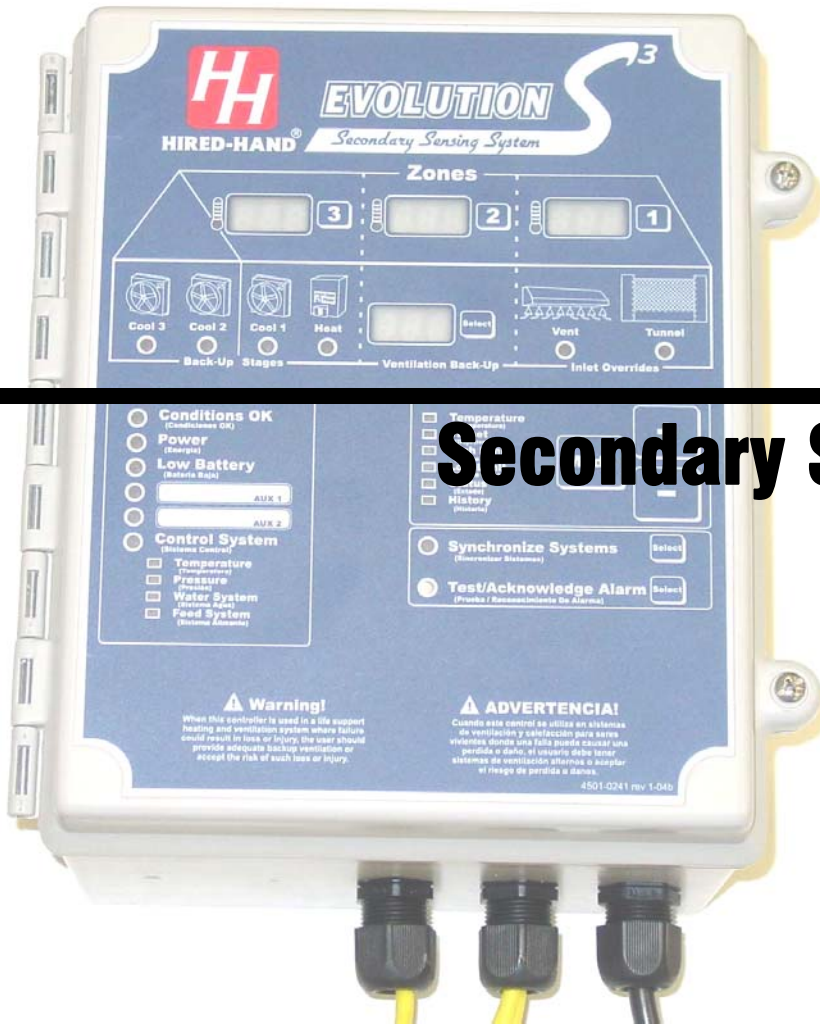




HIRED-HAND®



Secondary Sensing System

Owners Manual

Hired Hand Mfg., Inc.
1733 Co Rd 68
PO Box 99
Bremen, Alabama 35033

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1. Warnings

Warning!

Maximum operating temperature of controller is 50° C (122° F).
Use adequate ventilation to reduce the risk of overheating controller!

Warning!

- Do not perform modifications or wiring with voltage applied!
- Keep high voltage (or AC) separate from low voltage wires!

Warning!

When this controller is used in a life support heating and ventilation system where failure could result in loss or injury, the user should provide adequate back-up, or accept the risk of such loss or injury!

2. Limited Warranty

All products are warranted to be free from defects in material and workmanship for a period of one year from the date of purchase if installed and used in strict accordance with the installation instructions. Liability is limited to the sale price of any products proved to be defective or, at manufacturer's option, to the replacement of such products upon their return. No products are to be returned to the manufacturer, until there is an inspection and/or a return-goods authorization (RGA) number is issued.

All complaints should be directed first to the authorized distributor who sold the product. If satisfaction is not obtained or the name of the distributor is not known, write the manufacturer that appears below, directed to the attention of Customer Service Manager.

This limited warranty is expressly in lieu of any and all representations and warranties expressed or implied, including any implied warranty of merchantability or fitness for a particular purpose. The remedy set forth in this limited warranty shall be the exclusive remedy available to any person. No person has authority to bind the manufacturer to any representation or warranty other than this limited warranty. The manufacturer shall not be liable for any consequential damages resulting from the use of our products or caused by any defect, failure or malfunction of our products. (Some areas do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.)

This warranty gives you specific legal rights and you may also have other rights that vary from area to area.

Warrantor:

Hired-Hand Manufacturing, Inc.
1733 Co. Rd. 68
PO Box 99
Bremen, Alabama 35033

3. Ratings and Specifications

- Power Supply.....240VAC 50/60 Hz
- Temperature Range.....32°F - 122°F (0°C – 50°C)
- Inputs.....Three thermistor temperature sensors 32°F – 120°F (0°C - 49°C)
Three auxiliary inputs (contact closure)
- Outputs.....One siren (1.0 Amps @ 12VDC)
One dry contact (5 Amps @ 240 VAC)
4 - 1 Hp Stage Outputs (Plus Model ONLY)

4. Introduction

The **Evolution Secondary Sensing System**, also known as **S³ (S cubed)**, is a unique control system. It combines the features of two systems into one. The **S³** is an alarm system that has the added abilities of the Evolution Back-Up System. It combines these functions to provide ultimate security at a lower system cost.

- **Alarm System**

First, it functions as an alarm system to warn or alert of problem conditions such as Power Outage, High or Low temperature conditions, and/or out of range conditions in other devices through auxiliary switch inputs such as alarm relays. It contains an alarm relay that is capable of driving a 12 volt audible siren and also capable of signaling an external dialer through a N.O./N.C. contact. The **S³** is capable of monitoring up to three auxiliary alarm inputs. It can also monitor up to three temperature sensors for out of range conditions which allows the **S³** the flexibility to monitor any brood setup. In addition, the **S³** has a built in Cycle Pressure Alarm that can be used in conjunction with a static pressure switch or a Photohelic gauge to provide a minimum ventilation monitor.

- **Back-Up System**

As an added bonus, the **S³** can also act as the buildings Back-Up System. All of the functionality of the Evolution Back-Up System is packed into this unit. Therefore, as with the Evolution Back-Up System, it is capable of driving up to 32 of the Evolution 3000/3001 relay outputs, it can override the vent or tunnel inlets based on the level of Back-Up necessary, and it contains a back-up timer percentage capable of assisting in minimum ventilation. This unit is also not limited to use with the Evolution 3000/3001. With the addition of a fail-safe relay card, this unit is capable of driving four 1 h.p. loads directly. Therefore, it is capable of being used with any control system. (Note: If used with control systems other than the Evolution 3000/3001, some functionality will be lost.)

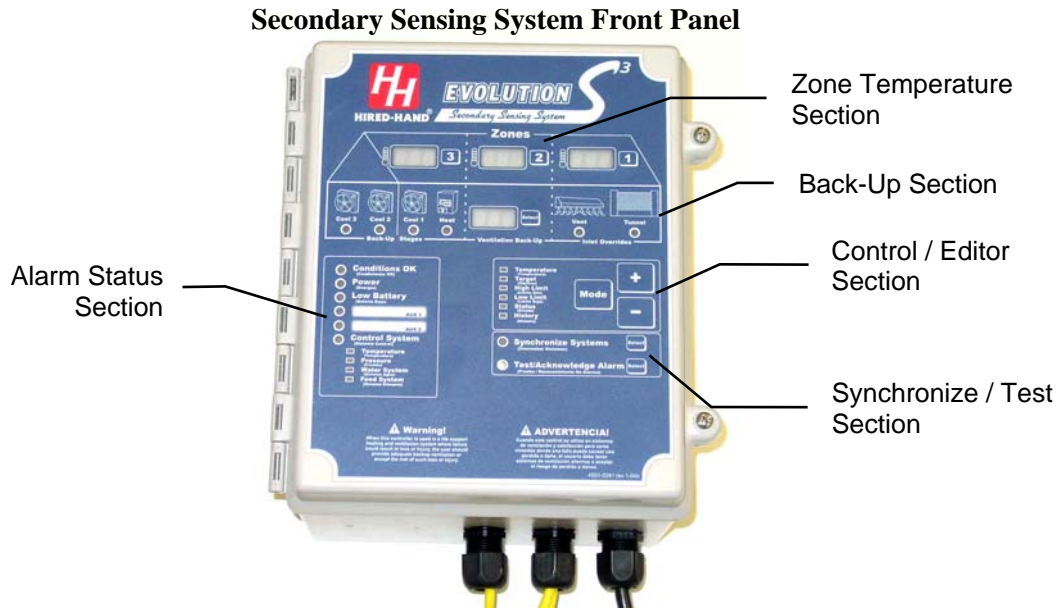
- **Additional Benefits**

By combining the alarm system and the Back-Up system, the **S³** adds additional benefits other than the obvious benefit of a lower system cost. The added benefits include the addition of another Back-Up temperature sensor, a back-up battery to provide power in the case of a breaker failure or a power supply fuse failure, and an additional back-up stage delay which delays turning equipment on after a power failure to allow proper generator start-up.

In addition to the above features and benefits, the design of this system focused on providing a system that was more user-friendly and beneficial to the end user. The **S³** added a target temperature in addition to the High and Low limits for the alarm and the Back-Up System. The High and Low limits are based off of this target, therefore, keeping your alarm and back-up limits in line is as easy as matching the target temperature of your **S³** with the main systems target temperature. In fact, when used in conjunction with the Evolution 3000/3001 controllers, it is as easy as pressing the “Synchronize” button. Another added benefit is the addition of an on board history that tracks high and low temperatures, alarm conditions, and back-up conditions.

5. S³ Front Panel

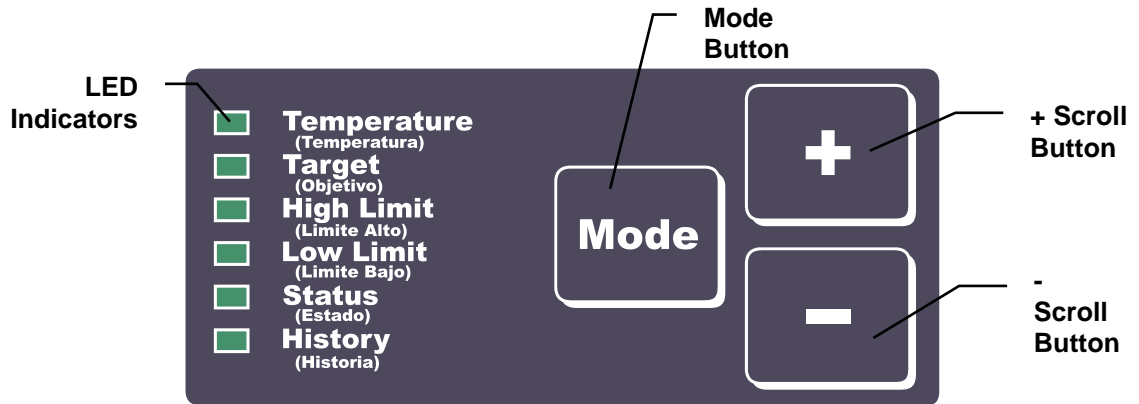
The S³ has five main sections on the faceplate. These are the Zone Temperature Section, the Back-Up Section, the Control / Editor Section, the Synchronize / Test Section, and the Alarm Status Section.



5.1 Control / Editor Section

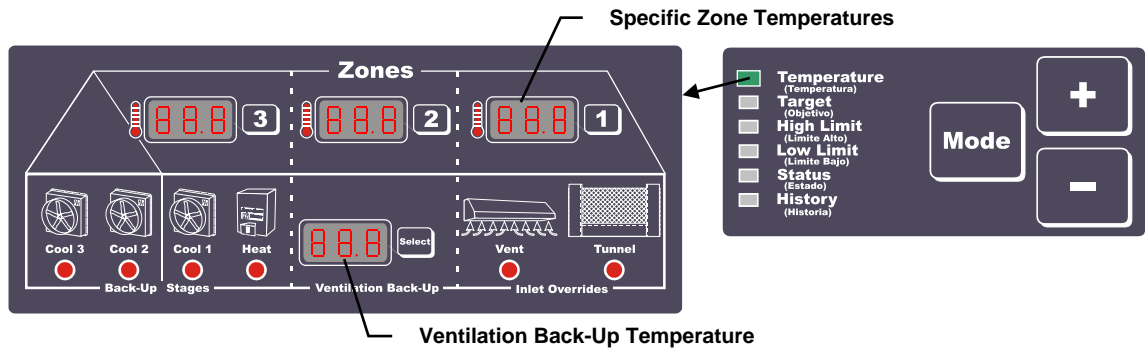
Just below the Back-Up Section on the right hand side of the controller is the **Control / Editor Section**. This section has three buttons: **Mode**, **Plus (+)** and **Minus (-)**. The **Mode** button is used to navigate thru settings and conditions. When the Mode button is momentarily pressed, the green LED Indicators changes to the next reading. By pressing and holding the **Mode** button for at least 5 seconds, the S³ can be placed in the **Program Mode** as discussed in **Section 6** of this manual. Press the **Plus (+)** or **Minus (-)** button to change the values (readings) in the Ventilation Back-Up Display or Zone Temperature Section Displays depending on the specific display selected.

Control / Editor Green Indicator LED's show the type of information represented. For example, if the green light beside "Temperature" is lit, then the Zone Displays are showing the current readings from sensors. The other options for the Display Indicators are Target, High Limit, Low Limit, Status, and History. These modes are changed by momentarily pressing the Mode button. Each press of the Mode button steps the Display Indicator to the next reading Mode.



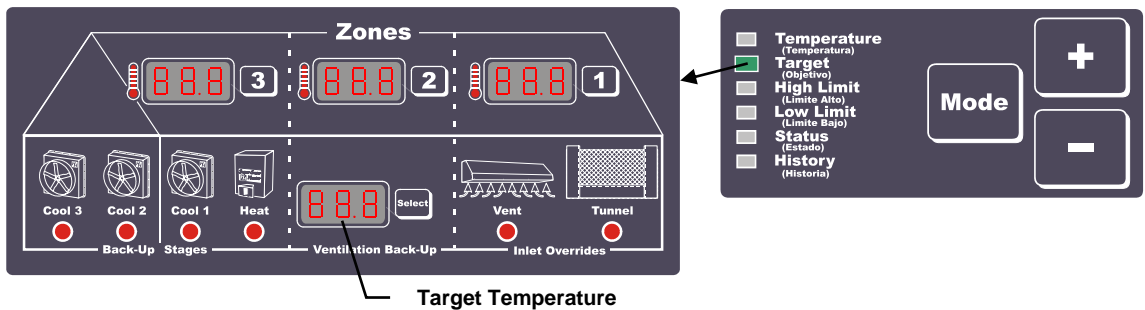
5.1.1 Temperature

The specific **Zone Temperature** (Zone 1, 2, or 3) lists the individual sensor temperature for each zone. The Ventilation Back-Up Temperature shown will be the average of the enabled sensors (Zone 1, 2, and/or 3). In the Zone Temperature Section, a reading of “--.-” indicates the sensor is *disconnected* or in *error*. Also, if the display is flashing “OFF”, it means the sensor is disabled. Therefore, it will not cause the alarm to sound or be included in the Back-Up System’s average temperature. The Ventilation Back-Up Temperature displays the average of the enabled Zone Temperature Sensors.



