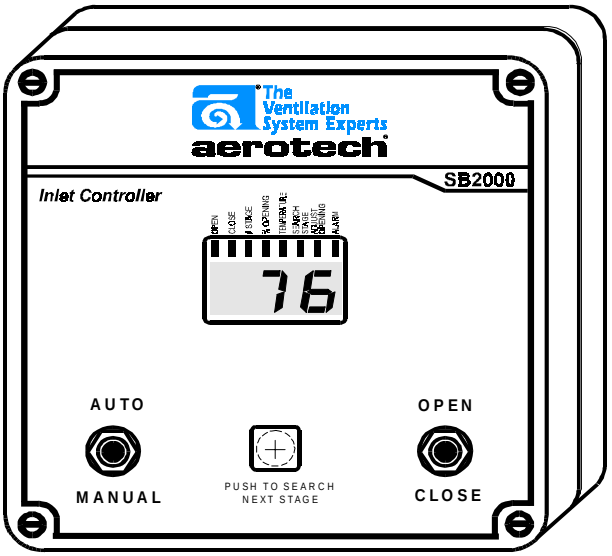
Inlet Controller

SB 2000

USER'S MANUAL



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FORM: QM 1320
Rev. 3, Sept. 1997

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FOR CUSTOMER USE
Enter below the serial number located on the side of the controller and retain this information for future reference.

Model number: ____SB2000___
Serial number: _____
Date installed: _____

PRECAUTIONS

Fuses at the input and outputs of the controller adequately protect its circuitry in the case of an overload or overvoltage. However, we recommend that you install an additional protection device on the controller's supply circuit to prolong the life of the controller.

The room temperature where the controller is located MUST ALWAYS REMAIN BETWEEN 32° AND 104°F (0° AND 40°C).

To avoid exposing the controller to harmful gases or excessive humidity, it is preferable to install it in a corridor.

DO NOT SPRAY WATER ON THE CONTROLLER

FEATURES

The SB 2000 is an electronic device used for air inlet control in livestock buildings. In combination with a ST series environment controller, theSB 2000 coordinates the movement of the air inlets with the operation of the fans using a potentiometer located on the panel drive.

The main features of the SB 2000 are as follows:

▶ DIGITAL DISPLAY

A digital display shows the operation parameters and alarm messages.

▶ PILOT LIGHTS

Pilot lights indicating the state of outputs allow you to monitor the operation of the system from a distance.

▶ ALARM OUTPUT

The controller generates an output signal that will activate any alarm system in the case of various operation problems.

▶ HYSTERESIS

A hysteresis prevents the air inlet panels from oscillating around the desired position when small variations in fan speed occur.

▶ PERMANENT MEMORY

Settings are retained in memory even in the event of a power failure.

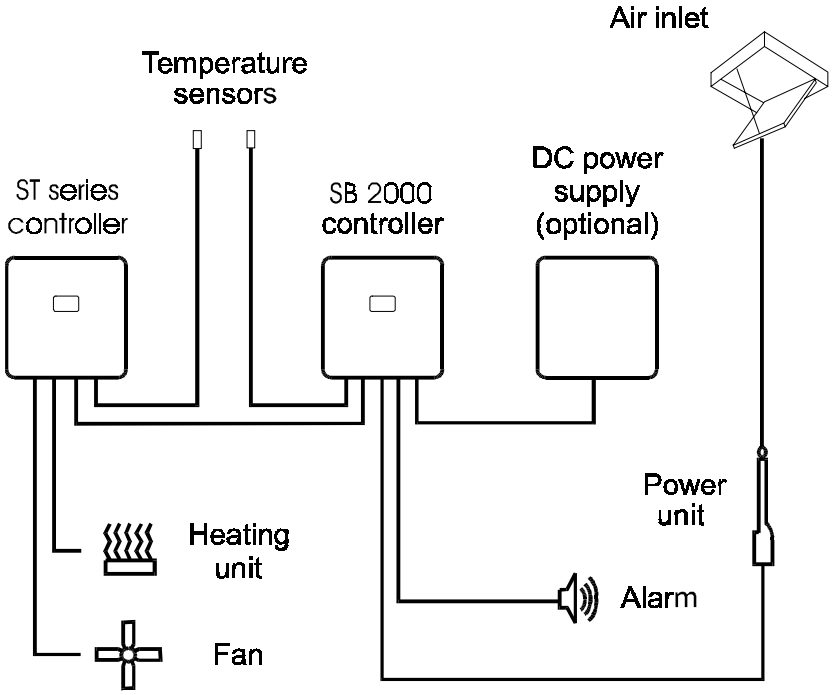
▶ OVERLOAD AND OVERVOLTAGE PROTECTION

Fuses located at the input and outputs of the controller protect its circuitry in the case of an overload or overvoltage.

