch cable ships with the SerialBrick
12	Network Assembly	ELAN	NWA18	IP	RJ-45 Female X RJ-45 Female	Use any available LAN port
13	g! System Controller	ELAN	Various (e.g. HC12)	IP	RJ-45 Female	

OPTION 2: DIRECT TO RS485 PORT ON G! SYSTEM CONTROLLER (OR MULTIBRICK)



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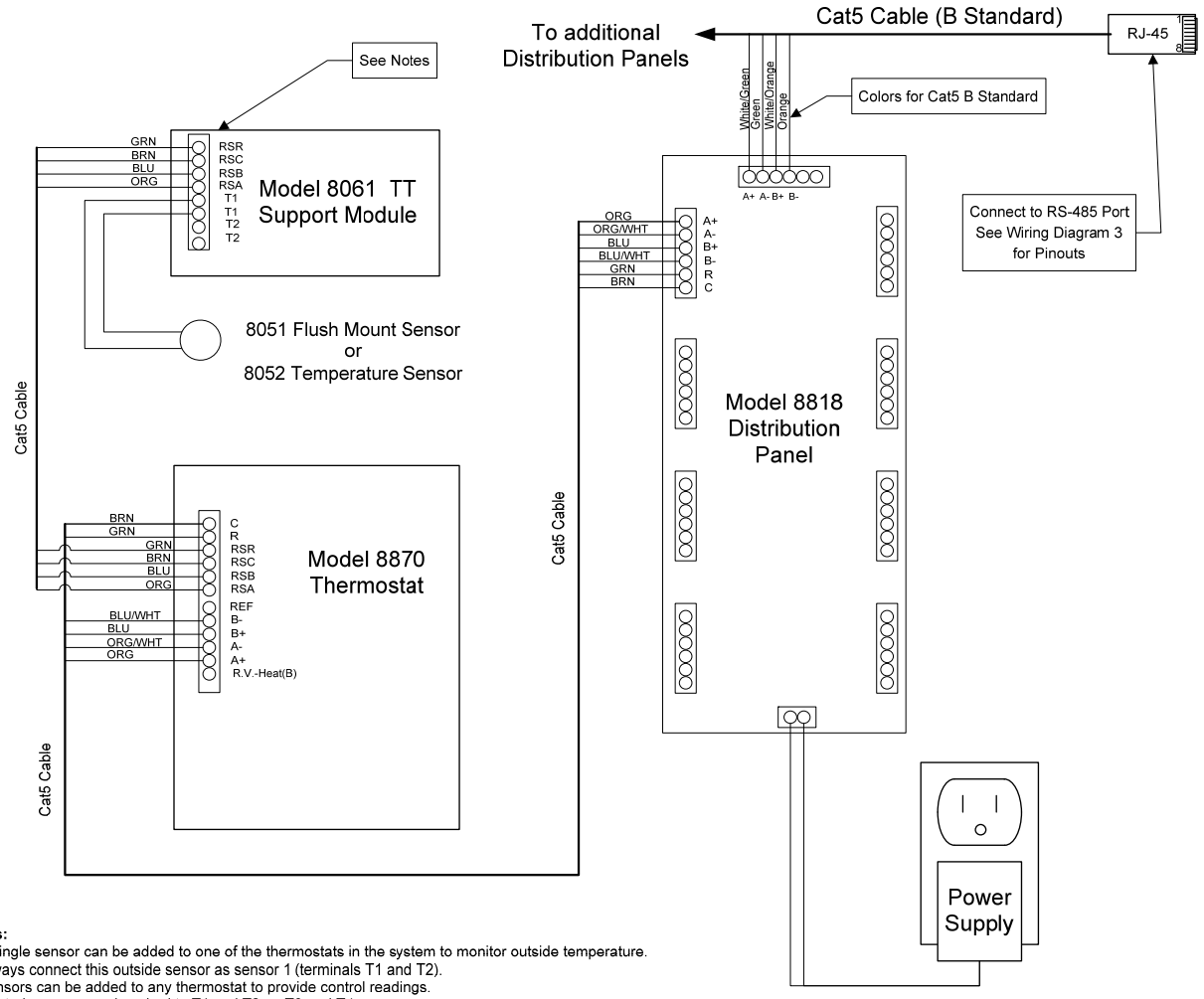
3	Temperature Sensor (Choose One)					
	Duct Mount Sensor	Aprilaire	8052	Analog	2 wires	Optional
	Flush Mount Sensor	Aprilaire	8051	Analog	2 wires	Optional
4	Cat5 Cable	Installer	N/A	RS-485	None	
5	Cat5 Cable	Installer	N/A	RS-485	None	
6	18/2 Cable	Installer	N/A	24V AC	None	
7	Plug-In Transformer	Aprilaire	8027	24V AC	Screw terminal	Run and teminate wires before plugging in
8	Distribution Panel	Aprilaire	8818	RS-485	Screw terminal	
9	Cat5 Cable Assy.	Installer	N/A	RS-485	RJ-45 Male X Wire	
10	g! System Controller	ELAN	Various (e.g. HC12)	RS-485	RJ-45 Female	