5.1.2 Target

The **Target mode** displays the target temperature used for Zone Alarm Limits and Back-Up Limits. The Zone Alarm Limits and the Back-Up Limits are referenced to the target much like that of a stage on point in a controller. Therefore, once initially set, the user will only adjust the target which will automatically adjust the high and low limits appropriately. The Target temperature can be changed (0.5° increments) using the Plus (+) or Minus (-) buttons. Example: If the Target Temperature is set to 80.0° F; The High Zone Limit temperature is set to 92.0° F; The Back-Up High Limit temperature set to 90.0° F; When the Target is dropped to 70.0° F, the High Zone Limits will change to 82.0° F and the Back-Up High Limit temperature will change to 80.0° F.

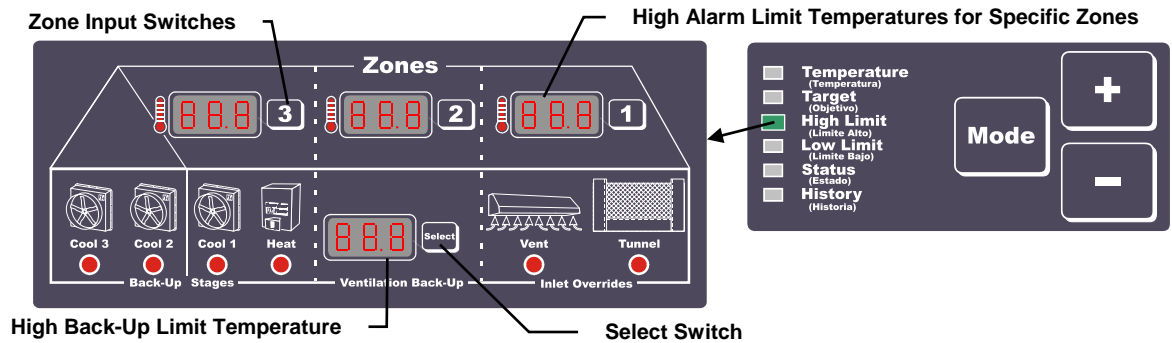


5.1.3 High Limit

The **High Alarm Temperature** is the high temperature at which the controller will indicate an alarm condition. The High Alarm Temperature is displayed and can be changed using **Zone Input Switches** (Zones 1, 2, or 3) then using the **Plus (+) or Minus (-) buttons**.

The **High Back-Up Limit** is the high temperature at which Cool 1 of the Back-Up will turn ON. See **Section 8 (Back-Up Operating Conditions)**. The High Back-Up Temperature is displayed and can be changed (1.0° increments) using the **Select Button** then using the **Plus (+) or Minus (-) buttons**.

NOTE: The High & Low Limits for the temperature sensors can be set individually or can be programmed to be identical using program parameter **P2** (See **Section 6**).

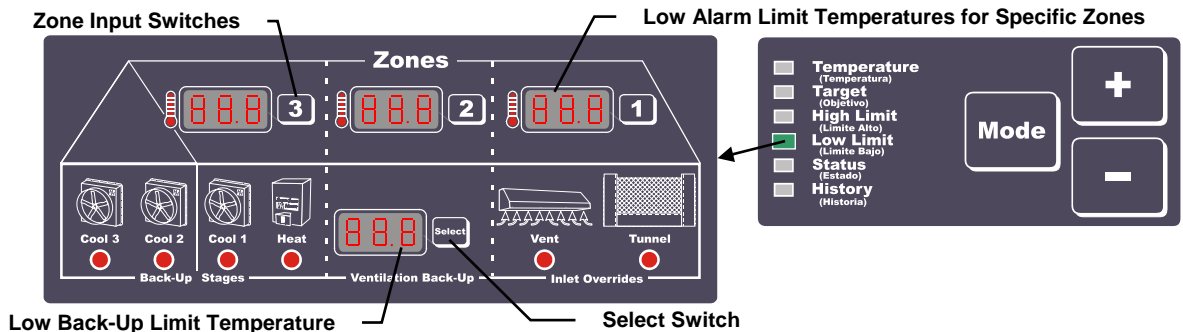


5.1.4 Low Limit

The **Low Alarm Temperature** is the low temperature at which the controller will indicate an alarm condition. The Low Alarm Temperature is displayed and can be changed using **Zone Input Switches** (Zones 1, 2, or 3) then using the **Plus (+) or Minus (-) buttons**.

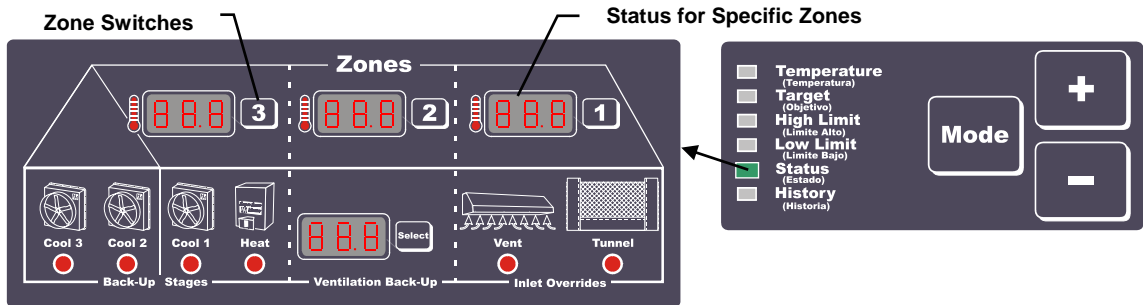
The **Low Back-Up Limit** is the low temperature at which Heat of the Back-Up will turn ON. See **Section 8 (Back-Up Operating Conditions)**. The Low Back-Up Temperature is displayed and can be changed (1.0° increments) using the **Select Button** then using the **Plus (+) or Minus (-) buttons**.

NOTE: The High & Low Limits for the temperature sensors can be set individually or can be programmed to be identical using program parameter **P2** (See **Section 6**).



5.1.5 Status

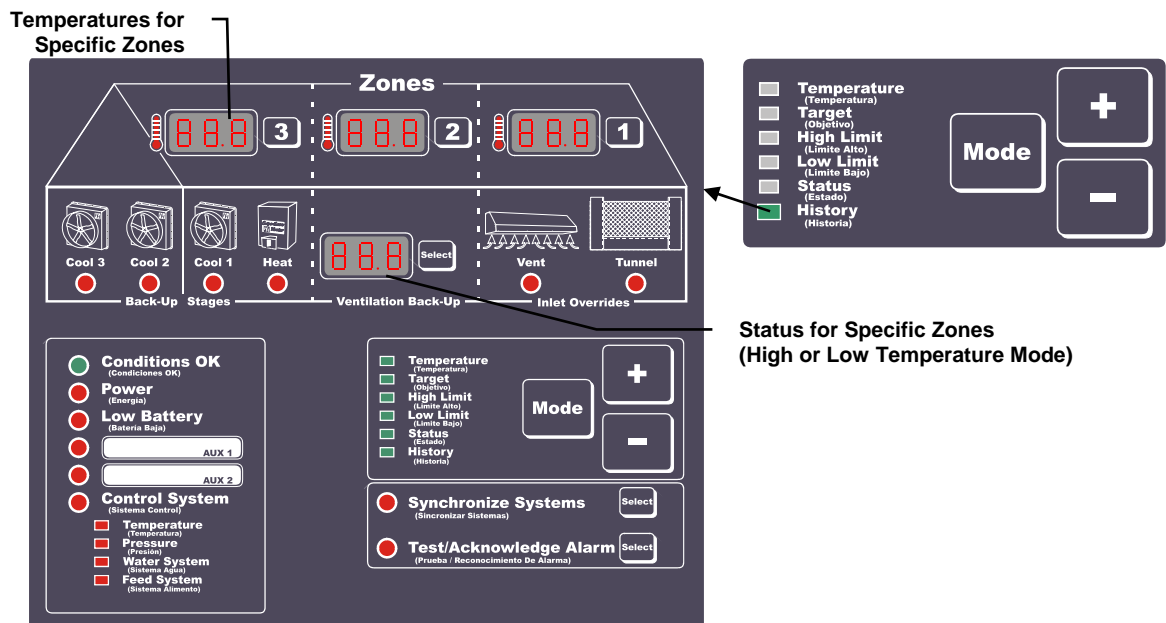
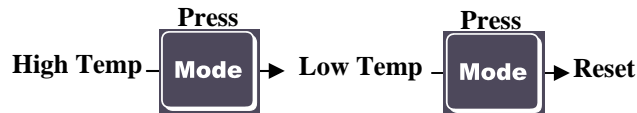
The **Status Mode** displays the Sensor Status (ON or OFF) for each specific zone. This setting is used to remove unused sensors or to deactivate sensors outside of the brood area during ½ or ¾ brood conditions. Use the **Zone Switches** for selecting the specific Zone Temperature Sensor then using the + (ON) or – (OFF) buttons to enable or disable sensors.



5.1.6 History

The **History Mode** displays the High and Low Temperatures for each specific zone, any Back-Up stages which have turned ON, as well as any alarm conditions which have occurred since the last reset. The **History Reset** function is displayed after pressing the Mode Button once after the Low Temp is displayed. The Zone 1 display will indicate “HIS” and the Zone 2 display will indicate “no” initially. Press the “+” button for selecting YES, then press the Mode button to confirm the History Reset to reset all control history.

Display History Selection Sequence

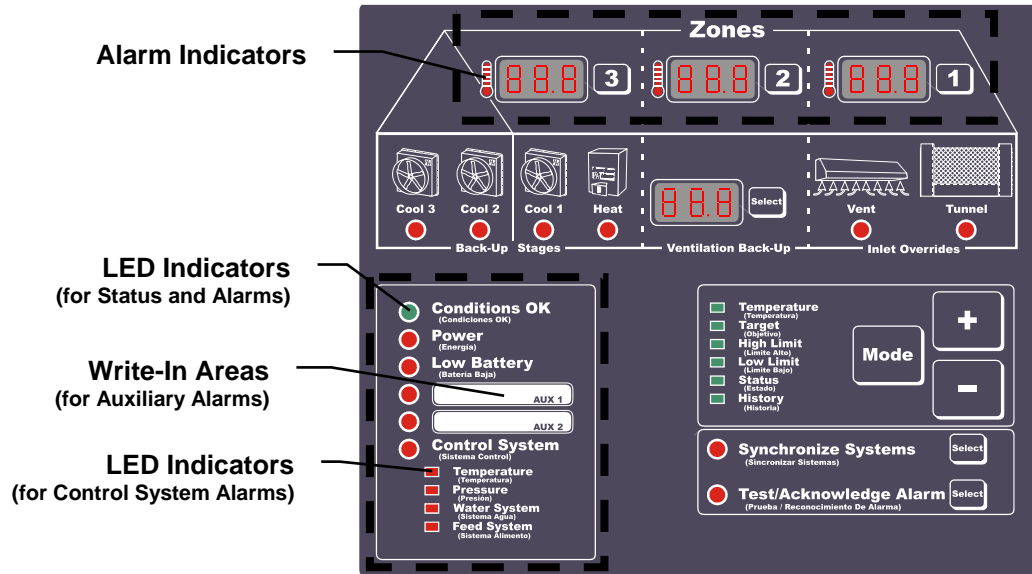


5.2 Alarm System Indicators

The Alarm Status LED Display indicates if all Conditions are OK (Green LED) or the specific reason for the alarm condition (Red LED's).

If a red Alarm LED is blinking, the problem may be one of two causes:

- If Conditions OK LED is Green, an Alarm condition exists although the 30 second confirmation timer has not expired.
- If Conditions OK LED is OFF, the alarm condition has been acknowledged (Acknowledge LED will also be ON).



Except for the Conditions OK (status) indicator, all of the remaining LED Indicators have red LED's for displaying alarm status information.

5.2.1 Conditions OK Indicator

At the top of the **Alarm Status Indicators** section is an LED indicator labeled “**Conditions OK**”. This indicator shows the current alarm status of the **S³**. If the **Conditions OK** LED is green, there are no alarms being generated. If the LED indicator is **OFF**, the **S³** is in the alarm mode. When the LED is OFF, refer to the other Alarm Status Indicators for specific alarm condition information.

5.2.2 Power

When this RED LED turns ON, the **S³** control has lost AC power or the F1 fuse is blown. Refer to **Section 9.4** for fuse replacement information.

5.2.3 Low Battery

When the **Low Battery** RED LED indicator turns ON during loss of AC power, the battery level is partially depleted and currently operating at a low energy level. If the battery voltage has dropped below about 10.6 volts, the red LED Indicator will light. If the battery indicates low, the operator should set all controls so that the siren will not activate, and leave the machine plugged in for about four hours. This should recharge the battery. If this doesn't work the battery is probably bad. In this case, contact your Hired-Hand dealer for a replacement. Note that it is common for the Low Battery indicator to be lit if the alarm has sounded for a long time.

5.2.4 AUX 1 and AUX 2

The designated alarm condition exists when the **AUX 1** and/or **AUX 2** RED LED turns ON. The Auxiliary inputs can be connected to a variety of external control sources such as curtain drops, control alarm outputs, pressure switch, or any device with a NC (Normally Closed) dry contact connection. The white area to the right of the LED indicator can be used to write-in the alarm title/description by using a

permanent fine-tipped marker. Each auxiliary alarm can be individually enabled or disabled by using the circuit board jumpers. Refer to the **Circuit Board Layout in Section 12.1**. If the jumper is installed, the **AUX 1** or **AUX 2** alarm is Disabled; If the jumper is removed, the **AUX 1** alarm is Enabled.

5.2.5 Control System Auxiliary

The Control System auxiliary input is a special input that should be connected to the main control system. It operates similar to Aux1 and Aux2 and yet has special functions associated with it to provide better protection for the building. The functions are different when the unit is connected to an Evolution 3000/3001 and when it is connected to another type control system. The following details the differences.

SPECIAL FEATURES IF USED WITH EVOLUTION 3000/3001

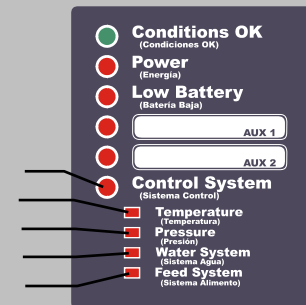
Operation with Evolution 3000/3001:

If connected to a Evolution 3000/3001, there is a communication network that allows communication of the alarm data from the main system to the S³. This allows the system to alarm even if the hard-wired connection to the Control System Auxiliary does not exist. It also allows the S³ to provide more detail as to what problem exist using the four LEDs located just below the Control System indication. The following picture highlights these indicators.

The **CONTROL SYSTEM** alarm can be enabled or disabled by using the circuit board jumpers. Refer to the **Circuit Board Layout in Section 12.1**. If the jumper is installed, the **CONTROL SYSTEM** alarm is Disabled; If the jumper is removed, the **CONTROL SYSTEM** alarm is Enabled. The Evolution controller communicates with the S³ to display the four alarms described below:

- | | |
|---|--|
| <p>TEMPERATURE:</p> <p>PRESSURE:</p> <p>WATER SYSTEM:</p> <p>FEED SYSTEM:</p> | <p>The temperature is beyond the alarm limits.</p> <p>Indicates a High, Low, or Cycle Pressure alarm.</p> <p>Indicates High or Low water usage.</p> <p>Indicates a feed auger excessive runtime alarm.</p> |
|---|--|

Control System



Operation without the Evolution 3000/3001:

If the unit is used with another type control system, the Control System Auxiliary can take on other functions on top of just being an alarm. This input can function in one of two ways depending on the setting in program parameter P62 (See Section 6).