Equipment List

Integrating an air inlet control system into your ventilation system requires the following equipment:

- a SL1400 Communication board added to your ST series controller
- a SB 2000 controller
- an alarm system (by others)
- a DC power supply (optional)
- an actuator or curtain machine equiped with a 10 turn potentiometer (> 1 kOhm)



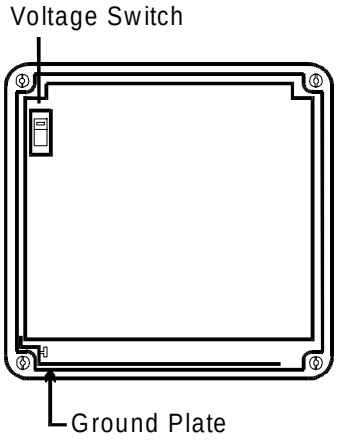
Mounting the Controller

Remove the four screws in the front cover and lift the cover. Remove the black caps located on the three mounting holes. Mount the enclosure to the wall using three screws. Be sure the electrical knockouts are at the bottom of the enclosure in order to prevent water from entering the controller. Insert the screws into the mounting holes and tighten. **Fasten the black caps onto the mounting holes.**

Connecting the Equipment

To connect the equipment, refer to one of the two wiring diagrams enclosed with this user's manual depending on whether you are using an AC or DC type power unit motor. Also refer to the DC power supply wiring diagram when using a DC type motor.

- Use the electrical knockouts provided at the bottom of the enclosure. Do not make additional holes in the enclosure.
- Set the voltage switch to the appropriate line voltage.
- If metallic cable holders are used to secure cables entering the enclosure, connect the ground wire to the ground plate.



Inside of the enclosure

WARNING

ALL WIRING MUST BE DONE BY AN AUTHORIZED ELECTRICIAN AND MUST COMPLY WITH APPLICABLE CODES, LAWS AND REGULATIONS. BE SURE POWER IS OFF BEFORE DOING ANY WIRING TO AVOID ELECTRICAL SHOCK AND EQUIPMENT DAMAGE.

CONCERNING THE ALARM CONNECTION: There are two types of alarms in the industry. One type activates when no current is at its input. The other activates when current is supplied at its input. For an alarm of the first type, use the NC terminal as shown on the wiring diagram. For an alarm of the second type, use the NO terminal.

WHEN ALL THE EQUIPMENT HAS BEEN CONNECTED, MAKE THE FOLLOWING VERIFICATIONS:

- Power the SB 2000 and set the auto-manual switch to MANUAL.

Verify the motor operation:

- Open and close the air inlet panels using the open-close switch. The air inlet panels should open when the switch is set to OPEN and close when the switch is set to CLOSE. If the air inlet panels move the opposite way, the motor operates in the wrong direction. Turn off the power and reverse the wires connected to terminals #1 and #4 for a DC motor or terminals #3 and #4 for an AC motor. Verify that the motor now operates in the right direction.

Verify the potentiometer operation:

- Open and close the air inlet panels using the open-close switch while measuring the voltage between terminals #2 and #3 using a DC voltmeter (2.5 volts maximum). The voltage should increase when opening the panels and decrease when closing the panels. If the voltage varies the opposite way, the potentiometer operates in the wrong direction. Turn off the power and reverse the wires connected to terminals #1 and #3. Verify that the potentiometer now operates in the right direction.

- If you do not have a voltmeter, set the auto-manual switch to AUTO. If the potentiometer operates in the wrong direction, the SB 2000 will display the alarm code AL3. If that is the case, turn off the power and reverse the wires connected to terminals #1 and #3. Verify that the controller is no longer displaying the alarm code.

Verify the extreme positions of the air inlet panels:

- Fully close the air inlet panels using the open-close switch. Adjust the power unit limit switch to this position in order to prevent the power unit from closing further. Fully open the air inlet panels using the open-close switch. Adjust the power unit limit switch to this position in order to prevent the power unit from opening further.

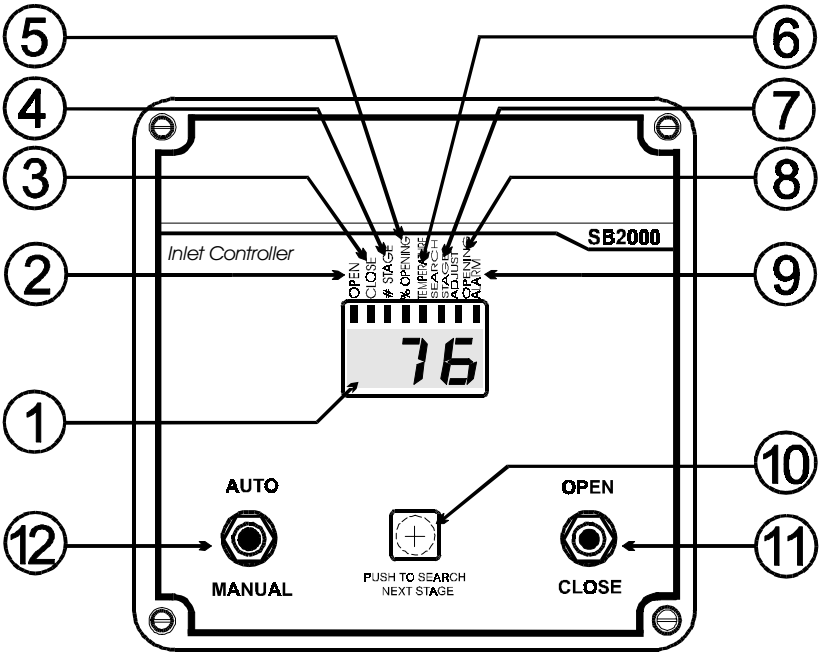
Temperature Probe

The interface is supplied with a temperature probe connected to terminal #1. This probe can be extended up to 500ft (150m). To extend the probe:

