STAGED ENVIRONMENT CONTROL

MODEL SEC-HD   USER'S GUIDE

PHASON
STAGED
ENVIRONMENT
CONTROL

MODEL SEC-HD

76.2

Prog   Store   Parm   Return

STAGE 1 ▶
STAGE 2 ▶
STAGE 3 ▶
STAGE 4 ▶
STAGE 5 ▶

PROGRAM PARAMETERS

Main
0 Memory Protect
1 Temp Set (Start P-Band)
2 Stage 1 Min Vent
3 Stage 2 Min Vent

Differentials
4 Stage 1 Off-Set-Back
5 Stage 1 P-Band 1
6 Stage 2 Off-Set-Back
7 Stage 2 Start P-Band 2
8 Stage 2 P-Band 2
9 Stage 3 Turn On
10 Stage 4 Turn On
11 Stage 5 Turn On
12 Low Temp Alarm
13 High Temp Alarm

COMMON PARAMETERS ◄

General
14 Low Power Alarm
15 Alarm Latching
16 Ventilation

Setup
17 Units F or C
18 Stage 3 Heat or Cool
19 Stage 4 Heat or Cool
20 Stage 5 Heat or Cool
21 Stage 1 Minimum Idle
22 Stage 2 Minimum Idle
23 Hysteresis
24 Stage 1 P.F. Compensation
25 Stage 2 P.F. Compensation

◄ Same in all programs

STAGE-1   STAGE-2   STAGE-3   STAGE-4   STAGE-5   ALARM

Phason
electronic control systems

LIMITED WARRANTY

PHASON warrants this unit, the SEC-HD, subject to the following terms and conditions. This warranty is valid only to the original purchaser for a period of 2 years from the date of manufacturing. Manufacturing date is stated in the first eight digits of the serial number in the form year-month-day. PHASON hereby warrants that should this product prove defective by reason of improper workmanship, PHASON will repair the unit, effecting all necessary parts replacements without charge for either parts or labour.

CONDITIONS

1. Installation must be made in accordance with our enclosed installation instructions.
2. The unit must not have been previously altered, modified or repaired by anyone other than PHASON.
3. The unit must not have been subject to accident, misuse, abuse or operated or installed contrary to the instructions contained in the accompanying manual. The opinion of PHASON with respect to these matters shall be final.
4. The person requesting the services provided hereunder must be the original purchaser of the unit and furnish proof of purchase upon request.
5. This warranty is applicable only to the PHASON SEC-HD Temperature Control.
6. All transportation charges on units submitted for warranty repair must be borne by the purchaser.
7. For warranty services, return unit together with original proof of purchase to your dealer.

EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, NO OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY TO THIS UNIT. ANY AND ALL IMPLIED WARRANTIES ARE EXCLUDED. PHASON SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES SUSTAINED IN CONNECTION WITH THE SAID UNIT. PHASON NEITHER ASSUMES NOR AUTHORIZES ANY REPRESENTATIVES OR OTHER PERSONS TO ASSUME FOR IT ANY OBLIGATION OR LIABILITY OTHER THAN SUCH AS IS EXPRESSLY SET FORTH HEREIN.

PHASON RESERVES THE RIGHT TO IMPROVE OR ALTER THE SEC-HD WITHOUT NOTICE.

SERVICE AND TECHNICAL ASSISTANCE

Your dealer will be happy to answer all technical questions which will improve your use of the control. Be prepared with the model number, serial number and necessary information before you place a call to your dealer. If your control requires service when the warranty period has expired, return the unit to your dealer.