WIRING DIAGRAM 1: CONNECTING THE THERMOSTAT WITH THE 8061 TT SUPPORT MODULE

The diagram below shows connections in more detail. Note that the A+/A- and B+/B- colors shown are for Cat5 EIA568B cables. See below for the EIA568A colors.

Note: The Aprilaire documentation may show different wiring for connecting the distribution panel to their 8811 protocol adapter, use the diagram below for connecting to g! with a SerialBrick or the RS485 port on a g! System Controller or MultiBrick.



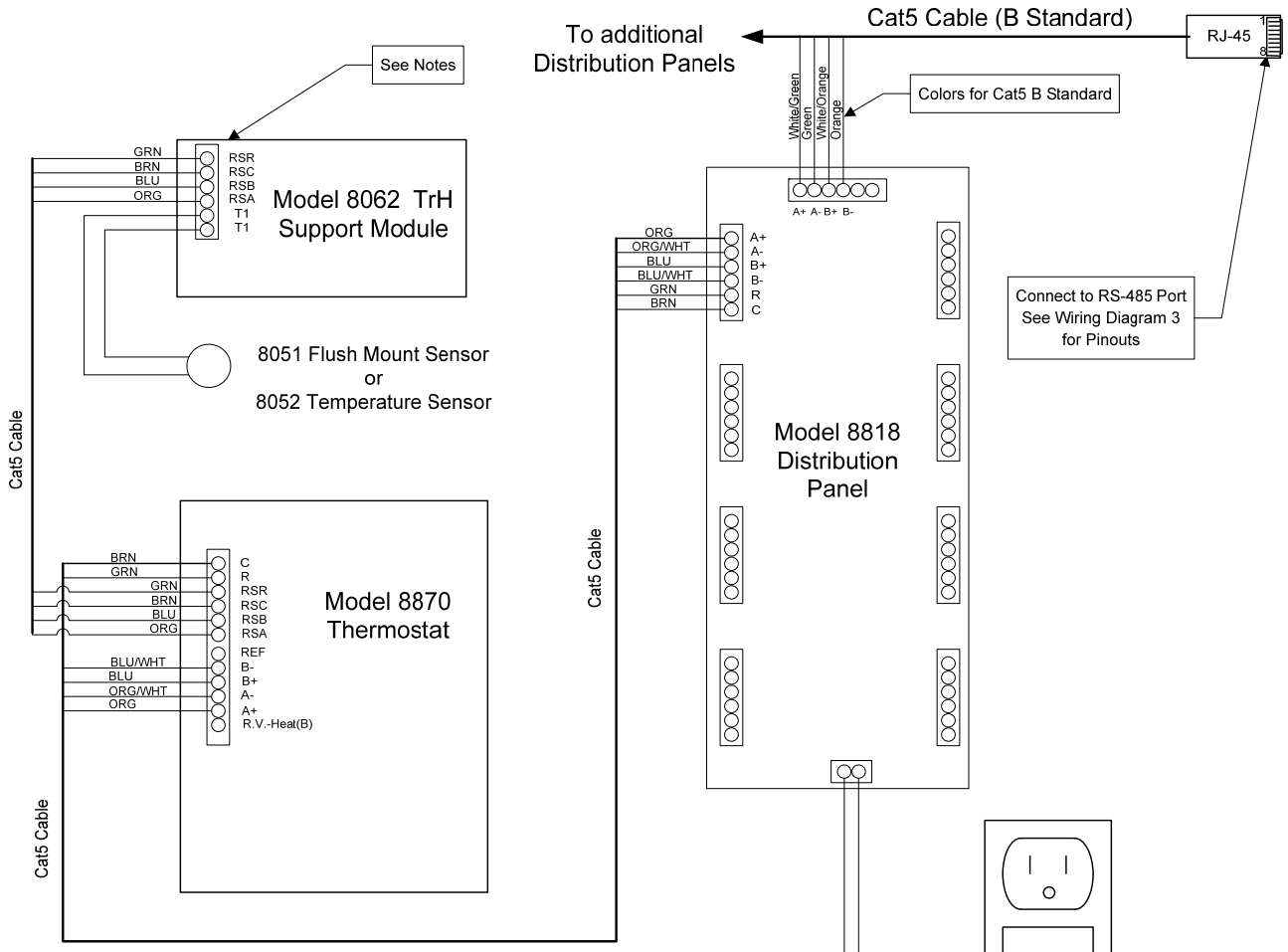
Notes:
1. A single sensor can be added to one of the thermostats in the system to monitor outside temperature. Always connect this outside sensor as sensor 1 (terminals T1 and T2).
2. Sensors can be added to any thermostat to provide control readings. Control sensors can be wired to T1 and T2, or T3 and T4.
3. Refer to the Aprilaire 8061 TT Module documentation for unit setup information.