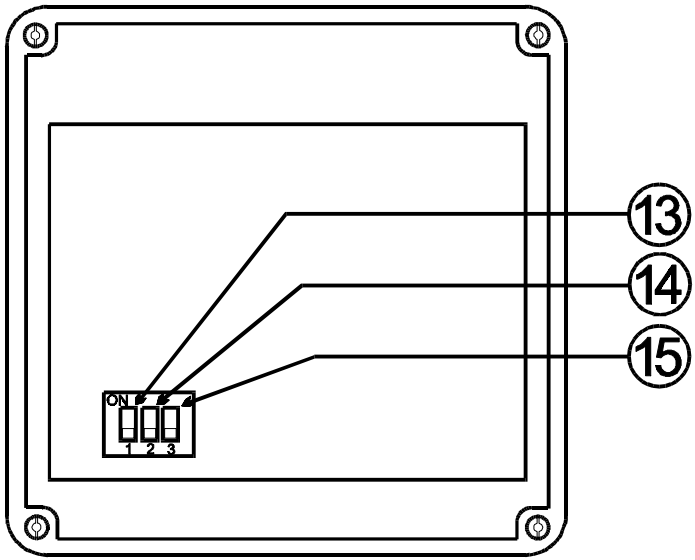
- Use a shielded cable of outside diameter between 0.245 and 0.260 in (6.22 and 6.60 mm) to ensure the cable entry is liquid-tight (the cable dimension must not be under 18 AWG).
- It is preferable to solder the cable joint to ensure a proper contact between the two cables.
- **<u>Do not</u> ground the shielding.**

CAUTION : The probes operate under low voltage and are isolated from the power supply. Be sure the probe cable is isolated from all high voltage sources. Do not route the probe cable and other power cables through the same electrical knockout. Do not run the probe cable next to other power cables. When crossing over other power cables, cross at 90°.

LOCATION OF THE CONTROLS



Cover



Inside of the cover

1 **Three-digit display**
Displays the percentage of air inlet opening and other operation parameters.

2 **Open pilot light**
Turns on when the controller opens the air inlet panels.

3 **Close pilot light**
Turns on when the controller closes the air inlet panels.

4 **Stage number pilot light**
Turns on when the controller displays the presently operating stage number.

5 **Percent opening pilot light**
Turns on when the controller displays the percentage of air inlet opening.

6 **Temperature pilot light**
Turns on when the controller displays a temperature and flashes when the controller displays the supplementary stage differential.

7 **Search stage pilot light**
Flashes when the controller is searching for the reference point of the next stage.

8 **Adjust opening pilot light**
Flashes when the controller waits for you to adjust the air inlet opening.

9 **Alarm pilot light**
Turns on when the controller activates the alarm.

10 **Push-button**
Used to search for the reference point of the next stage and to select a parameter.

11 **Open-close toggle switch**
Used to open or close the air inlet panels and to adjust the parameter settings.

12 **Auto-manual toggle switch**
Used to select the operating mode.

⑬ Lock switch

The automatic mode can be locked to prevent the program and the operation parameters from being accidentally modified. Use this switch to lock and unlock the automatic mode.

ON position	The automatic mode is **LOCKED**.
OFF position	The automatic mode is **UNLOCKED**.

FACTORY SETTING: When the controller is shipped from the factory, the lock switch is set to OFF.

⑭ Temperature unit switch

The temperature can be displayed in °CELSIUS or °FAHRENHEIT. Use this switch to select the desired temperature unit.

ON position	The temperature is displayed in ° **CELSIUS**.
OFF position	The temperature is displayed in **° FAHRENHEIT**.

FACTORY SETTING: When the controller is shipped from the factory, the temperature unit switch is set to OFF.

⑮ Season switch

The controller can operate according to two distinct seasonal programs. Use this switch to select a season when programming the automatic mode and to select the desired operation program.

ON position	**WINTER** season.
OFF position	**SUMMER** season.

FACTORY SETTING: When the controller is shipped from the factory, the season switch is set to OFF.

MANUAL MODE

The SB 2000 operates in the manual mode when the auto-manual switch is set to MANUAL. In the manual mode, you can adjust the air inlet opening using the open-close switch. The air inlet panels will remain in the same position as long as you do not set the SB 2000 to the automatic mode.

To Operate in the Manual Mode

- Set the auto-manual switch to MANUAL. The current percentage of air inlet opening appears on the display and the percent opening pilot light turns on.
- Using the open-close switch, adjust the air inlet opening.

AUTOMATIC MODE

The SB 2000 operates in the automatic mode when the auto-manual switch is set to AUTO. In the automatic mode, the SB 2000 adjusts the air inlet opening according to the operation of the ST controller ventilation stages. It can also adjust the air inlet opening according to the room temperature for a supplementary ventilation stage. Before using the SB 2000 in the automatic mode, a series of reference points must be programmed.