2 Terracon Place
Winnipeg, Manitoba, Canada
R2J 4G7
Phone: (204)233-1400
Fax: (204)233-3252

TABLE OF CONTENTS

FEATURES OF THE SEC-HD

The Staged Environment Control (SEC-HD), is a microprocessor based product designed to efficiently control the environment in livestock buildings. It connects to two variable speed fans, a combination of secondary fans and heaters and an alarm system. When operating, the SEC-HD measures and displays the room temperature. While monitoring the temperature it controls the connected ventilation and heating equipment according to the programmed settings to keep the temperature at the desired point. The program settings can be adjusted to change the turn on points and other parameters of the stages. This is a list of the standard features of the SEC-HD.

- Digital display of temperature, alarms and settings

- 7 programs with pre-programmed factory settings which can be easily changed

- A built-in keyboard to allow easy adjustment of settings

- 3 stages with relay contacts to control secondary fans or heaters

- A relay to signal high or low temperature, power interruptions or low line voltage conditions

- Internal memory is retained during power failures

- 120/230 VAC operation @ 10.0 amps output for each variable speed fan (with noise suppression to eliminate radio and T.V. interference)

- Three second full power turn on for variable speed outputs to minimize fan freeze-up

- Transient protected

- Compact design, 18cm/7" (H) x 23cm/9" (W) x 9.5cm/3.75" (D)

- Non-corrosive, fire retardant enclosure

- Two year warranty

- Sensor can be extended

GETTING STARTED

Congratulations on the purchase of your new SEC-HD environment control! This manual has been prepared to help you get the utmost in satisfaction from your SEC-HD. It contains detailed information regarding the installation and operation of the control. The Getting Started section will step you through the installation and configuration of your SEC-HD. The following steps refer to other sections of this user's guide for additional information. For this reason, it is not necessary to read through the entire document from front to back, but rather in the order that the information is needed.

STEP **1**

CHECKING RATINGS OF EQUIPMENT
• Read the SEC-HD ELECTRICAL RATINGS on page 4. • Fill in the EQUIPMENT LIST on page 5. WARNING: The equipment to be connected to the SEC-HD control must not draw more current than what the SEC-HD stages are rated for. Use of equipment that is rated higher than the SEC-HD will result in damage to the control and will void the warranty.

STEP **2**

INSTALLATION
• Follow the instructions in Appendix A for installing and wiring the SEC-HD and equipment. Be sure to read the General Warnings section in Appendix A before installation.

STEP **3**

TESTING
• Turn to Appendix B and follow the instructions there, to test the operation of the equipment installed to ensure that it is connected properly.

STEP **4**

SETTING UP
- Read through the GETTING TO KNOW THE SEC-HD section on page 6 and get familiar with the programming procedures.   - Read the SETUP section on page 11.   - Configure the SEC-HD according to the type of equipment connected.   - Mark the changes in the Blank Program Tables in Appendix D.