P62 = On – Cycle Pressure Alarm Enabled

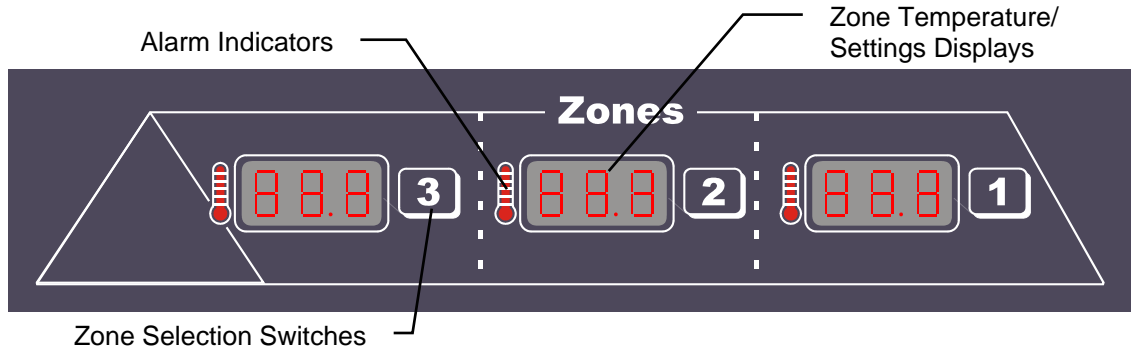
If “P62 = On”, the input becomes a Cycle Pressure input. Therefore, while connected to a Photohelic, or Static Pressure switch, it will monitor the static pressure through the timer cycle period (P63). If it does not see a static pressure spike during this cycle, it will assume that the minimum ventilation is not working. Therefore, it will sound the alarm and also trigger the Back-Up system to run the “Cool1” backup stage on a minimum ventilation cycle. The minimum ventilation cycle is five minutes and the runtime will be based on the setting in P3 (See Section 6).

P62 = OFF – Cycle Pressure Alarm Disabled

If “P62 = OFF”, the input is a normal auxiliary input that will function in much the same way as Aux1 and Aux2. There is one distinction. If the S³ detects the alarm signal on this input, it will not only sound the alarm but it will also trigger the Back-Up System to run the “Cool1” backup stage on a minimum ventilation cycle. The minimum ventilation cycle is five minutes and the runtime will be based on the setting in P3 (See Section 6).

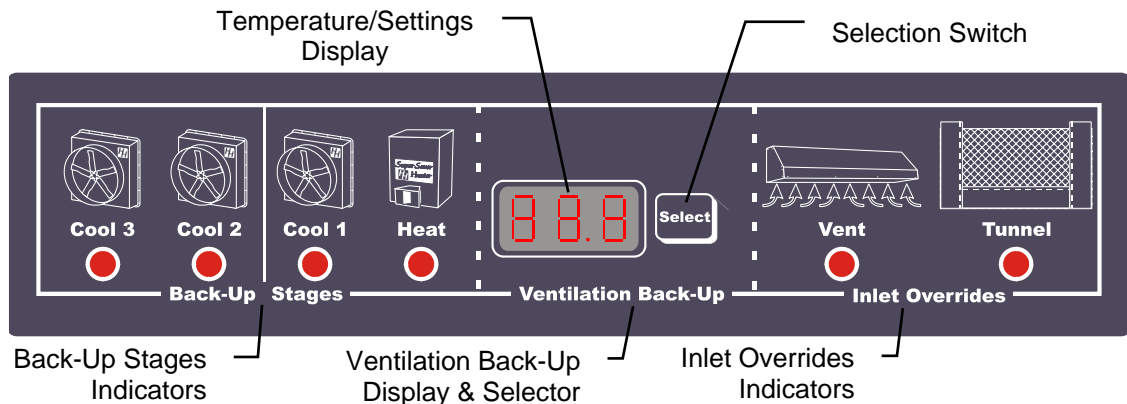
5.2.6 Zone Temperature Section

The **Zone Temperature Section** shows the specific zone alarm status and control settings for the temperature alarms. If the Alarm Indicator is ON, that particular Zone is out of its temperature range based on the High and Low Limits.



5.3 Back-Up System Indicators

The Back-Up System Indicators display the Back-Up operation status and control settings. Refer to **Section 8** for additional information.



5.3.1 Inlet Overrides Indicators

The **Inlet Override Indicators** indicate if the Back-Up is calling for vent inlets or tunnel inlets to open. Vent inlets operate with Cool 1; Tunnel inlets operate with Cool 3.

5.3.2 Ventilation Back-Up Display and Selection Switch

The Ventilation Back-Up Display and Selection Switch are used to select and change the back-up settings. Refer to **Section Error! Reference source not found.** for additional information.

5.3.3 Back-Up Stages

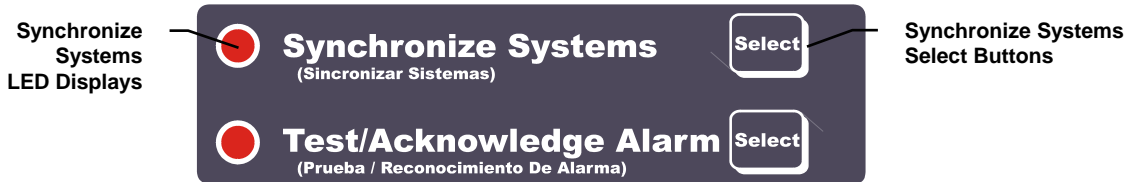
The Back-Up Stages Indicators indicate if the Heat, Cool 1, Cool 2, or Cool3 stages are ON or OFF. If Cool 1 is flashing, it indicates that it is operating on a minimum ventilation timer. Refer to **Section 8.1.1** for additional information.

5.4 Synchronize / Test Indicators

The Synchronize / Test Section include two functions. Synchronize Systems and Test/Acknowledge Alarm.

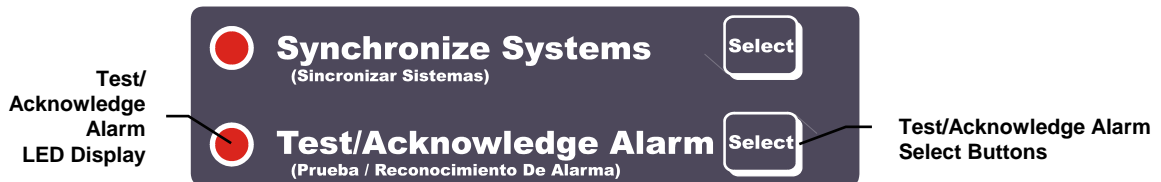
5.4.1 Synchronize Systems

The **Synchronize Systems** feature is used with the EV-3000 or EV-3001 controller to update the S³ target temperatures to the match the controller target temperatures. If the S³ and the EV-3000 or EV-3001 temperature targets do not reflect the same information, the **Synchronize Systems LED** will flash. Press the **Select** button to automatically **Synchronize** the target temperatures. When the **Synchronize Systems Select** button is pressed, the target temperatures of the S³ will be changed to match the Evolution 3000/3001 controller target temperatures. It will also be displayed in the Back-Up display for verification.



5.4.2 Test/Acknowledge Alarm

The **Test/Acknowledge Alarm** Section has two functions. It allows the user the ability to test the alarm contacts or the ability to silence (acknowledge) an active alarm.

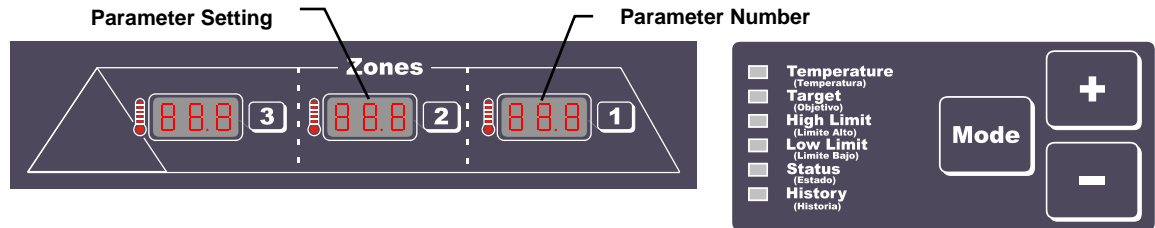


- **Testing Alarm Contacts**
To test the Alarm contacts, the user can simply press and hold the “Select” button next to the Test/Acknowledge Alarm indicator. This allows the user the ability to manually test his alarm siren and/or alarm dialer. As long as the button is depressed, it will activate the alarm relay irregardless of the conditions that exist. In applications that use audible sirens, it is recommended that the operator press the Test/Acknowledge Alarm button for at least five seconds twice a week. In addition to insuring that the alarm is working correctly, the sounding of the alarm helps to condition that livestock or poultry so they are not shocked by the sound when an emergency condition arises.
- **Acknowledging Alarms**
If an active alarm condition exists, you can silence the audible siren, phone dialer, etc. once you arrive by pressing this button. This indicates to the alarm that you are acknowledging the problem; therefore, it disables the alarm contacts. If a different alarm occurs after the acknowledgement, the alarm contacts will be re-enabled. After an acknowledgement, the alarm indicator will continue to blink and the indicator beside the Test/Acknowledge Alarm section will also be on. This acknowledged condition is reset by only two ways. First, the alarm condition is corrected; secondly, the AC power and the battery power are removed from the controller.

6. Program Mode

By pressing and holding the **Mode** button for at least 5 seconds, the **S³** can be placed in the **Program Mode** as discussed below and on the following pages.

Settings that are usually set up once per grow-out or maybe even just for summer or winter are referred to as program parameters and are accessed by taking the controller to program mode. To get to program mode, press and hold the “Mode” button for five seconds. When the controller has entered program mode, the Zone 1 display will show the first parameter (P1) and the Zone 2 display will show the current setting of parameter P1 (either C or F).



The “Pxx” is known as a parameter number. All the program items for the controller have a unique parameter number assigned to them. The numbers are listed in the following subsections with a short description of each parameter. When in program mode, you change the value of certain parameters by using the + and - buttons as needed. When you have finished with the current setting, press the “Mode” button to move to the next parameter.

6.1 General Parameters

General parameters are associated with the operation and control of the **S³**:

P1 – Temperature Limits

This general parameter selects either Celsius (C = Celsius) or Fahrenheit (F = Fahrenheit) temperature units. If P1 is set to “C”, the temperature units will be displayed in Celsius. If P1 is set to “F”, the temperature units will be displayed in Fahrenheit.

P2 – Individual Sensor Limits

This general parameter determines how to program the Sensor High and Low temperature limits. As indicated earlier, these limits can be set individually to different values. However, if it is desired to set Sensor 1, Sensor 2, and Sensor 3 to the same values, this parameter changes the programming procedure to allow limits to be entered only once but used for all sensors. If P1 is set to “YES”, the high and low sensor limits are entered individually. If P1 is “NO” limits are entered once for all sensors. To change the value of P2, press the Plus (+) button for “YES” or the Minus (-) button for “NO”.

P3 – Back-Up Timer Percentage

This determines the percentage that **COOL 1** will be run in an Emergency condition for minimum ventilation. (5% to 100%). The timer is a five minute timer.

P4 – Back-Up Stage On Delay

This determines the number of seconds that the **S³** will wait before turning Stages ON during power loss (10 to 60 seconds). This feature is designed to help with generator start-up.

6.2 PC Compatible Hired-Hand Network Parameters

These parameters are used with Hired-Hand’s Farm Manager Software. The controller has four parameters which are used to function with the Hired-Hand PC compatible inter-controller network (HH.Net).

P40 – HHNet Address

HH.Net permits up to 32 controllers to be addressed on a single communications port of a personal computer (PC). In order for the computer to recognize the communications from the controllers, each controller must have a unique network address.

P41 – Version Number

This is not settable by the user. It is the version of the controller software.

P42 – Controller Setup

This is not settable by the user. It is a unique number that allows the network software (Farm Manager) to recognize the type of controller.

P43 – Local Network Enable

The **Local Network Enable** feature enables the S³ to communicate with an Evolution 3000/3001 controller. If connected to an Evolution 3000/3001 and the Back-Up is enabled, the setting will automatically change to Yes.

No = Not Connected [Stand-Alone]; Yes = Connected [EV Network]

6.3 Alarm Function Parameters

The Alarm Function Parameters operate special alarm features.

NOTE: *These Features Are Automatically Disabled If Connected To The Evolution 3000/3001 Controller.*

P62 – Cycle Pressure Alarm

The **Cycle Pressure Alarm** is setup to monitor minimum ventilation. It uses a pressure switch or other pressure/timer fan monitoring device and must be connected to **Control Aux**. This setting changes the operation of the control system auxiliary alarm. Contrary to its normal operation where an open signal would trigger an alarm, it will actually be looking for an open signal during the Minimum Vent Cycle Time (P63). If it does not see the open signal during this period, it will sound the alarm and trigger the Back-Up system to run “Cool 1” on a minimum ventilation timer cycle. (ON = Enabled; OFF = Disabled)

P63 – Minimum Vent Cycle Time

The Minimum Cycle Time is the time in minutes which is being used to provide minimum ventilation such as 5 or 10 minute timers. (Cycle time for timer fans)

6.4 Sensor Calibration Parameters

The S³ has three temperature sensors that can be calibrated. The parameter(s) for calibration are **PSx** where **x** is the sensor number.

NOTE: A sensor should never be calibrated more than 8 degrees. If a setting is that far out of range, it indicates that there is a problem other than sensor calibration.

PS1 - Calibrate Sensor 1

This is the calibration temperature for Sensor 1.

Instructions: With the controller operating, use a digital thermometer or similar independent temperature measuring device to measure the temperature at Sensor 1 location. With PS1 selected, use the Plus (+) and Minus (-) buttons to set the calibration temperature to the thermometer reading.

PS2 - Calibrate Sensor 2

This is the calibration temperature for Sensor 2.

Instructions: Same as Sensor 1 except substitute PS2 for PS1 in the instructions above.

PS3 - Calibrate Sensor 3

This is the calibration temperature for Sensor 3.

Instructions: Same as Sensor 1 except substitute PS3 for PS1 in the instructions above.

7. General Operation

7.1 Alarm Inputs

The S³ has seven inputs that can be used to sound an alarm; Three from temperature sensors, three auxiliaries, and one for power out. The temperature sensors can be enabled or disabled. If a sensor is enabled it will be used to generate an alarm. If a sensor is disabled, it will not generate an alarm, even if the S³ determines that its readings are out of limits. The Auxiliary and Power Out inputs are always enabled. The seven alarm inputs are:

7.1.1 Temperature Sensors #1 ,#2 and #3

The S³ comes from the factory with three temperature sensors. The S³ will trigger an alarm if the temperature goes above the high limit setpoint or below the low limit setpoint of the sensors. The S³ will wait 30 seconds after a sensor indicates it is out of range before triggering an alarm.

7.1.2 Auxiliary Inputs #1, #2, and Control System

The S³ is equipped with three auxiliary inputs. These inputs are connected in a closed loop circuit. On the circuit board located on the door of the alarm enclosure there is a terminal block for connecting the Auxiliary Inputs (See **Section 12.7** for a connection diagram). Each of the connections has an IN and OUT terminal. If, at any time, the connection between the IN and OUT positions is broken (opened), the alarm will sound. There are many devices on the market that could be used with these inputs. For instance, water pressure switches, light meters, and thermostats could all be used. The S³ will wait 30 seconds after an auxiliary input is broken before triggering an alarm.

7.1.3 Power Out

The Power Out alarm indicates that there has been no AC electricity present on the alarm power feed for at least 30 seconds.