Pin	EIA 568A Colors	EIA568B Colors
A+	White / Orange	White / Green
A-	Orange	Green
B+	White / Green	White / Orange
B-	Green	Orange

WIRING DIAGRAM 2: CONNECTING THE THERMOSTAT WITH THE 8062 TRH SUPPORT MODULE

The diagram below shows connections in more detail. Note that the A+/A- and B+/B- colors shown are for Cat5 EIA568B cables. See below for the EIA568A colors.

Note: The Aprilaire documentation may show different wiring for connecting the distribution panel to their 8811 protocol adapter, use the diagram below for connecting to g! with a SerialBrick or the RS485 port on a g! System Controller or MultiBrick.

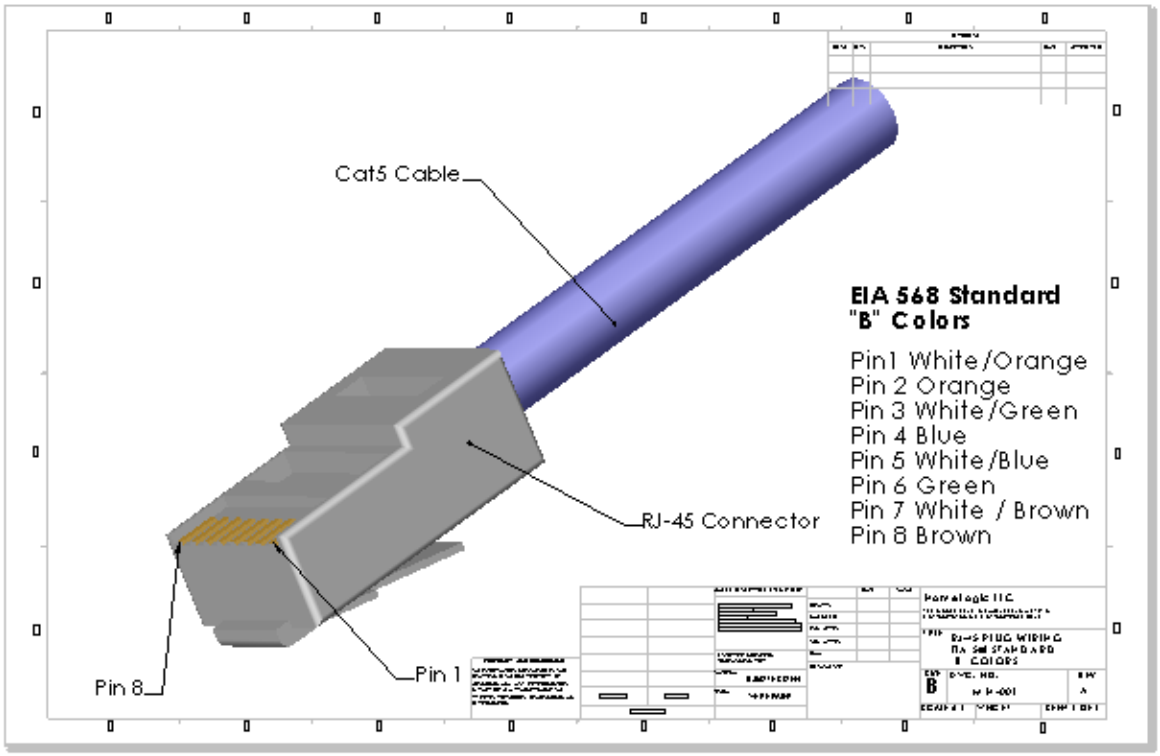


Notes:

1. A single temperature sensor can be set as a "monitor" sensor to provide the outside temperature.
2. If a humidity sensor is set to "monitor", the humidity reading is displayed on the thermostat, but will not appear in this version of the Viewer interface.
3. A humidity sensor cannot be set as a "control" sensor in this version of the OneHome system.
4. Refer to the Aprilaire 8062 TrH Module documentation for additional setup information.