Programming Procedure

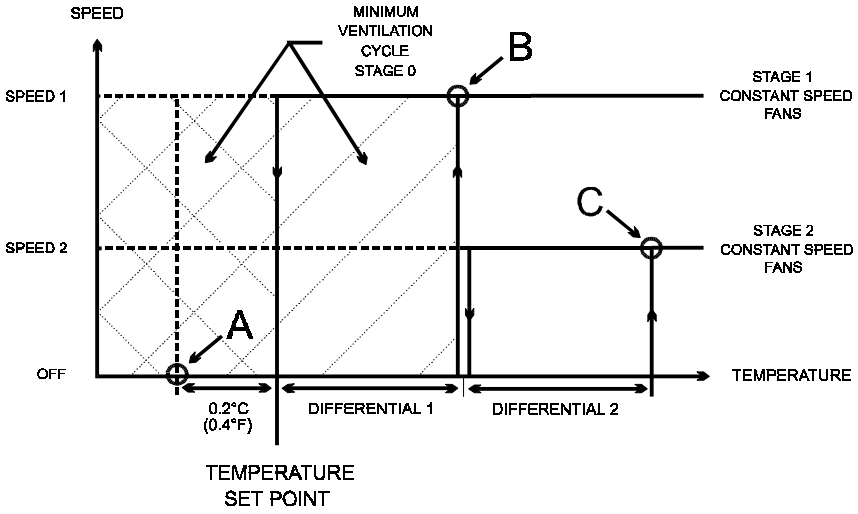
When you begin the programming procedure, the ST controller interrupts its normal operation. It no longer operates according to the current room temperature of the room but rather according to the room temperature prescribed by the SB 2000.

The SB 2000 leads you through the programming procedure by gradually increasing the room temperature to simulate the complete operation of the ST controller from the minimum ventilation cycle up to the last ventilation stage. Every time the room temperature reaches a reference point temperature, the SB 2000 waits for you to adjust the air inlet panels to the required position for this reference point. You can determine the required position either by measuring the static pressure in the room or by calculating, according to the fan airflow, the opening that will maintain the desired air speed at the inlet.

A supplementary stage can be programmed in order to continue opening the air inlet beyond the last ST controller ventilation stage. This supplementary stage is optional. It is used to direct the airflow more efficiently during periods of high temperature. When all the reference points of the ST controller ventilation stages have been programmed, the SB 2000 allows you to specify a temperature differential as well as a percentage of air inlet opening for the supplementary stage.

VENTILATION STAGE REFERENCE POINTS

1 **<u>If you are using a ST controller which has no variable speed ventilation stage</u> (Examples: ST 4022R, ST 4026, ST 4026R)**



REFERENCE POINT "A" (Stage 0 - minimum ventilation cycle)

The stage 1 fans are not running. The reference point temperature is *"temperature set point - 0.4°F (0.2°C)"*.

REFERENCE POINT "B" (Stage 1 - constant speed ventilation)

The stage 1 fans are running. The reference point temperature is *"temperature set point + differential 1"*.

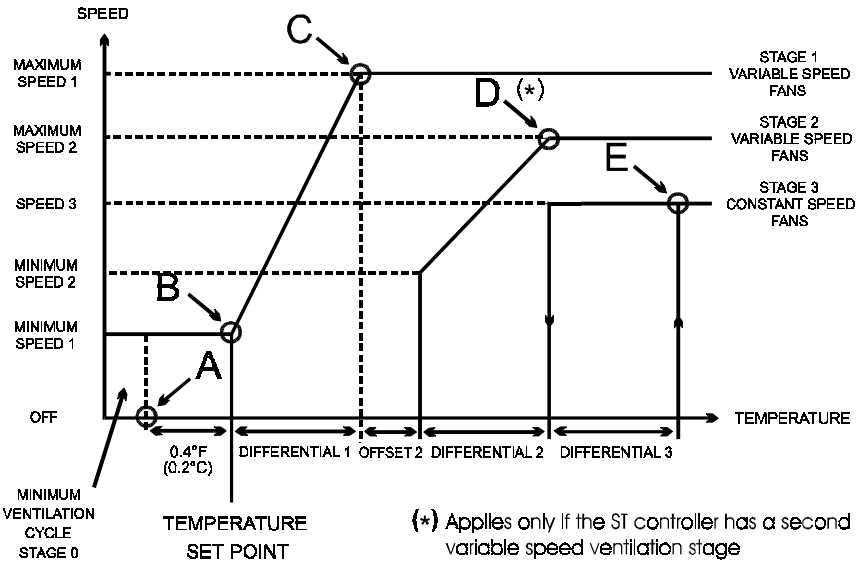
REFERENCE POINT "C" (Stage 2 - constant speed ventilation)

The stage 2 fans are running. The reference point temperature is *"temperature set point + differential 1 + differential 2"*.

OTHER STAGES

The reference points of the other constant speed ventilation stages are defined in the same way as stage 2.

2 **<u>If you are using a ST controller which has one or more variable speed ventilation stages</u> (Examples: ST 4110, ST 4120, ST 4121, ST 4124, ST 4220, ST 4222)**



REFERENCE POINT "A" (Stage 0 - minimum ventilation cycle)

The stage 1 fans are not running. The reference point temperature is *"temperature set point - 0.4°F (0.2°C)"*.

REFERENCE POINT "B" (Stage 0 - minimum ventilation cycle)

The stage 1 fans are running at minimum speed. The reference point temperature is *"temperature set point"*.

REFERENCE POINT "C" (Stage 1 - variable speed ventilation)

The stage 1 fans are running at maximum speed.The reference point temperature is *"temperature set point + differential 1"*.

REFERENCE POINT "D" (Stage 2 - variable speed ventilation)

The stage 2 fans are running at maximum speed. The reference point temperature is *"temperature set point + differential 1 + offset 2 + differential 2"*.

REFERENCE POINT "E" (Stage 3 - constant speed ventilation)

The stage 3 fans are running. The reference point temperature is *"temperature set point + differential 1 + offset 2 + differential 2 + differential 3"*.