AC Power Fuse:

If it is found that there is power present at the electrical outlet and the Power Alarm is ON at the S³, the 3 Amp slow-blow fuse located on the S³ circuit board (Fuse F1) should be checked for a blown fuse. To replace a fuse, disconnect AC power, disconnect the positive (+) battery terminal from the battery, carefully replace the blown fuse with the correctly sized replacement fuse, reconnect the positive (+) battery terminal to the battery, reapply AC power, and verify the power alarm has cleared. The S³ will wait 60 seconds after a Power Out indication before triggering an alarm. Refer to the S³ **Circuit Board Layout in Section 12.1 and Fuse Replacement in Section 9.4.**

Terminal Connections to the Battery:

If AC power is out or disconnected from the S³ AND none of the S³ Displays or LED's are ON, verify that the Battery Positive (+) and Battery Negative (-) quick-connect terminals are securely attached to the battery. Refer to the S³ **Wiring in Section 12.1.**

If the AC power is OFF for an extended period of time with the alarms ON, the Back-Up Battery will eventually be drained of all power. Refer to **Section 9** for additional troubleshooting information.

7.2 Alarm Outputs

The S³ has two alarm outputs. These can be used individually or simultaneously. The alarm outputs are:

7.2.1 Siren

The siren hookup to the S³ will deliver a 12 volt DC signal with a current up to 1.0 amps. Many operators want to mount the siren a long distance from the controller. Sometimes, this is desirable in order to locate the siren closer to their dwelling, sometimes to get it away from their animals. The use of a small gauge wire to connect the Alert Alarm to the siren could cause a great deal of voltage drop. This voltage drop, in turn, can cause the siren to become inoperative. If the operator wants to mount the siren more than 50 feet from the controller, a relay with a 12VDC rated coil should be used to switch current to the siren. When a relay is added, the operator must provide a separate battery and charger for the siren circuit.

7.2.2 Dry Contact (N.O. and N.C. Contacts)

The S³ provides a set of dry contacts that can be used to trigger a modem, auto-dialer or other auxiliary equipment. Both normally open (N.O.) and normally closed (N.C.) contacts are available. See **Section 12.6** for a wiring diagram.

8. Back-Up System Operating Conditions

The S³ Back-Up System operates differently based on whether it is connected to a Evolution 3000/3001 control system or if it is a stand-alone (not connected to the Evolution 3000/3001 local network) system. Of course the system loses some of its functionality when it is not connected to the Evolution 3000/3001 network but its capabilities are still much better than other Back-Up system alternatives. This section will be divided into two sub-sections.

Important!

Before continuing, one must determine which type of system is installed for this specific application. If the S³ is connected to a Hired-Hand Evolution 3000 or Evolution 3001, refer to **Section 8.1** for a description of the Back-Up operation with the Evolution 3000/3001. Otherwise, refer to **Section 8.2** for Back-Up operation as Stand-Alone System.

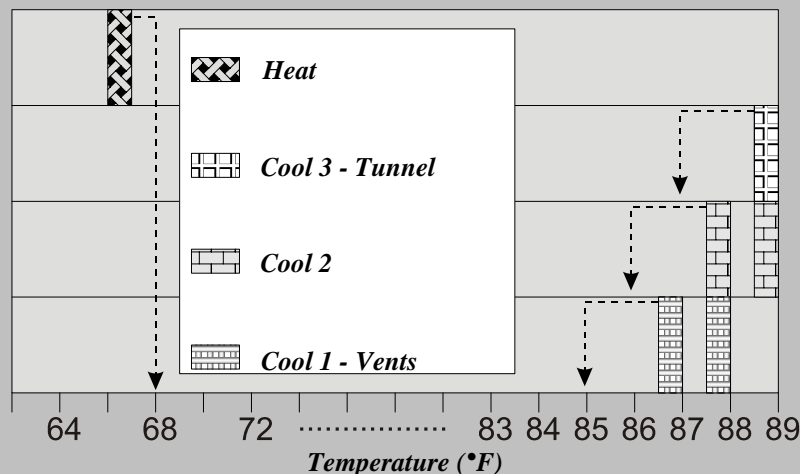
SPECIAL FEATURES IF CONNECTED TO EVOLUTION 3000/3001

8.1 Operation with the Evolution 3000/3001

8.1.1 Normal S³ Back-Up Operation

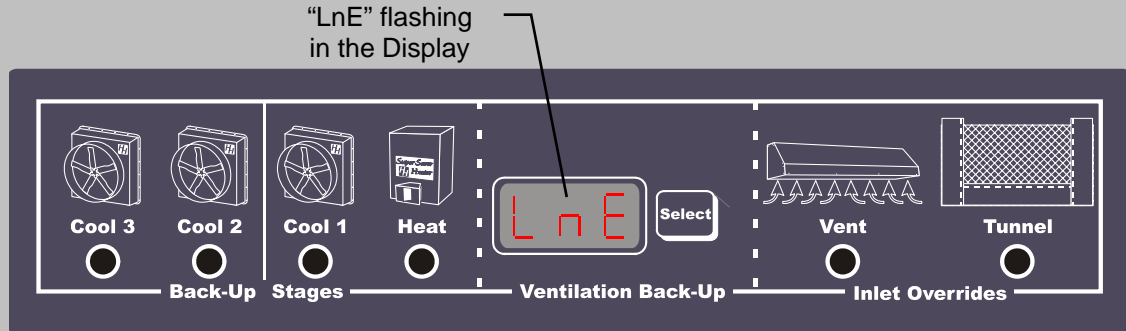
During Normal Operation, the S³ always maintains the temperature between its high and low limits. It accomplishes this by using its temperature sensors and its four stage outputs. If the temperature drops below the Low Limit, the Heat stage will come on. That stage will not turn off until it warms the building at least 2°. The same is true if the temperature goes above the High Limit however, there are three levels of cooling stages on the Back-Up System. The following example explains the operation of the stages in relationship to the temperature and the limits. In this example the Low Limit is set as 66° F, and the High Limit is set as 86° F. If the temperature drops to 66° F, then the HEAT stage turns on. The HEAT stage turns off when the temperature rises to 68° F (2° above the Low Limit). If the temperature rises to 86° F, then COOL 1 turns on. If the temperature continues to rise to 87° F (1° above the High Limit), then COOL 2 turns on. If the temperature rises to 89° F, then COOL 3 turns on. When used with EV-3000/3001, Cool 3 comes ON and Cool 1 will go OFF to disable sidewall/negative fans while in tunnel ventilation. Stages turn off at temperatures as indicated by the arrows in Graph 1.

Graph 1: Cool 1, 2, 3 and Heat



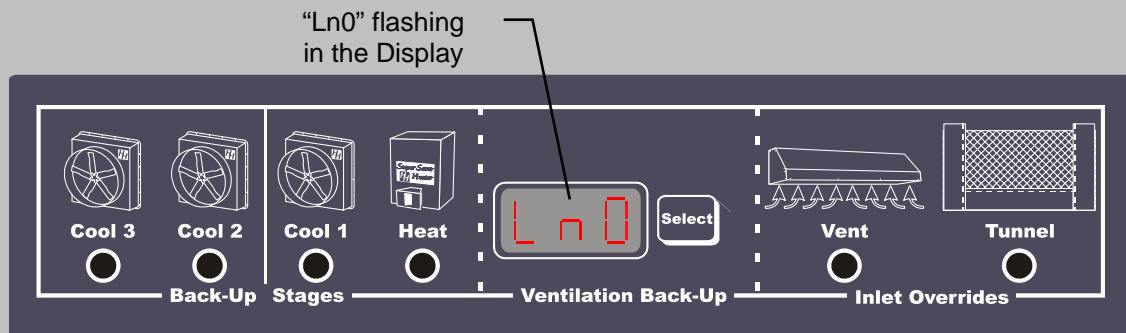
8.1.2 Emergency Operation

In this mode of operation, the system still maintains the temperature as it does in Normal Operation. In addition, it will begin running the first cooling stage (**Cool 1**) on a 5 minute timer. The timer percentage is determined by the setting in **P3** (Emergency Timer Percentage). This mode of operation is entered if communication is lost between the master controller and the **S³**. In this case, the **S³** assumes that the master controller is lost and tries to maintain the minimum ventilation until someone recognizes the problem. Emergency Operation is indicated by a “**LnE**” flashing in the display of the **S³**. The alarm relay on the **S³** is also engaged in this mode operation.



8.1.3 Override Operation

In this mode of operation, the system still maintains the temperature as it does in Normal Operation. In addition, it receives commands from the master controller to turn on certain stages of heating or cooling. There are many different circumstances that could cause this to happen, in this manual, we will list one of the most common. For example, if communication were lost inside the EV-3000, the master controller would be unable to turn the appropriate stages on in the usual way. Therefore, the master controller would communicate to the **S³** and indicate which stages that it is trying to turn on. At this point, the **S³** would obey the command and turn the appropriate stages on. For this mode of operation to work to its fullest potential, care must be taken to insure that the stage jumpers on the relay strips match the stage setting in the master controller (**Refer to Section 12.5**). Override Operation is indicated by a “**LnO**” flashing in the display of the Back-Up System. The alarm relay is also engaged in this mode of operation.



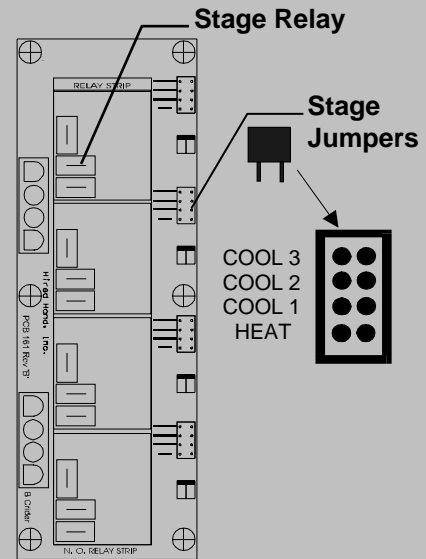
8.1.4 Fail-Safe Relay Operation

There are two types of Relay strips used in the Evolution 3000. The Normally Open (NO) strip requires a signal from the controller board in order to energize a stage of ventilation. Should power be removed from the EV-3000 the Normally Open Relay strips would not be able to energize a ventilator. On the other hand the Fail-Safe relay strip would close each of the relays in the strip resulting in energizing the ventilators in case of a controller power failure. Each of the relay strips contains four relays for controlling four stages. In the EV-3000 there are a total of four relay strips, three will be N.O. and one will be a Fail-Safe. The operator must insure that the Fail Safe relay strip is connected only to stages that should be turned on in case of a controller failure. See the **EV-3000 Owners Manual Part No. 4801-5307** for a physical description of the relay strips. The S³ Stand-Alone Unit (Plus) also contains a Fail-Safe. It is not recommended to place heating equipment on Fail-Safe stages.

8.1.5 Setting EV Back-Up Stage Jumpers

Pictured at the right is a Stage Relay Board consisting of four stage relays and the associated stage jumper for each stage relay. This board is located in the EV-3000 or EV-3001 controller. The stage jumpers are labeled COOL 1, COOL 2, COOL 3 and HEAT. Location of the jumper places the equipment on one of these four Back-Up Stages, or if the jumper is not inserted, the equipment is not placed on Back-Up. The jumpers should be placed based on the operation of stage equipment and should be the same as assigned in the EV-3000 Controller. Jumpers are placed according the following table:

Type of Stage Operation	Jumper Assignment
Cool Negative Fan	COOL 1
Cool Negative Tunnel Fan	COOL 2
Cool Tunnel Fan	COOL 3
Heat Stage	HEAT
Stage not on Back-Up	No Jumper Installed



STAGE RELAY BOARD

Additional information can be found in the Evolution 3000 Owners Manual, Part Number 4801-5307.

8.1.6 Vent/Tunnel Inlet Override Operation

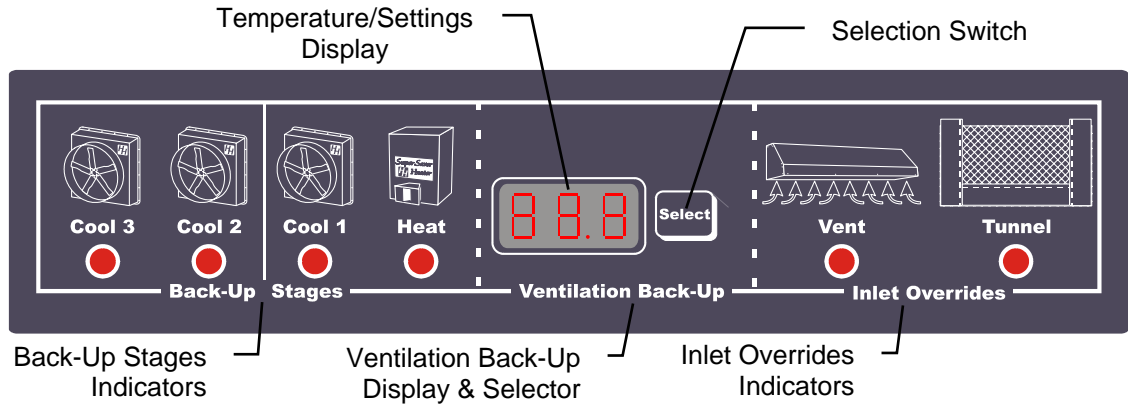
The S³ contains override relays to operate your **Vent** or **Tunnel** inlets during Back-Up situations. It is intelligent enough to understand how it needs to operate these overrides in a manner that will not disrupt what the main control system is trying to do.

Typical operation results in the **Tunnel** inlet being overridden open anytime the Back-Up stage **Cool3** is on. Otherwise, if **Cool1** or **Cool2** is on, the S³ will override the **Vent** inlets open. This is the correct assumption most of the time but there are exceptions. It is important to note that if **Cool3** is turned on, the S³ will turn off **Cool1** which, in turn, will disable the **Vent** inlet override. This allows the Back-Up system to perform in much that same manner as the main control system would function during tunnel ventilation.

If connected to the Evolution 3000/3001, the S³ communicates with the master controller. Therefore, it is aware of what type ventilation mode the controller is currently in. For example, if the main controller is in tunnel ventilation. The S³ will not allow **Cool1** to turn on. The reason is due to the fact that it knows that this is your sidewall fans. Therefore, it understands that it would be detrimental to the ventilation to turn them on. This, in turn, also disables the **Vent** inlets from opening.

8.2 Operation as Stand-Alone System

The S³ contains an integrated back-up system. This system's purpose is to back up the master controller in the case of failure. The back-up system is a stand-alone control system. It contains its own three temperature sensors which are used to divide the building into zones. These are the same temperature sensors that are used for the alarming functions described earlier. This allows the user to set High and Low Back-Up limits, in which the system will use to operate one Heat stage and three Cool stages. The system is equipped with a fail-safe relay card that is capable of driving four separate 1 h.p. loads. The following shows the Back-Up System interface.

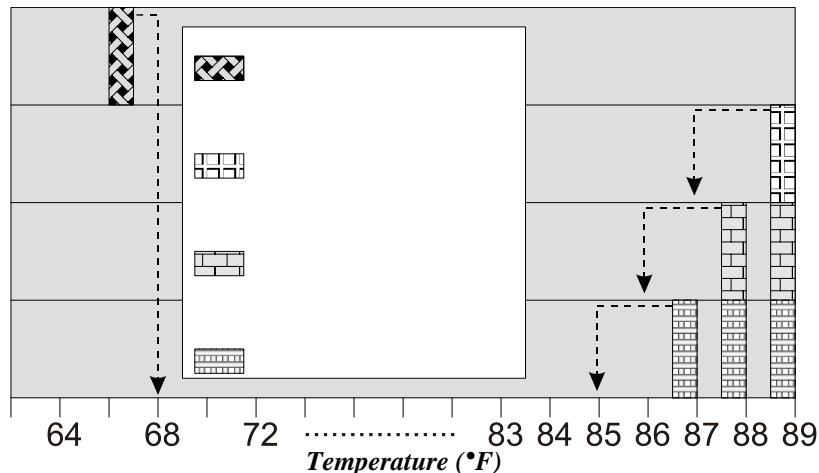


This setup does not use the Local Network connection that would be present if used in conjunction with the Evolution 3000/3001. Therefore, its functionality is limited to monitoring the temperature sensors for out of range conditions but it does still contain some protection against minimum ventilation failure.