Pin	EIA 568A Colors	EIA568B Colors
A+	White / Orange	White / Green
A-	Orange	Green
B+	White / Green	White / Orange
B-	Green	Orange

WIRING DIAGRAM 3: RJ-45 CONNECTOR PINOUTS



THERMOSTAT PROGRAMMING

Once the thermostats are powered up and running properly, you need to make a few changes to the thermostat settings to integrate with the **g!** system.

STANDARD THERMOSTAT SETUP

The changes outlined below in **Table 1** assume that you are starting with a factory default thermostat. These changes will then put the thermostat into a standard g! setup.

Step	Instructions	Comments
1	Press [Mode] and [Enter] at the same time	Places the thermostat into **Setup Mode**
2	Press the [Scroll Down] + [Scroll Down] + [Scroll Down] + [Scroll Down]	Goes to the **Communications Set-up** menu
3	Press [Enter] + [Enter]	Prompts you for the **Network ADDRESS**
3	Press [Scroll Down] and [Scroll Up]	Set the network address. Set the first thermostat to 1, the second to 2, and so on.
4	Press [Enter]	Saves the ID and prompts your for the **Number of Stats on Network**
5	Press [Scroll Down] + [Scroll Up]	Set the number of thermostats on the network
6	Press [Enter] + [Scroll Down] + [Enter]	Goes back to the **Communications Set-up** menu
7	Press [Scroll Down] + [Scroll Down] + [Scroll Down] + [Scroll Down]	Goes to the **Display Set-up** menu
8	Press [Enter] + [Enter] + [Enter]	Goes to the **Display Time and Date** location
9	Press [Scroll Down]	Selects **Yes**
10	Press [Enter] + [Enter]	Goes to the **Display Set-up** location
11	Press [Scroll Down] + [Enter]	Restarts thermostat

Table 1: Steps to setup a factory default Model 8870 thermostat with standard g! settings.

TABLE 2: OTHER THERMOSTAT SETTINGS

In addition to the standard settings listed above, there may be situations that require additional changes to the thermostat to solve a particular installation issue.

The following table lists the thermostat settings and comments on each. Items in the g! Standard column that are bold are items that we suggest you change, as explained above. Refer also to the Aprilaire documentation for more information.

Recall that thermostats are put into programming mode by pushing the **Mode** and **Enter** button at the same time. Pressing the scroll up and down arrows allows selection of the various submenus.

Once the desired menu heading has been located, press the **Enter** key to view and set the associated variables. To get back to the menu select **Exit** and push the **Enter** button.

Themostat Menu Headings	Variable	Apriaire Default	Elan g! Standard	Comments
Network Override	Enabled	Yes	Yes	OK to change
	Disabled	No	No	OK to change
Thermostat Lockout	Complete Lockout	No	No	OK to change
	Patial	No	No	OK to change
	Unlock	Yes	Yes	OK to change
Security Setup	Remove Pass Code	Yes	Yes	OK to change
	Set/Activate Pass Code	No	No	OK to change
Communications Set Up	Thermostat Address	1	**1 thru N**	**Must be set with a unique address**
	Number Of Stats on Network	32	**N**	**N must be set to the total number of thermostats on the network**
	Baud Rate	9600 Baud	9600 Baud	**Do not change**
Temperature Set Up	Display Temp Offset	No	No	OK to change
	Temperature Offset	0 degrees	0 degrees	OK to change
	Differential 1st Stage	1 degree	1 degree	OK to change
	Differential 2nd Stage	2 degree	2 degree	OK to change
Backlight Set UP	On With Every Change	Yes	Yes	OK to change
	Only When Needed	No	No	OK to change
	Disable	No	No	OK to change
Balance Points Set Up	Low Balance Points	20 F	20 F	Consult Aprilaire manual
	High Balance Points	60 F	60 F	Consult Aprilaire manual
Display Set Up	Temperature Scale	F	F	OK to change
	Show Setpoints Always	Yes	Yes	OK to change
	Show Setpoints if Changed	No	No	OK to change
	Show Time And Date	No	**Yes**	OK to change

Table 2: Aprilaire Model 8870 thermostat settings, showing factory defaults and g! standards. Note the comments to the right which indicate which values should not be changed.

g! CONFIGURATION DETAILS

The following table provides settings used in the g! Configurator. In the table below:

- o "<Select>" Select the appropriate item from the list (or drop-down) in the Configurator.
- o "<User Defined>", etc. Type in the desired name for the item.
- o "<Auto Detect>", etc. The system will auto detect this variable.