OTHER STAGES

The reference points of the other constant speed ventilation stages are defined according to the same principle as stage 2.

SUPPLEMENTARY STAGE (OPTIONAL)

Differential [0.5° to 20.0°F, 0.3° to 11.1°C] The supplementary stage differential is a range of degrees where the SB 2000 opens the air inlet panels proportionally to the room temperature.

Percentage of air inlet opening [100% or more] The supplementary stage percentage of air inlet opening determines the position of the air inlet panels when the room temperature is equal to *"temperature of the last reference point + supplementary stage differential"*.

BEFORE PROGRAMMING THE REFERENCE POINTS

When to program the reference points

It is preferable to program the reference points when the room is empty because adjusting the air inlet openings will cause drafts.

Operation of the ST controller

Adjust the stage 1 time on and time off to zero so that the fans do not run during the minimum ventilation cycle. This is necessary to program the first reference point.

If you are using a controller which has one or more variable speed ventilation stages, adjust the stage 1 minimum speed to 40. This provides greater precision when positioning the air inlet panels. Also, be sure that the appropriate motor curve has been selected for each variable speed ventilation stage.

Adjust all other parameters for normal operation in order to properly simulate the operation of the ventilation stages.

Verify that the internal switches have been set according to the number of heating stages connected to the controller.

Be sure that the circuit breakers at the service panel and all other protection devices are in a position such that the fans can be activated.

Air inlet panel position

Install a static pressure measuring device or determine in advance the position required at each reference point by calculating, according to the fan airflow, the opening that will maintain the desired air speed at the inlet.

Fully close the air inlet panels before begining the programming procedure.

Set the open-close switch to OPEN for about 3 seconds in order to release the limit switch.

SB 2000 internal switches:

Set the lock switch to OFF in order to unlock the automatic mode.

Using the season switch, select the season you want to program.

To Program the Reference Points

- Set the lock switch to OFF in order to unlock the automatic mode.
- Using the season switch, select the season you want to program.
- Set the auto-manual switch to MANUAL. The percentage of air inlet opening appears on the display and the percent opening pilot light turns on.

NOTE: It is necessary to complete the programming procedure in order for the program to be saved. The controller does not save the program as long as the word "end" is not displayed.

STEP 1 : Programming the minimum ventilation cycle

1 **If you are using a ST controller which has no variable speed ventilation stage**

- Press the push-button. A question mark appears flashing on the display and the search stage pilot light begins to flash. The SB 2000 adjusts the room temperature so that it is equal to the reference point "A" temperature. At this temperature, the ST controller is operating according to the minimum ventilation cycle and the stage 1 fans are not running. The stage number pilot light turns on and the number "0" appears on the display, indicating that the SB 2000 has reached the stage 0 (minimum ventilation cycle) reference point. At the same time, the adjust opening pilot light begins to flash.
- Set the open-close switch to OPEN for about 3 seconds in order to release the limit switch.

Go to STEP 3

To Program the Reference Points (continued)

2 **If you are using a controller which has one or more variable speed ventilation stages**

- Press the push-button. A question mark appears flashing on the display and the search stage pilot light begins to flash. The SB 2000 adjusts the room temperature so that it is equal to the reference point "A" temperature. At this temperature, the ST controller is operating according to the minimum ventilation cycle and the stage 1 fans are not running. The stage number pilot light turns on and the number "0" appears on the display, indicating that the SB 2000 has reached the first stage 0 (minimum ventilation cycle) reference point. At the same time, the adjust opening pilot light turns on.

- Set the open-close switch to OPEN for about 3 seconds in order to release the limit switch.

- Press the push-button once again. A question mark appears flashing on the display and the search stage pilot light begins to flash. The SB 2000 increases the room temperature by increments of 0.1°F (0.1°C) until it is equal to the reference point "B" temperature. At this temperature, the ST controller is operating according to the minimum ventilation cycle and the stage 1 fans are running at minimum speed. The stage number pilot light turns on and the number "0" appears on the display, indicating that the SB 2000 has reached the second stage 0 (minimum ventilation cycle) reference point. At the same time, the adjust opening pilot light turns on.

- Using the open-close switch, adjust the air inlet panels to the position required when the stage 1 fans are running at minimum speed.

Go to STEP 2

To Program the Reference Points (continued)

STEP 2 : Programming the variable speed ventilation stages

Programming stage 1

- Press the push-button once again. A question mark appears flashing on the display and the search stage pilot light begins to flash. The SB 2000 increases the room temperature by increments of 0.1°F (0.1°C) until it is equal to the reference point "C" temperature. At this temperature, the stage 1 fans are running at maximum speed. The stage number pilot light turns on and the number "1" appears on the display, indicating that the SB 2000 has reached the stage 1 reference point. At the same time, the adjust opening pilot light turns on.

- Using the open-close switch, adjust the air inlet panels to the position required when the stage 1 fans are running at maximum speed.

Programming stage 2 (if you are using a ST controller which has a second variable speed ventilation stage)

- Press the push-button once again. A question mark appears flashing on the display and the search stage pilot light begins to flash. The SB 2000 increases the room temperature by increments of 0.1°F (0.1°C) until it is equal to the reference point "D" temperature. At this temperature, the stage 2 fans are running at maximum speed. The stage number pilot light turns on and the number "2" appears on the display, indicating that the SB 2000 has reached the stage 2 reference point. At the same time, the adjust opening pilot light turns on.