8.2.1 Normal S³ Back-Up Operation

During Normal Operation, the S³ always maintains the temperature between its high and low limits. It accomplishes this by using its temperature sensors and its four stage outputs. If the temperature drops below the Low Limit, the Heat stage will come on. That stage will not turn off until it warms the building at least 2°. The same is true if the temperature goes above the High Limit however, there are three levels of cooling stages on the Back-Up System. The following example explains the operation of the stages in relationship to the temperature and the limits. In this example the Low Limit is set as 66° F, and the High Limit is set as 86° F. If the temperature drops to 66° F, then the HEAT stage turns on. The HEAT stage turns off when the temperature rises to 68° F (2° above the Low Limit). If the temperature rises to 86° F, then COOL 1 turns on. If the temperature continues to rise to 87° F (1° above the High Limit), then COOL 2 turns on. If the temperature rises to 89° F, then COOL 3 turns on. Stages turn off at temperatures as indicated by the arrows in Graph 1.

Graph 1: Cool 1, 2, 3 and Heat

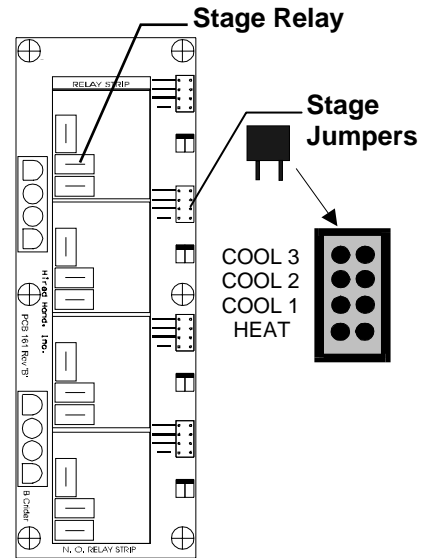


8.2.2 Minimum Ventilation Protection

As explained earlier, this Back-Up System contains a back-up minimum ventilation timer. This timer is normally off but is triggered upon an alarm occurring on the Control System auxiliary input. There are two situations that can cause an alarm on the Control System auxiliary that depends on the setting in P62 (See Section 6.3). Whether P62 is set to be a Cycle Pressure Alarm or a normal control system alarm, if the alarm is triggered the S3 will enable the 5 minute timer clock. Then Cool1 will operate based on the setting in P3. This process will continue as long as the Control System auxiliary alarm is present.

8.2.3 Fail-Safe Relay Strip

The stand-alone system will be equipped with a fail-safe relay strip. This relay strip has four output relays. Each relay is capable of driving up to 1 h.p. Also, each relay has a stage jumper. These stage jumpers can be used to assign each relay to a back-up stage, Heat, Cool1, Cool2, Cool3. Therefore, the end user can select what stages that he would like to back up. For example, you may not care to back up your heat stages; therefore, you could use one relay for Cool1, one relay for Cool2, and two relays for Cool3.



STAGE RELAY BOARD

Any combination will be acceptable but it is important that you understand the operation of each output so that you back up your main control system appropriately. For example, minimum ventilation protection is provided by Cool1. If you do not assign a relay output to Cool1, you will not have back up protection for minimum ventilation. It is also important to choose the correct fans to back up. For example, choose a fan that is not your typical minimum ventilation fan to run off of Cool1, such as one of your initial tunnel fans. This will help you two ways. First, it will protect against fan mechanical failure. Secondly, by choosing a tunnel fan it will not affect tunnel ventilation if the back up kicks in on a hot day. The graph in **Section 8.2.1** helps to show how the stages operate but it is also important to understand how the inlet overrides operate in conjunction with the Cool outputs (See **Section** Error! Reference source not found.). The following table helps associate the Back-Up stage outputs with the type of equipment that you are trying to operate.

Type of Stage Operation	Jumper Assignment
Cool Negative Tunnel Fan	COOL 1 *
Cool Negative Tunnel Fan	COOL 2
Cool Tunnel Fan/Evap.	COOL 3
Heat Stage	HEAT
Stage not on Back-Up	No Jumper Installed

*** IMPORTANT NOTE:** Cool1 controls your minimum ventilation Back-Up Stage.

8.2.4 Vent/Tunnel Inlet Override Operation

The S³ contains override relays to operate your **Vent** or **Tunnel** inlets during Back-Up situations. It is intelligent enough to understand how it needs to operate these overrides in a manner that will not disrupt what the main control system is trying to do.

Typical operation results in the **Tunnel** inlet being overridden open anytime the Back-Up stage **Cool3** is on. Otherwise, if **Cool1** or **Cool2** is on, the S³ will override the **Vent** inlets open. This is the correct assumption most of the time but there are exceptions.

The exception occurs if the S³ determines that conditions warrant tunnel ventilation. Therefore, it assumes that opening the **Vent** inlets would be detrimental to the current ventilation setup. In this case, it will open the **Tunnel** inlet upon any Back-Up stage being turned on due to temperature.

It is important to note. If the Back-Up stage **Cool1** is ever timed on due to detection of a minimum ventilation error, then it will always override the **Vent** inlets only.

9. Trouble-Shooting Your Alarm

9.1 **Low Battery**

If the battery in the S³ drains down to approximately 10.6 volts, the Low Battery alarm condition will be active. This is very common if the alarm has sounded for some time. If the Low Battery alarm is active, the Alarm should be set so that no alarm condition exists and the battery should be allowed to recharge. This may require the operator to disconnect the siren to allow the battery to build back up. If recharging doesn't fix the problem, then the battery must be replaced. Contact your nearest Hired-Hand dealer for a replacement.

9.2 **Power Out**

The Power Out alarm can occur in two cases. One is when the power has been out for more than one minute. The other situation could be caused by the 120VAC 3 amp fuse blown. If the Power-Out alarm condition is active and you find that there is power present at the outlet where the alarm is plugged in, then you should check the fuses.

9.3 **No Siren at Test**

If the siren fails to sound when the test button is pressed, several conditions could exist. The siren itself could be bad. Check for 12VDC at the siren leads. And, of course, there could be a bad connection somewhere in the siren circuit.

9.4 **Replacing the Fuses**

The S³ includes two fuses located on the circuit board; One AC power fuse (F1 - 3 Amp) and also a Back-Up Relay circuit fuse (F2 - 10 Amp).

AC Power Fuse (F1, 3 Amp)

The **AC Power Fuse** is electrically placed between the S³ operating circuitry and the 4-pin header connector connected by wires to the AC conversion transformer. If power is present at the AC wall receptacle and the S³ front panel displays are not ON, check the AC Power Fuse for a blown fuse.

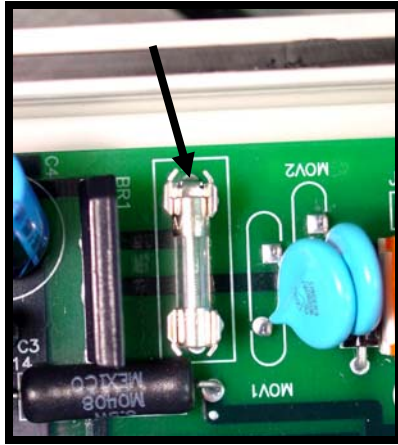
Back-Up Relay Fuse (F2, 10 Amp Slow-Blow)

The **Back-Up Relay Fuse** helps to provide protection between the S³ circuitry and the EV-3000/3001. If all AC power is turned OFF or unplugged at the electrical outlet AND the externally powered controls are also lacking power, the 10 Amp slow-blow fuse located on the S³ circuit board (Fuse F2) should be checked for a blown fuse.

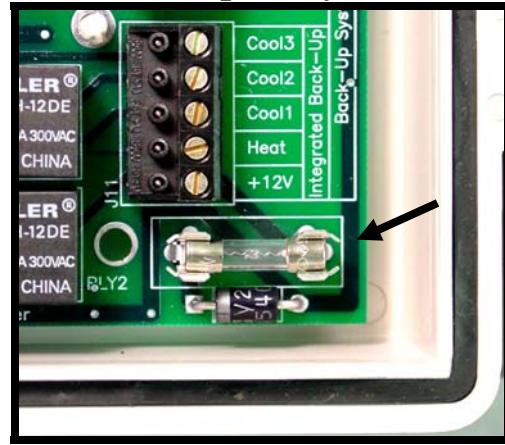
Fuse Replacement

To replace either fuse, disconnect AC power, disconnect the positive (+) battery terminal from the battery, and carefully replace the blown fuse with the correctly sized replacement fuse. Reconnect the positive (+) battery terminal to the battery, plug the male plug end of the AC power cord to the electrical outlet, and verify that power and functional operation has been restored.

AC Power Fuse



Back-Up Relay Fuse



9.5 Temperature Sensors Disconnected

If the temperature Sensors become disconnected or damaged, the Display Indicator for that sensor will show a line of bars (- - -). This problem should be corrected before any attempt to calibrate the sensor is made.

9.6 Temperature Sensors Out of Calibration

If the operator believes that the temperature sensors are not reading correctly, the following steps should be followed: Obtain a thermometer that is known to be accurate. Place this thermometer next to the temperature sensor for at least 10 minutes. Insure that there are no strong breezes or winds blowing on the thermometer and the sensor being calibrated. Note the temperature from the thermometer and use this reading to calibrate the sensor. Refer to **Section 10.3** for **Sensor Recommendations**.

9.7 Trouble-Shooting the Auxiliaries

The auxiliary inputs must always form a closed loop circuit. If the loop is ever open, the alarm will sound. If an auxiliary input is sounding, the trouble can be isolated between the alarm and the circuit by disconnecting the circuit from the terminal block in the alarm box and replacing it with a jumper (**See Section 12.7**). If the corresponding auxiliary input still causes an alarm condition, the problem is in the PCB circuitry, otherwise the wiring is the culprit.

10. Controller Installation and Setup

10.1 Tools Required

Mini Screwdriver Standard Screwdriver
Wire Strippers

10.2 Installation Instructions

1. Unpack system, and check that all components are present.

<u>Qty</u>	<u>Description</u>	<u>Qty</u>	<u>Description</u>
1	S ³	1	Local Net Cable
3	Temperature Sensors	1	Back-Up Cable
1	Manual		

2. Hang **S³** with four screws.
3. Make sure all power supplies are disconnected before breaking any wires, or reaching into the system enclosure.
4. Open the **S³** and find all connections. Refer to wiring diagrams in **Section 12** of this manual.
5. Run temperature sensors out to locations inside the house. Be sure that the sensors are in a safe location, free from any temperature influences (direct sunlight, water, etc.) Use care when securing sensor wires so that the wire is not accidentally cut. Any short, or break in the wire will cause improper sensor operation. Next, run the wires into the enclosure via the watertight connector at the bottom of the box. The wires should be cut off and stripped. They next should be attached to the terminal block in the positions marked *Sen 1*, *Sen 2* and *Sen 3*. Note that the sensors are not polarity sensitive, and it therefore makes no difference as to which wire goes to which sensor terminal.
6. After the siren is mounted, it should be wired into the control box. This is done at the terminal block locations labeled *siren red* and *siren white*. Note that polarity is important here and that the red siren wire must be connected into the *siren red* terminal block position and the same for the white wire. Note also, any 12VDC device that uses less than 1.5 Amps of current could be connected in the siren's place.
7. Connect wires from Alarm terminals to the alarm circuit or relay box. (See wiring diagrams in **Section 12.6** for locations of terminals.)
8. If using a modem, connect wires from Modem terminals to the modem circuit or relay box. (See wiring diagrams in **Section 12.6** for locations of terminals.)
9. If necessary, connect the **S³** to the Hired Hand Farm Manager Network. (See the connections in **Section 12.9** of this manual.)
10. Connect the AUX and CONTROL AUX connections. Refer to **Section 12.7** diagram.
11. Remove jumpers for AUX & CONTROL connections if being used.
12. If connecting to an EV 3000/3001 controller, connect Local Net and Back-Up Network setting in Evolution controller (Plus models ONLY).
13. Wire Stage to Relay Card for Back-Up operation.
14. Set Stage Jumpers on Relay Cards in **S³** or EV 3000/3001. Refer to **Section 12.5** diagram.
15. Connect Vent/Tunnel Overrides.
16. Connect AC Power. Refer to **Section 12.2** diagram.
17. Program the **S³**. Refer to **Section 6**.

10.3 Sensor Recommendations

It is important to note the Hired Hand temperature sensors are fabricated using thermistors and are not interchangeable with sensors commonly used on controllers from other manufacturers. The three temperature sensors may be installed in a variety of ways. It is recommended that a sensor be located high enough from the floor so that livestock or poultry can not peck at it. It is also essential that the sensor not be hung in front of heaters, fans or other devices that would cause false readings. If a sensor is to be run from one building to another, it is recommended that the connection be made with underground-rated wire buried between the two structures. This recommendation is to reduce the effects of lightning.

Once again, the temperature sensors should be dropped as low in the house as possible while still being out of reach of the livestock or poultry. And, as discussed earlier, it is recommended that the operator press the Test button for ten to fifteen seconds at least twice a week to verify the operation of the alarm as well as to condition the livestock or poultry to the sound of the siren.

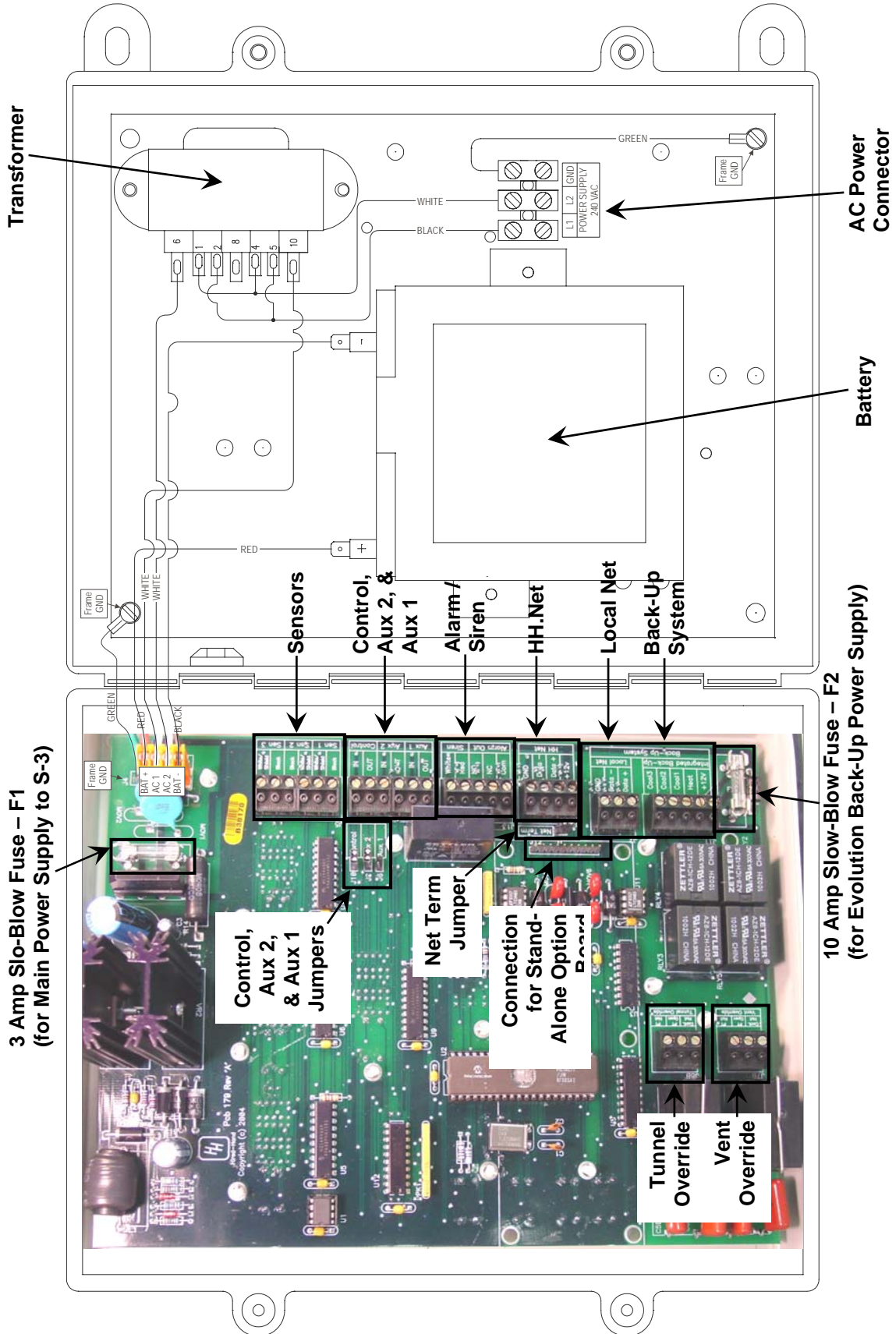
11. Maintenance

Check the calibration of your temperature sensors at least once per quarter. You will need to have two people, one at the sensor with a trusted thermometer, and one at the controller to calibrate the sensor.