Devices	Variable Name	Setting	Comments
Communication Devices	**Name**	<Auto Detect> See Note 1	
(Option 1-SerialBrick)	**Type**	**(IP to Serial) SerialBrick**	
	SerialBrick Name	<Select from list>	
	Communication Type	**Aprilaire RS485 Network**	
	Location	<User Defined> (Not Required)	
Communication Devices	**Name**	<User Defined>	
(Option 2- g! System Controller or MultiBrick)	**Type**	**Serial Port**	
	Communication Type	**Aprilaire RS485 Network**	
	Location	<User Defined> (Not Required)	
	COM Port	**<Select>**	**Select RS485 port on g! System Controller. MultiBrick must be COM 3**
HVAC Units	**Name**	<User Defined>	
	Model	**Generic HVAC Unit**	
	Controls Heat	<Select from list>	
	Controls Cooling	<Select from list>	
	Controls Fan	<Select from list>	
<Discover Devices>			Click the **Discover Devices** button on the Communication Device
Thermostats	**Name**	<User Defined> (Default: **Thermostat1**, etc.)	
	Location	<User Defined> (Not Required)	
	Com Device	<Auto Detect>	
	Thermostat #	<Auto Detect>	
	Heating Unit	<Select from list>	
	Cooling Unit	<Select from list>	
Schedules	**HVAC Schedule**	<Select from list>	Select desired number of schedules
	Programs	<Select from list>	Select desired weekly programs
	Monday - Sunday	<Select days>	Select days that go together
	Periods per Day	<Select from list>	1, 2 or 4 periods per day
Global Options	**Units**	<Select from list>	Fahrenheit or Celsius, no decimal places (see note 2)
	Temporary Hold Mode	<Select from list>	Timed Hold or Hold until next schedule period
	Temporary Hold Default Time	<Select from list>	Select default Temporary Hold time
	Outside Temperature Sensor	<Select from list>	Choose optional sensor if installed or choose Internet
	Outside Humidity Sensor	<Select from list>	Choose optional sensor if installed or choose Internet

Notes:

1. The **Communication Devices Name** is set to **New Device** by default. After you select the SerialBrick, the name will change to that specified by the SerialBrick.
1. Select either Fahrenheit or Celsius no decimal places. All other options are not supported.

COMMON MISTAKES

1. Plugging in the 24 VAC transformer before terminating the wires. If the bare wires touch, the non-replaceable fuse in the transformed will blow, ruining the transformer.
2. Programming two thermostats with the same address.
3. Programming the thermostats with the incorrect number of stats in the system.
4. Wiring the Aprilaire thermostats and Distribution Panel incorrectly. There are a lot of wires in this system: use the jigs to double check that the wiring is correct. Wiring a thermostat incorrectly will cause other thermostats to exhibit strange and inconsistent behavior. Strip 0.25 inches of insulation off the wire and insert it into the connector so that the end of the insulation is flush with the side of the connector. The switches on the Distribution Panel can be used to help isolate the bad thermostat / wiring.
5. Failing to plug the Cat5 cables into the correct port: make sure that each of the RJ-45 connectors is plugged into the corresponding port.
6. Wiring the RJ-45 connector in the cable assembly between the **Serial**Brick and the distribution panel backwards. When this happens, only 2 thermostats will work at one time. Adding more than 2 thermostats to the system, with the RJ-45 connector wired backwards, will prevent the system from working.
7. Bending the pins on the thermostat. Removing the thermostat from its base has a tendency to bend the pins outward, away from the center of the thermostat. This can result in a poor connection when the thermostat is replaced in its base. Gently bend the pins so they are square or bent slightly toward the center of the thermostat to correct the problem.
8. Wiring the Distribution panel according to Aprilaire documentation. The Aprilaire documentation shows a different wiring scheme for connecting the distribution panel to their 8811 protocol adapter. Follow the diagrams in this note for connecting Aprilaire to a g! RS485 port.

WIRING JIGS

The following wiring jigs have been provided to help you quickly inspect wiring. Cut along the lines indicated, then fold the pieces in half along the vertical line.