To Program the Reference Points (continued)

- Using the open-close switch, adjust the air inlet panels to the position required when the stage 2 fans are running at maximum speed.

Go to STEP 3

STEP 3 : Programming the constant speed ventilation stages

Repeat the following procedure for each constant speed ventilation stage:

- Press the push-button once again. A question mark appears flashing on the display and the search stage pilot light begins to flash. The SB 2000 increases the room temperature by increments of 0.1°F (0.1°C) until it is equal to the reference point temperature of the following stage. At this temperature, the stage's fans start to run. The stage number pilot light turns on and the stage number appears on the display, indicating that the SB 2000 has reached the reference point of the stage. At the same time, the adjust opening pilot light turns on.

- Using the open-close switch, adjust the air inlet panels to the position required when the stage's fans are running.

When all the constant speed ventilation stages have been programmed, go to STEP 4

To Program the Reference Points (continued)

STEP 4 : Programming the supplementary stage

- Press the push-button once again. A question mark appears flashing on the display and the search stage pilot light begins to flash. The SB 2000 increases the room temperature by increments of 0.5°F (0.3°C) until it is equal to 120.0°F (48,6°C) in order to verify if there are other reference points. [NOTE: Knowing that there are no other reference points, you can immediately end the search by pressing the push-button for 2 seconds.] The temperature pilot light begins to flash and a default differential of 5.0°F (2.8°C) appears flashing on the display.

If you do not want to use the supplementary stage option:

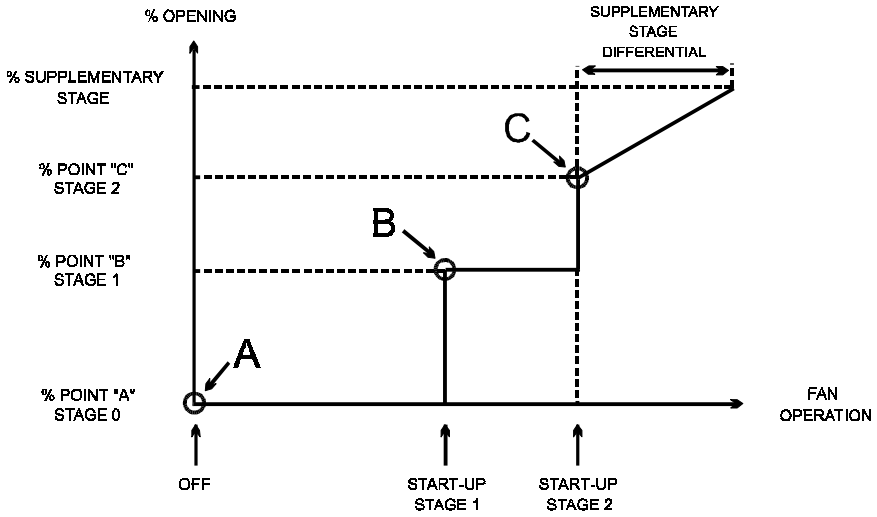
- Press the push-button twice. The word "end" appears on the display, indicating that the programming procedure is completed. At this moment, the SB 2000 saves the program for the selected season.

If you want to use the supplementary stage option:

- Using the open-close switch, adjust the supplementary stage differential to the desired value.
- Press the push-button once again. The percent opening pilot light turns on and a percentage of air inlet opening of 100% appears on the display.
- Using the open-close switch, adjust the supplementary stage percentage of air inlet opening to a value above 100%.
- Press the push-button once again. The word "end" appears on the display, indicating that the programming procedure is completed. At this moment, the SB 2000 saves the program for the selected season.

How the Controller Operates

1 **<u>If you are using a ST controller which has no variable speed ventilation stage</u> (Examples: ST 4022R, ST 4026, ST 4026R)**



Minimum ventilation cycle (stage 0)

When the stage 1 fans stop running, the SB 2000 positions the panels to the percentage of air inlet opening programmed at reference point "A".

When the stage 1 fans start to run, the SB 2000 positions the panels to the percentage of air inlet opening programmed at reference point "B".

Stage 1

When the stage 1 fans begin normal operation, the SB 2000 positions the panels to the percentage of air inlet opening programmed at reference point "B".

Stage 2

When the stage 2 fans start to run, the SB 2000 positions the panels to the percentage of air inlet opening programmed at reference point "C".