12. Wiring Diagrams, Schematics, etc.

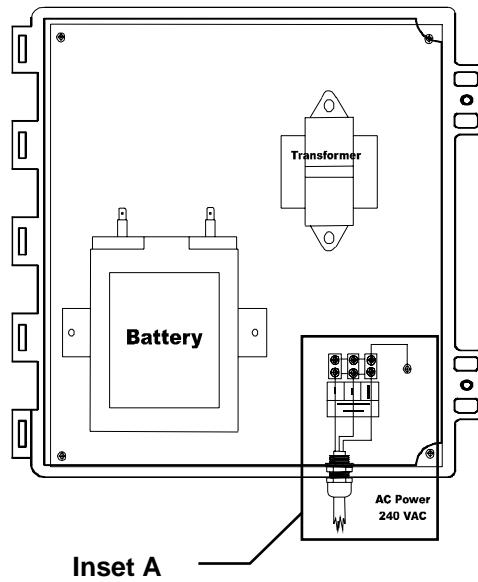
The following diagrams the Alert Alarm circuit board connections and how the Alert Alarm in connected to external equipment.

12.1 S³ Circuit Board Layout

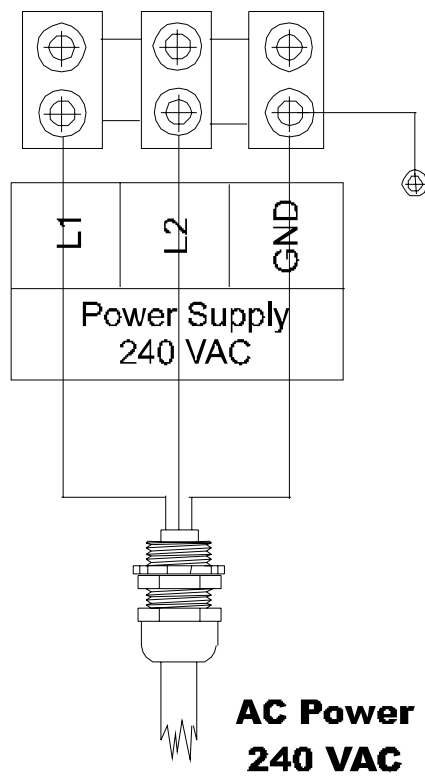


12.2 Connecting AC Power to the S³

Secondary Sensing System

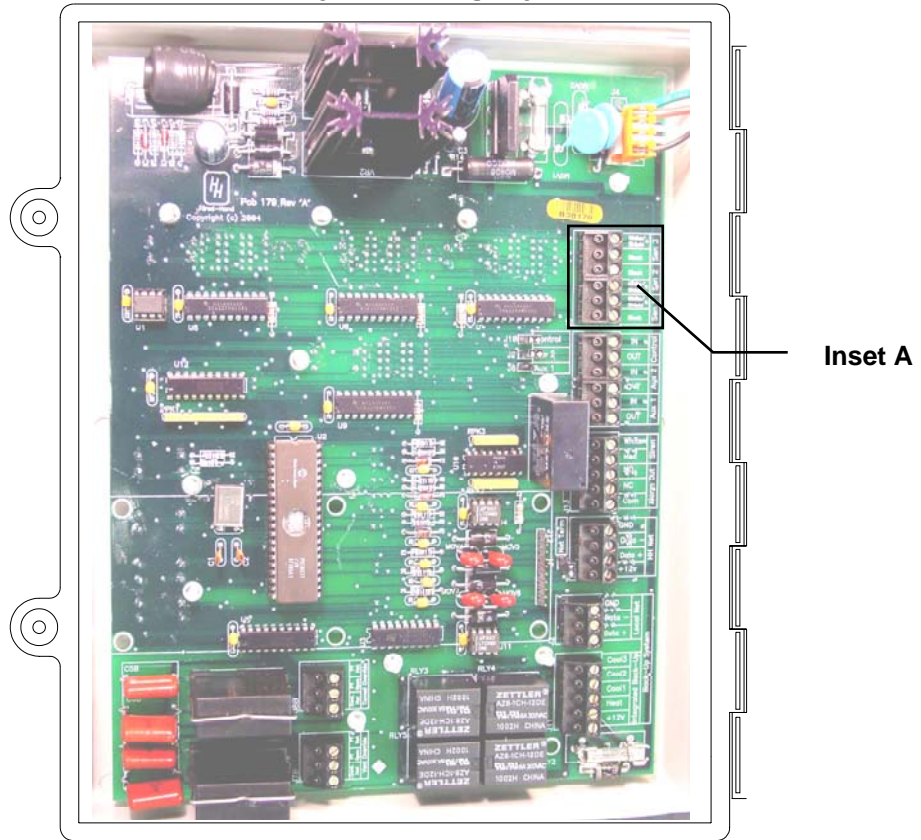


Inset A

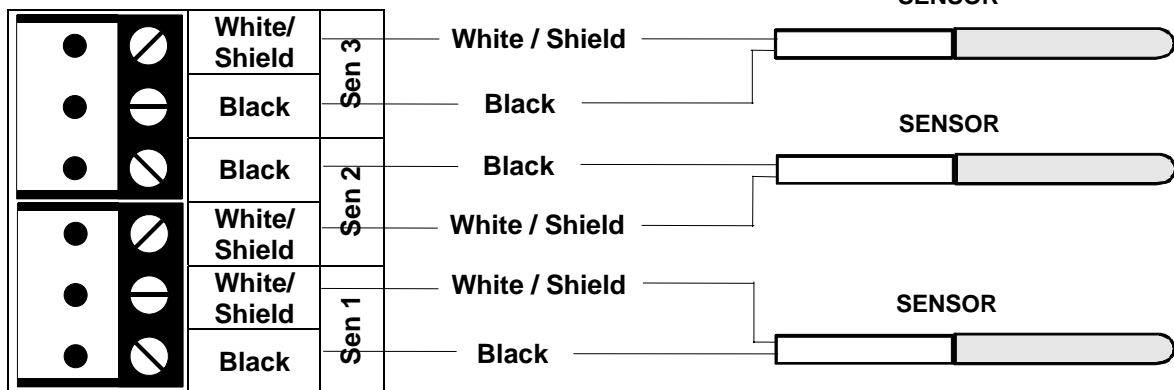


12.3 Connecting Sensors to the S³

Secondary Sensing System

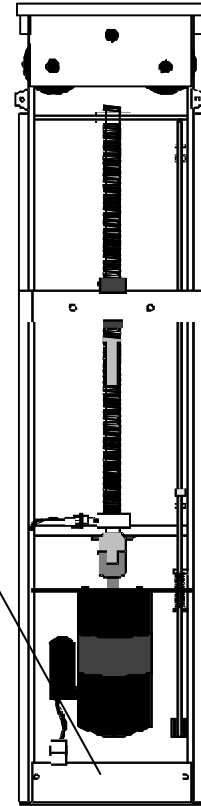
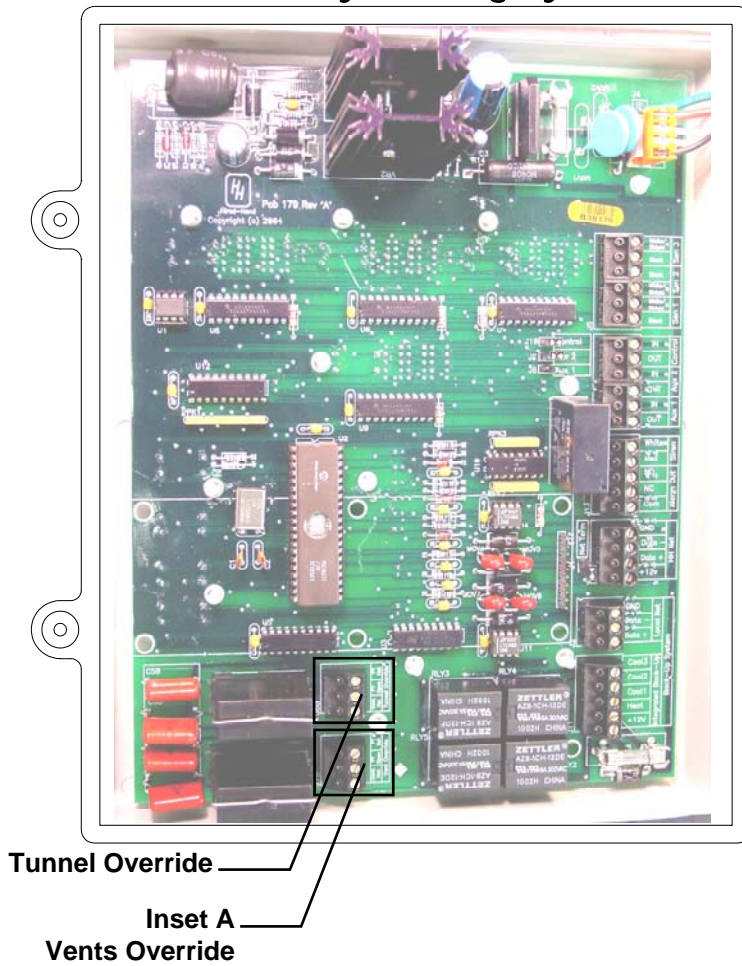


Inset A



12.4 S³ PowerTrak Override Settings and Wiring

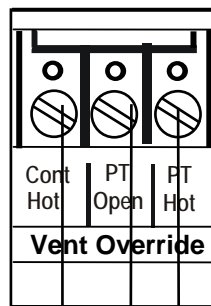
Secondary Sensing System



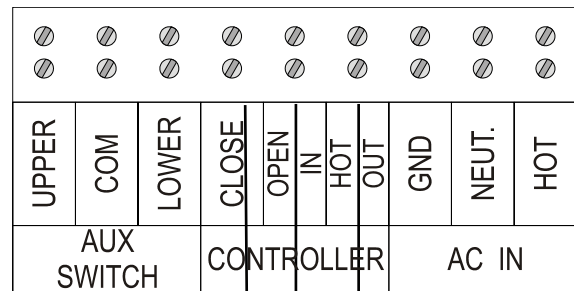
PowerTrak

INLET	MODE
Vent Override	Cool 1
Tunnel Override	Cool 3
Vents & Tunnel Will Wire The Same	

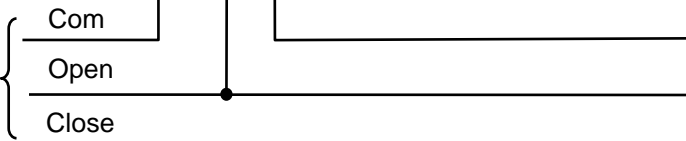
**Inset A
Vent Override**



**Inset B
PowerTrak**



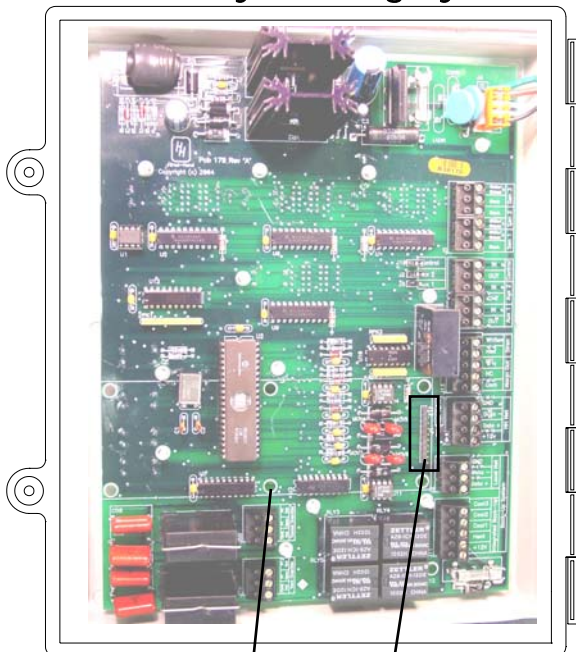
To
EV-3000/3001
or other Control
Source



NOTE: If curtain is setup to pull curtain up to open, then reverse wires connected to 'Open' and 'Close' terminals.

12.5 S³ Relay Card Wiring

Secondary Sensing System



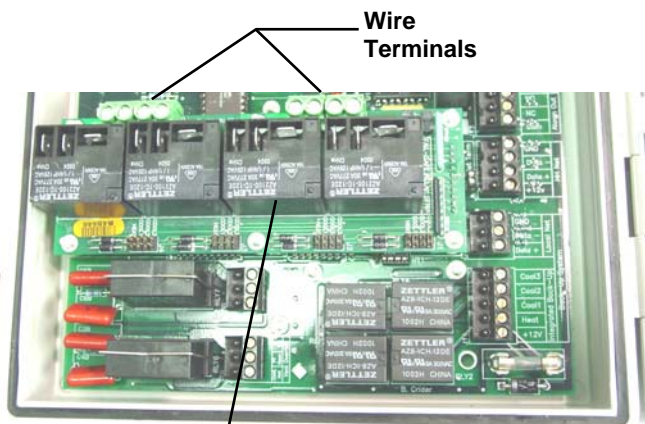
Six Stand-Off Attachment Holes

Header Connection For Relay Card

NOTE: Ensure the Relay Card connector and the PCB header are properly aligned during stand-off and Relay Card installation.

NOTE: The Relay Card is necessary on Stand-Alone systems ONLY. If S³ is used in conjunction with Evolution 3000/3001, this relay card is optional.

Relay Card

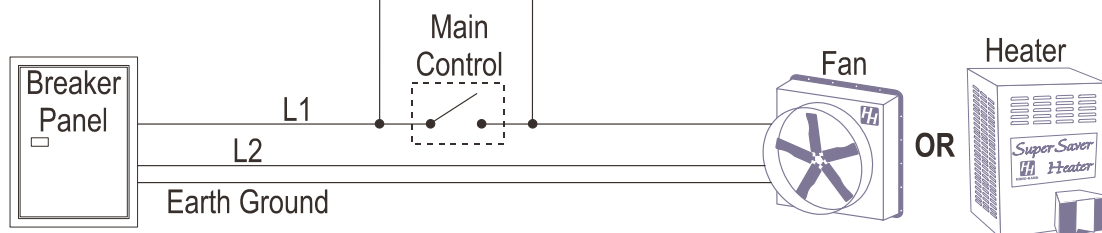
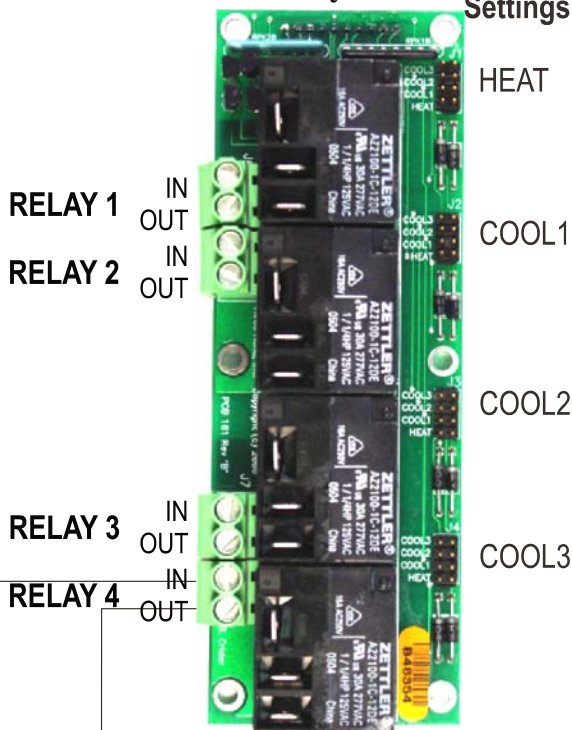


Wire Terminals

Inset A Relay Card

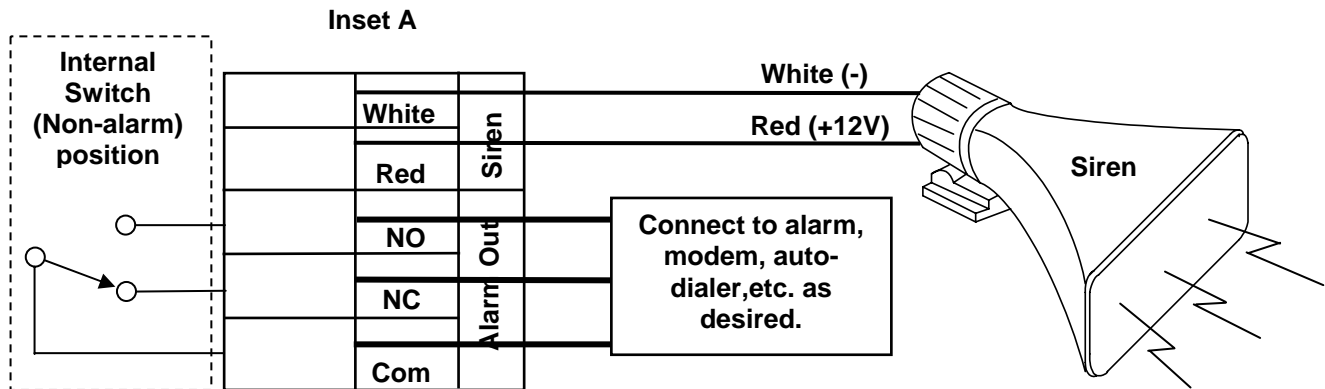
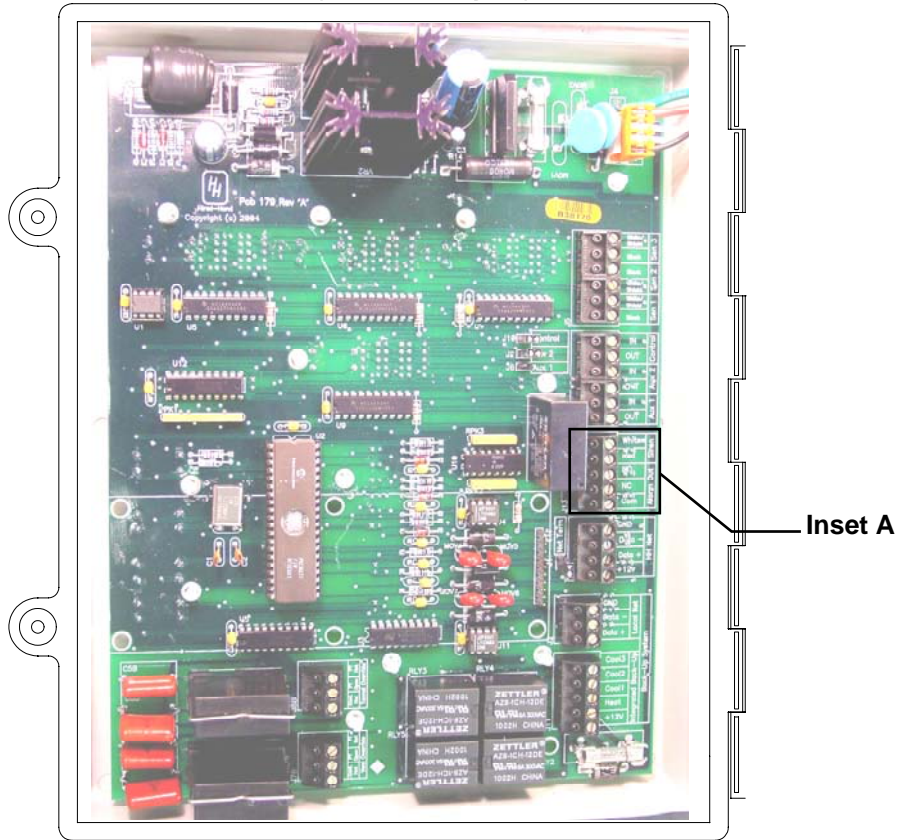
Inset A Relay Card

Jumper Default Settings



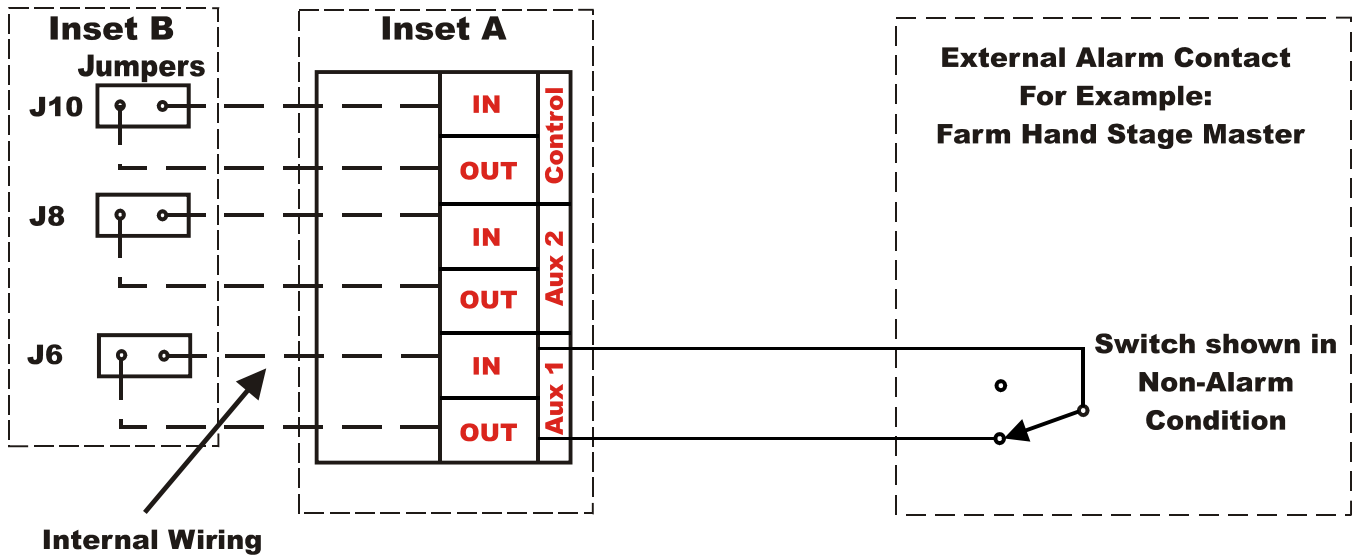
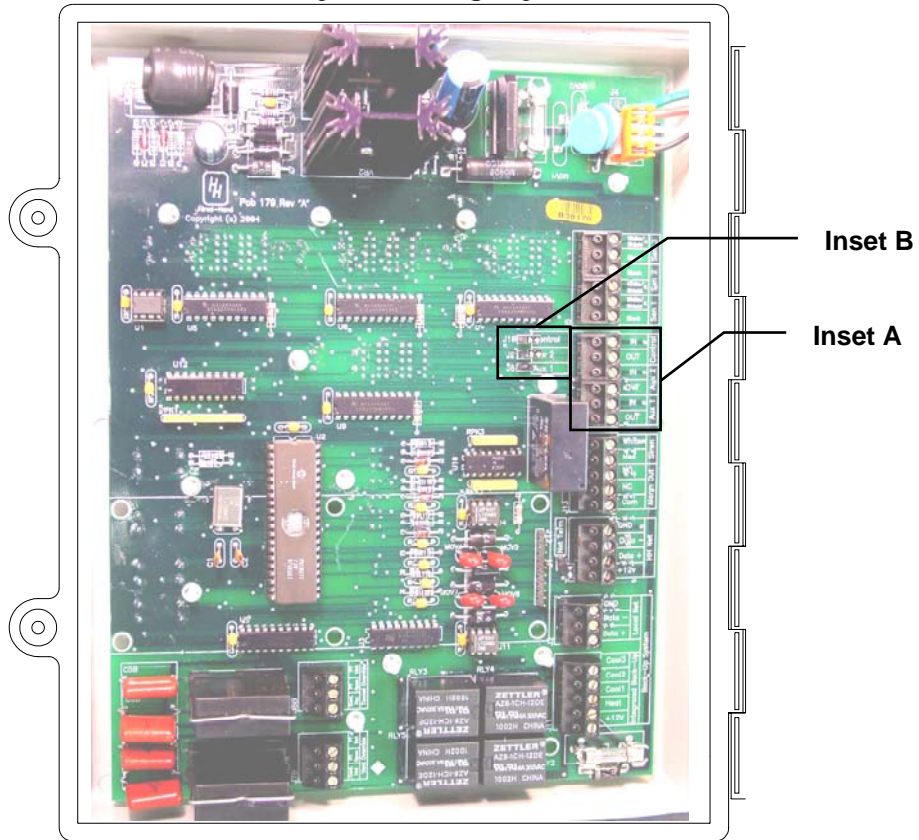
12.6 Connecting an Alarm or Siren to the S³

Secondary Sensing System



12.7 Connecting Auxiliary Inputs to the S³

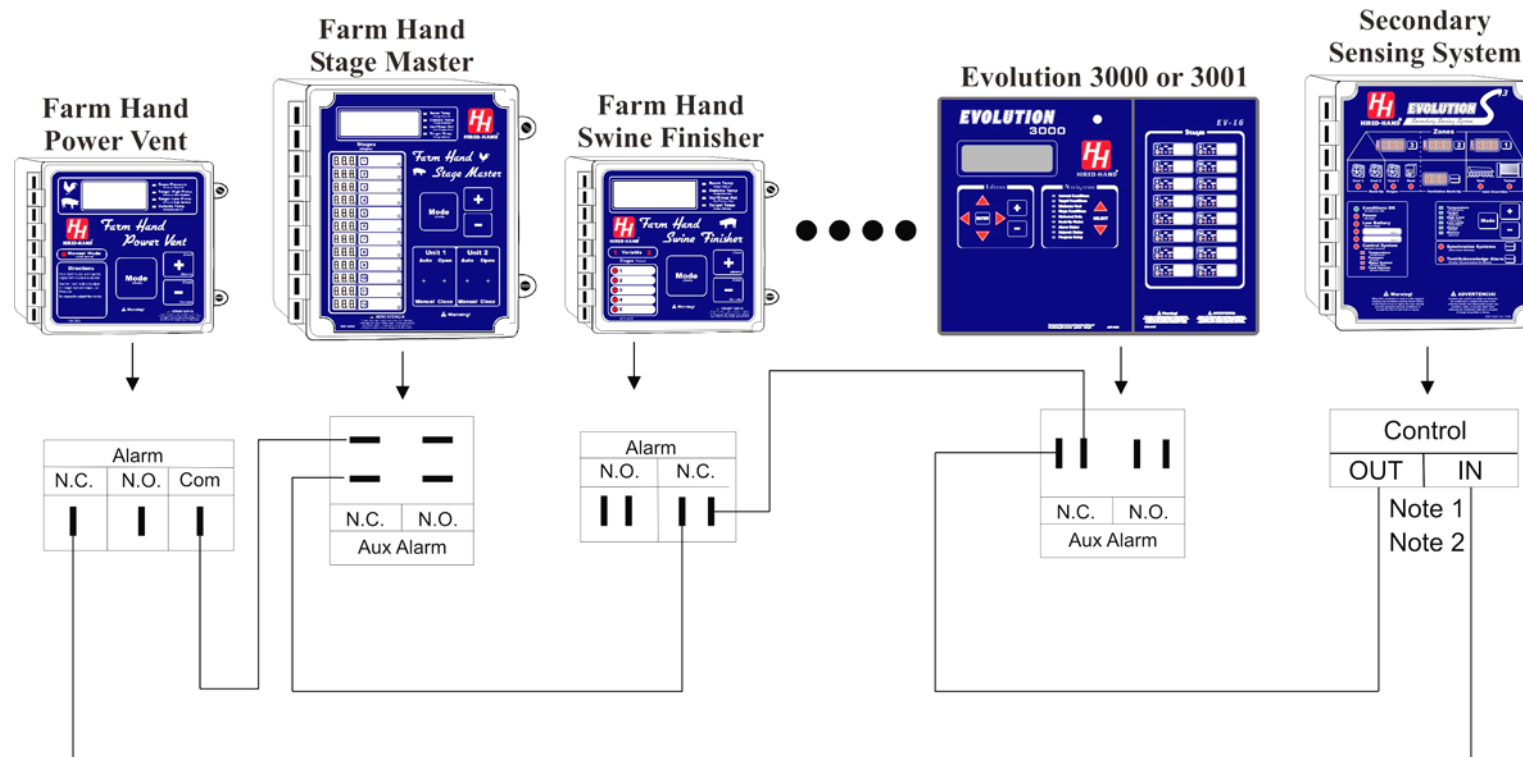
Secondary Sensing System



NOTE: The jumper across J6, J8 and/or J10 must be removed if an external alarm input is connected.