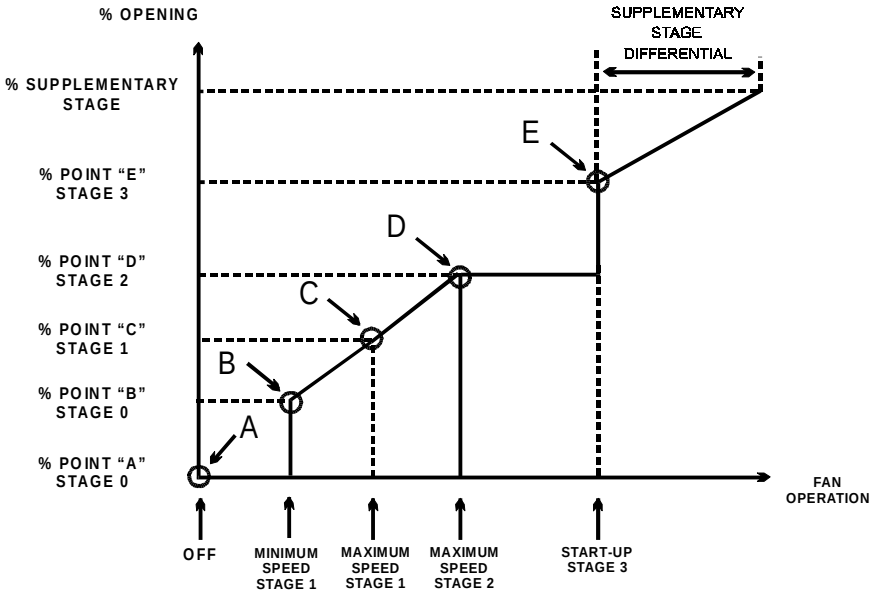
Other ventilation stages

Each time the fans of another stage start to run, the SB 2000 positions the panels to the percentage of air inlet opening programmed at the stage's reference point.

Supplementary stage

The SB 2000 gradually opens the panels in a linear fashion as the room temperature rises above the last reference point temperature. The percentage of air inlet opening specified for the supplementary stage is reached when the room temperature is equal to *"temperature of the last reference point + supplementary stage differential"*.

2 **If you are using a ST controller which has one or more variable speed ventilation stages (Examples: ST 4110, ST 4120, ST 4121, ST 4124, ST 4220, ST 4222)**



Minimum ventilation cycle (stage 0)

When the stage 1 fans stop running, the SB 2000 positions the panels to the percentage of air inlet opening programmed at reference point "A".

When the stage 1 fans start to run in minimum ventilation cycle, the SB 2000 positions the panels to the percentage of air inlet opening programmed at reference point "B".

Variable speed ventilation stages

When the stage 1 fans start to run in normal operation, the SB 2000 positions the panels to the percentage of air inlet opening programmed at reference point "B".

The SB 2000 gradually opens the panels in a linear fashion as the stage 1 fans increase in speed. The air inlet opening reaches the percentage programmed at reference point "C" when the stage 1 fans operate at maximum speed.

The SB 2000 gradually opens the panels in a linear fashion as the stage 2 fans increase in speed. The air inlet opening reaches the percentage programmed at reference point "D" when the stage 2 fans operate at maximum speed.

Constant speed ventilation stages

When the stage 3 fans start to run, the SB 2000 positions the panels to the percentage of air inlet opening programmed at reference point "E".

Each time the fans of another constant speed ventilation stage start to run, the SB 2000 positions the panels to the percentage of air inlet opening programmed at the reference point of the stage.

Supplementary stage

The SB 2000 gradually opens the panels in a linear fashion as the room temperature rises above the last reference point temperature. The air inlet opening reaches the percentage specified for the supplementary stage when the room temperature is equal to *"temperature of the last reference point + supplementary stage differential"*.

Operation Parameters

ROOM TEMPERATURE [°F or °C]

The room temperature is the temperature measured by the sensor connected to the SB 2000.

To View the Room Temperature

- Set the auto-manual switch to AUTO.
- Press the push-button repeatedly until the temperature pilot light turns on. The room temperature then appears on the display.

PERCENTAGE OF AIR INLET OPENING [%]

The SB 2000 considers the percentage of air inlet opening of the last ventilation stage reference point as being equal to 100% whatever the position of the panels (it is not necessary that the panels be fully open) and determines all other percentages of air inlet opening according to this reference.

To View the Percentage of Air Inlet Opening

- Set the auto-manual switch to AUTO.
- Press the push-button repeatedly until the percent opening pilot light turns on. The percentage of air inlet opening then appears on the display.

STAGE NUMBER [-]

The stage number represents the ventilation stage currently in operation.

To View the Stage Number

- Set the auto-manual switch to AUTO.
- Press the push-button repeatedly until the stage number pilot light turns on. The stage number then appears on the display.

HYSTERESIS [-]

The hysteresis determines the sensitivity of the power unit to variations in fan speed. It must be adjusted to suit the characteristics of the particular air inlet system. If the hysteresis is too low, the air inlet panels will oscillate around the desired position. If the hysteresis is too high, the air inlet panels will not be positionned with accuracy according to the programmed percentages of air inlet opening. The hysteresis is a value ranging from 0 to 10. We recommend decreasing the hysteresis until the inlet begins to oscillate and then increasing the hysteresis just above the point where it oscillates. This will set the air inlet system to operate with the most accuracy.

To Adjust the Hysteresis

- Set the auto-manual switch to AUTO.
- Press the push-button repeatedly until the word "HYS" appears on the display alternately with the hysteresis.
- Using the open-close switch, adjust the hysteresis the the desired value.

LOW ALARM OFFSET [°F or °C]

The alarm is activated when the room temperature measured by the sensor connected to the SB 2000 falls below the value *"temperature set point - low alarm offset".* The low alarm offset can be adjusted between 1° and 40°F (1°C and 22°C).

To Adjust the Low Alarm Offset

- Set the auto-manual switch to AUTO.
- Press the push-button repeatedly until the word "LOW" appears on the display alternately with the low alarm offset.
- Using the open-close switch, adjust the low alarm offset to the desired value.

HIGH ALARM OFFSET [°F or °C]

The alarm is activated when the room temperature measured by the sensor connected to the SB 2000 rises above the value *"temperature set point + high alarm offset".* The high alarm offset can be adjusted between 1° and 40°F (1° and 22°C).

To Adjust the High Alarm Offset

- Set the auto-manual switch to AUTO.
- Press the push-button repeatedly until the word "HI" appears on the display alternately with the high alarm offset.
- Using the open-close switch, adjust the high alarm offset to the desired value.

List of Alarms

When operating in the automatic mode, the SB 2000 displays an alarm code and activates the alarm 30 seconds after displaying the code, in the case of any one of the situations described in table 1 below.

When operating in the automatic or manual mode, the SB 2000 activates the alarm in the case of a power failure or a fault in the controller's supply circuit but it does not display an alarm code.

TABLE 1. List of Alarms

ALARM CODE	CAUSE OF THE ALARM
AL1	▶ The communication between the SB 2000 and the ST controller is faulty. — Be sure the communication module is firmly plugged into the ST controller's circuit. — Be sure the SB 2000 is correctly wired to the communication module. ▶ The ST controller's sensor #1 is connected improperly (the ST controller displays the letter "p"). — Correct the connection.
AL2	▶ The potentiometer is not wired correctly. — Correct the wiring.
AL3	▶ The potentiometer operates in the wrong direction. — Reverse the wires connected to terminals #1 and #3. The voltage between terminals #2 and #3 must increase when opening the air inlet panels and decrease when closing the air inlet panels.

TABLE 1. List of Alarms (continued)

ALARM CODE	CAUSE OF THE ALARM
AL4	▶ The automatic mode is not programmed or is programmed improperly. — Reprogram the automatic mode.
AL5	▶ The sensor connected to the SB 2000 is short-circuited or is connected improperly. — Be sure the sensor is properly connected. — Be sure the sensor cable is not damaged.
AL6	▶ The difference between the ambient temperature measured by the SB 2000 and by the ST controller is greater than 10.0°F (5.5°C). — Be sure the sensors are properly connected and positioned.
AL7	▶ Low temperature alarm.
AL8	▶ High temperature alarm.

In the case of an alarm of type AL1, AL2, AL3, AL4, AL7 or AL8, the SB-2000 naturally ventilates the room until the problem causing the alarm is corrected. To naturally ventilate the room, the SB-2000 opens or closes the air inlet panels according to the temperature for 8 seconds and stops opening or closing the air inlet panels for 52 seconds. This cycle is repeated as long as the room temperature exceeds the temperature set point by at least 2°F (1.1°C).

TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
There is no display.	The circuit breaker at the service panel is off or tripped.	Reset the circuit breaker.
	The wiring is incorrect.	Correct the wiring.
	The F3 input fuse is open.	Replace the fuse.
	The voltage selector switch is in the wrong position.	Set the switch to the correct position.
	The display board interconnect cable is unplugged from the power supply board.	Plug in the cable.
The room temperature displayed by the SB 2000 shows sudden variations.	A variation in resistance is induced on the sensor connected to the SB 2000.	Be sure the sensor is dry and move it away from drafts and from any source of radiant heating.
	There is electrical noise near the cable of the sensor connected to the SB 2000.	Do not run the sensor cable next to other power cables. When crossing other power cables, cross at 90°.

PROBLEM	CAUSE	SOLUTION
The SB 2000 alarm pilot light is on but the SB 2000 alarm is not activated.	The F2 alarm fuse is open.	Replace the fuse.
	The display board interconnect cable is unplugged from the power supply board.	Plug in the cable.
	The wiring is incorrect.	Correct the wiring.
	The SB 2000 alarm is defective.	Repair the alarm.
	The SB 2000 is defective.	Listen to see if there is a clicking sound when the alarm pilot light turns on. If there is no clicking sound, the SB 2000 is defective. Contact your distributor to repair the controller.
The SB 2000 alarm is activated.	There is an operation problem.	Refer to the list of alarms in table 1 (page 27) to identify the cause of the alarm and correct the problem.

PROBLEM	CAUSE	SOLUTION
The SB 2000 displays **535**.	No valid program has been entered.	Program the SB 2000.
	The potentiometer is not properly connected.	Check the connections, wires # 1 and # 3 might be reversed. Reprogram the SB 2000 after changing the connections.
The SB 2000 displays **ERR**.	SB 2000 does not communicate with the climate controller.	Check the communication connections and correct the problem. Check the communication board connections in the climate controller. Change the defective communication board. Programming is interrupted if no user activity is recorded after five minutes.
The SB 2000 displays **AL3** after working for a while.	The limit switches are not released.	Release the limit switches for about 3 seconds when programming SB 2000.
	The potentiometer is not properly connected.	Check the connections. Wires # 1 and # 2 might be reversed. Reprogram the SB 2000 after changing the connections.

TECHNICAL SPECIFICATIONS

Supply: -115/230 VAC, 50/60 Hz (-18%, +8%), overload and overvoltage protection fuse F3-1A fast blow.

-12 VDC for AC back-up supply; can activate alarm if supplied with DC back-up voltage.

Curtain: OPEN-CLOSE output, 115/230 VAC, 50/60 Hz, 30 VDC, 5A motor load, fuse F1-5A slow blow.

Alarm: 115/230 VAC, 50/60 Hz, 30 VDC, 3A, fuse F2-3A slow blow.

Probe: Low voltage (< 5V), isolated from the supply. Operating range: -40.0 °F to 120.0 °F (-40.0 °C to 48.9 °C). Accuracy: 1.8°F (1°C) between 41° and 95°F (5° and 35°C).

Enclosure: ABS, humidity and dust-tight.