12.8 Connecting Other Hired-Hand Controllers to the S³ Auxiliary Input

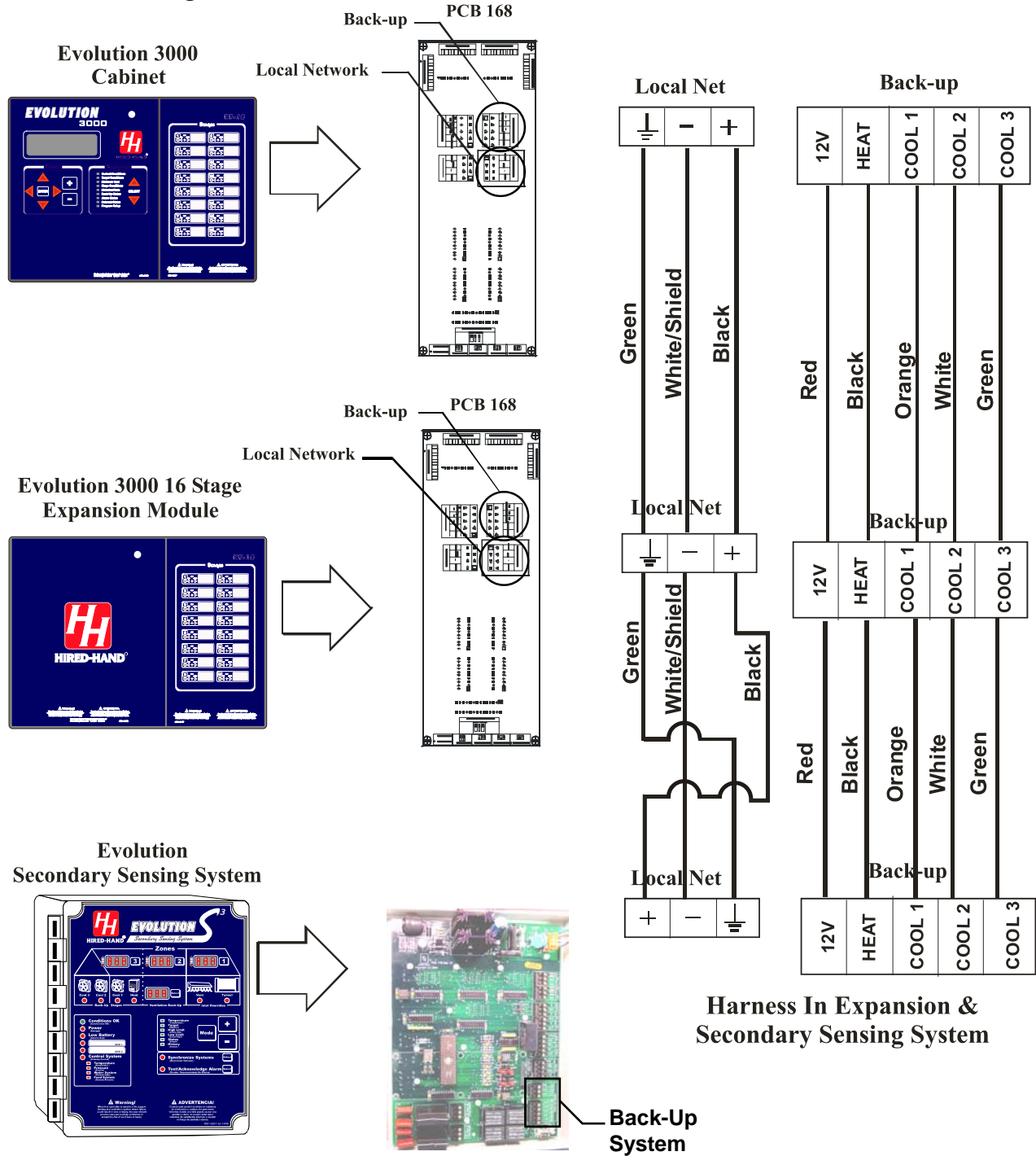
The diagram below shows the proper way to connect the Hired-Hand family of auxiliary alarm outputs to the S³ auxiliary inputs. The alarm activates when the connection is broken between the OUT and IN terminals.



NOTE 1: As long as a path for current flow is present, the Secondary Sensing System is not activated. Consequently, if one controller alarms, the path will be broken and the alarm will be activated.

NOTE 2: Remove the jumper between the OUT and IN terminals when installing external alarm inputs.

12.9 Connecting Local Network Connections to the S³



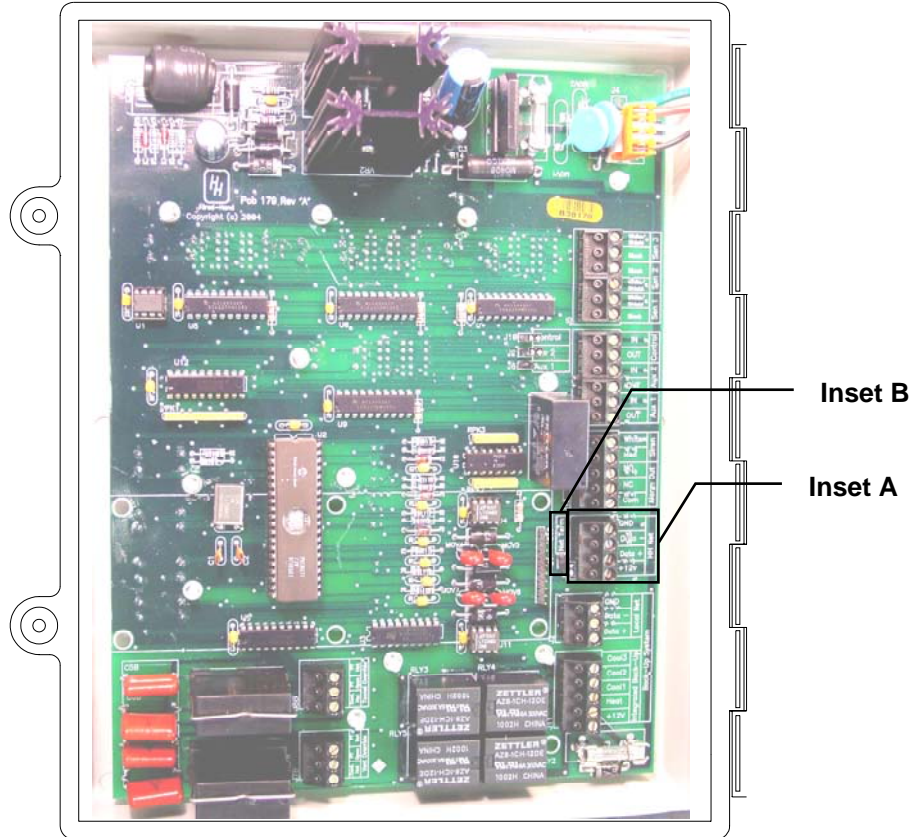
Warning!

Tape Shield To Prevent Damage!

NOTE: Harness to connect Local Network and Secondary Sensing system together are connected & included in the Secondary Sensing System and 16 Stage Expansion units.

12.10 Connecting the S³ to the HH.Net

Secondary Sensing System



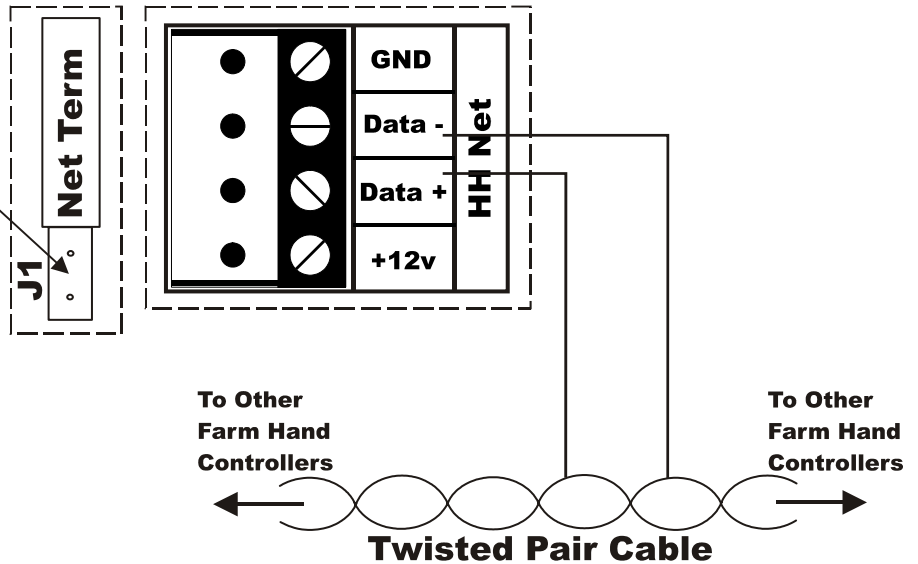
Inset A

To The HH.Net

Inset B

Jumper

NOTE: The "Net Term" jumper must be removed unless the Secondary Sensing System is the last controller on the network.



13. Replacement and Optional Parts

Controls

6450-5089	/KIT FH-AL to S3 upgrade
6607-8013	EV S ³ Plus
6607-8014	EV S ³

Replacement Parts

6407-0616	/DOOR ASSY S3
6407-6038	/EV-S3 Stand Alone Relay Card (PCB161)
3014-2174	Battery 12V 5.0 Ah
3006-3115	CONN SKT CLIP (For Tunnel/Vent Relays)
3006-5077	CONN Terminal Block 3 pos
3006-5078	CONN Terminal Block 4 pos
3006-5079	CONN Terminal Block 5 pos
3006-5092	CONN Terminal Block 6 pos
3540-0149	DIGITAL_IC LTC1483CN8 (Network Chips)
3010-3011	FUSE 10 AMP 5mmX20mm slow blow (F2)
3010-2991	FUSE 3 AMP 5mmX20mm slowblow (F1)
3701-6066	PIC S3 (Processor)
3015-1560	RLY AZ755-1C-12DE (Relay For Tunnel/Vent)
3008-2860	XFMR FD7-16 120/240-16VAC 56VA (Transformer)

Sensors and Wire

1503-2427	CBL SJT 18-2 Yellow (sensor)
6407-2593	/Temperature sensor asy 15'

Siren/Dialer

3016-1380	SIREN 12 VDC 1 AMP cont/warb
6607-6000	Voice Dialer AVD-45B

Manuals

4801-2997	MANUAL S ³
4801-5307	MANUAL Evolution 3000\3001

14. Temperature vs. Sensor Resistance Table

The following chart gives the resistance when measured between the white and black sensor wires at a given temperature. To check a sensor, first know the temperature in the area, then, use a multi-meter to check the resistance.

Resistance Kohms	Temp (F)	Temp (C)	Resistance Kohms	Temp (F)	Temp (C)	Resistance Kohms	Temp (F)	Temp (C)
32.654	32	0	15.714	59	15	8.59	83.3	28.5
32.158	32.5	0.3	15.568	59.4	15.2	8.517	83.7	28.7
31.671	33.1	0.6	15.353	59.9	15.5	8.408	84	28.9
31.191	33.6	0.9	15.211	60.3	15.7	8.336	84.6	29.2
30.72	34.2	1.2	15.001	60.8	16	8.23	85.1	29.5
30.257	34.7	1.5	14.863	61.2	16.2	8.125	85.6	29.8
29.802	35.2	1.8	14.658	61.7	16.5	8.056	86	30
29.355	35.8	2.1	14.457	62.2	16.8	7.954	86.5	30.3
28.915	36.3	2.4	14.325	62.6	17	7.853	87.1	30.6
28.482	36.9	2.7	14.128	63.1	17.3	7.787	87.4	30.8
28.057	37.4	3	13.999	63.5	17.5	7.689	88	31.1
27.777	37.8	3.2	13.808	64	17.8	7.592	88.5	31.4
27.363	38.3	3.5	13.682	64.4	18	7.496	89.1	31.7
26.957	38.8	3.8	13.496	64.9	18.3	7.433	89.4	31.9
26.557	39.4	4.1	13.373	65.3	18.5	7.34	90	32.2
26.164	39.9	4.4	13.192	65.8	18.8	7.248	90.5	32.5
25.777	40.5	4.7	13.073	66.2	19	7.157	91	32.8
25.523	40.8	4.9	12.896	66.7	19.3	7.098	91.4	33
25.147	41.4	5.2	12.779	67.1	19.5	7.009	91.9	33.3
24.777	41.9	5.5	12.607	67.6	19.8	6.922	92.5	33.6
24.413	42.4	5.8	12.493	68	20	6.836	93	33.9
24.055	43	6.1	12.325	68.5	20.3	6.779	93.4	34.1
23.82	43.3	6.3	12.215	68.9	20.5	6.695	93.9	34.4
23.472	43.9	6.6	12.051	69.4	20.8	6.612	94.5	34.7
23.13	44.4	6.9	11.943	69.8	21	6.531	95	35
22.793	45	7.2	11.783	70.3	21.3	6.45	95.5	35.3
22.572	45.3	7.4	11.678	70.7	21.5	6.371	96.1	35.6
22.244	45.9	7.7	11.522	71.2	21.8	6.319	96.4	35.8
21.922	46.4	8	11.42	71.6	22	6.241	97	36.1
21.71	46.8	8.2	11.268	72.1	22.3	6.165	97.5	36.4
21.397	47.3	8.5	11.168	72.5	22.5	6.089	98.1	36.7
21.088	47.8	8.8	11.02	73	22.8	6.015	98.6	37
20.886	48.2	9	10.874	73.6	23.1	5.941	99.1	37.3
20.586	48.7	9.3	10.778	73.9	23.3	5.869	99.7	37.6
20.29	49.3	9.6	10.636	74.5	23.6	5.798	100.2	37.9
20.096	49.6	9.8	10.542	74.8	23.8	5.728	100.8	38.2
19.809	50.2	10.1	10.404	75.4	24.1	5.658	101.3	38.5
19.526	50.7	10.4	10.312	75.7	24.3	5.59	101.8	38.8
19.34	51.1	10.6	10.177	76.3	24.6	5.522	102.4	39.1
19.065	51.6	10.9	10.088	76.6	24.8	5.456	102.9	39.4
18.884	52	11.1	9.956	77.2	25.1	5.39	103.4	39.7
18.616	52.5	11.4	9.869	77.5	25.3	5.326	104	40
18.352	53.1	11.7	9.741	78.1	25.6	5.262	104.5	40.3
18.179	53.4	11.9	9.614	78.6	25.9	5.199	105.1	40.6
17.503	54.9	12.7	9.53	79	26.1	5.137	105.6	40.9
17.339	55.2	12.9	9.407	79.5	26.4	5.076	106.2	41.2
17.095	55.8	13.2	9.325	79.9	26.6	4.995	106.9	41.6
16.856	56.3	13.5	9.205	80.4	26.9	4.936	107.4	41.9
16.698	56.7	13.7	9.086	81	27.2	4.877	108	42.2
16.465	57.2	14	9.007	81.3	27.4	4.82	108.5	42.5
16.312	57.6	14.2	8.891	81.9	27.7	4.763	109	42.8
16.085	58.1	14.5	8.815	82.2	27.9	4.688	109.8	43.2
15.935	58.5	14.7	8.702	82.8	28.2			

15. Error Codes

The controller records errors based on the communications links. When errors occur, an alarm will be generated.

Error Codes for the Evolution S³

Error Code	Description	Explanation
LnE	Local Network Error	The Back-Up has lost Communications with the Master Controller. NOTE: During this condition the Back-Up will run Cool 1 on a 5 minute timer.
LnO	Local Network Override Error	The Master Controller has lost communications with one or more of the Stage Units (PCB 168) connected to it. In this condition the Back-Up takes control over the stages.

16. S³ Program Label

Programming

(Secondary Sensing System)

P 1-9 General Parameters

P1 = Temperature Units
C = Celsius
F = Fahrenheit

P2 = Individual Alarm Temperature Limits
Yes = Temperature Limits Set Individually
No = Temperature Limits Set Identical

P3 = Back-Up Timer Percentage

P4 = Back-Up Stage On Delay

P 40-49 Hired-Hand Network

P40 = HHNET Network Address
P41 = Software Version Number
P42 = Controller Setup
P43 = Local Network Enable
No = Not Connected (Stand-Alone)
Yes = Connected (EV Network)

P 60-69 Alarm Functions

P62 = Cycle Pressure Alarm
ON = Enabled
OFF = Disabled

P63 = Minimum Vent Cycle Time (Minutes)

PS Sensor Calibration

PS1 = Sensor 1 Calibration
PS2 = Sensor 2 Calibration
PS3 = Sensor 3 Calibration

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