STEP **5**

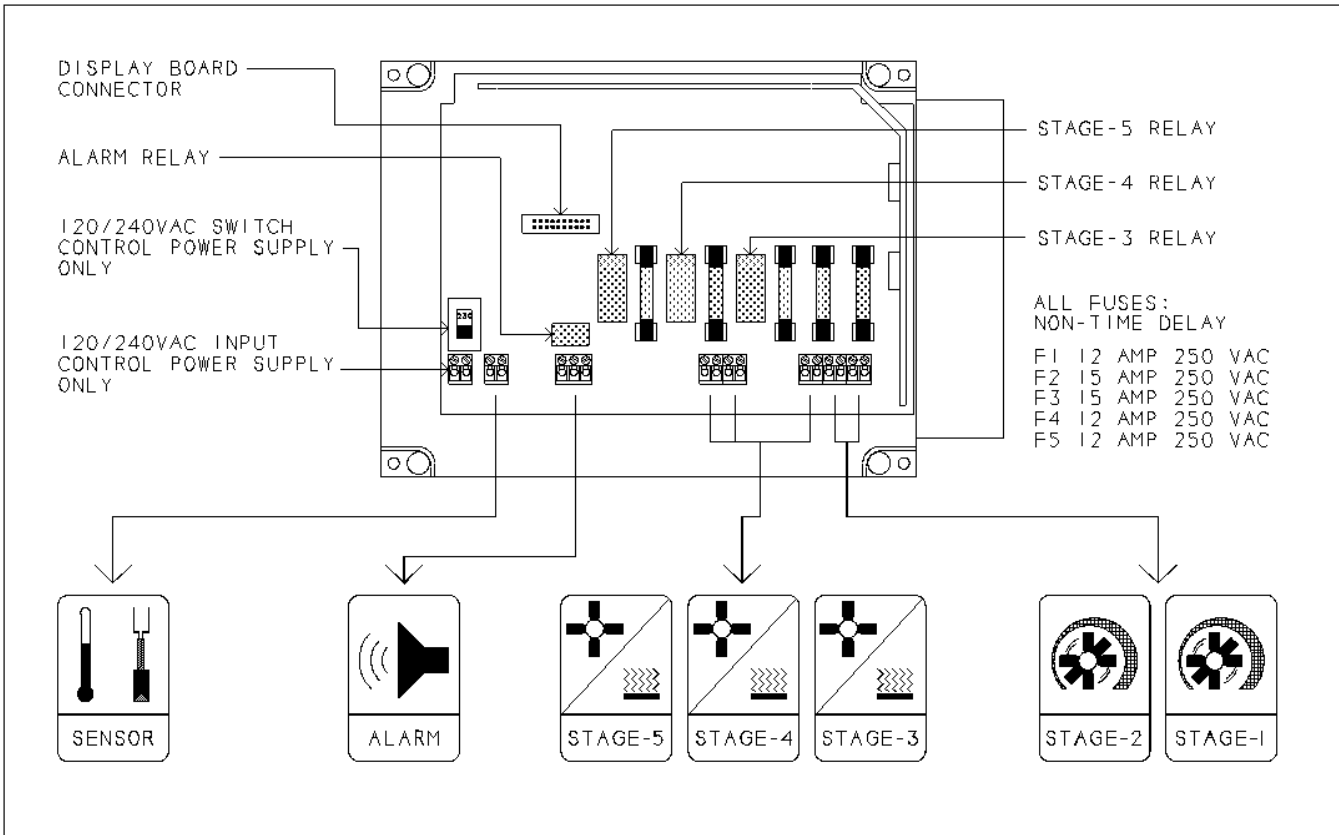| PUTTING CONTROL INTO SERVICE |
| --- |
| Read the SEC-HD OPERATION section on page 14. Select the most useful factory program, see page 20. Make changes to the program as desired, see page 9. Mark the changes in the Blank Program Tables in Appendix D. |

STEP **6**

METHODS OF USE
Read the METHODS OF USE section on page 21.

SEC-HD Electrical Ratings

| Variable stages	10 A at 120/230 VAC, general-purpose (resistive)
	7 FLA at 120/230 VAC, PSC motor
	1/2 HP at 120 VAC, 1 HP at 230 VAC, PSC motor
Variable stage fuses	15 A, 250 VAC ABC-type ceramic
Relays	6 A at 120/230 VAC, general-purpose (resistive)
	1/3 HP at 120 VAC, 1/2 HP at 230 VAC
	360 W tungsten at 120 VAC
Relay fuses	12 A, 250 VAC ABC-type ceramic
Alarm relay	0.4 A at 125 VAC; 2 A at 30 VDC, resistive load
	0.2 A at 125 VAC; 1 A at 30 VDC, inductive load

NOTE: This is not a wiring diagram. All wiring diagrams are located in Appendix A.

Equipment List

STAGE-1	**Variable Speed Stage 1**	Make and Model # of fan(s): Max. Total Current Draw of fan(s): Must not be greater than 10.0 amps. Operating Voltage:	_____ _____ _____
STAGE-2	**Variable Speed Stage 2**	Make and Model # of fan(s): Max. Total Current Draw of fan(s): Must not be greater than 10.0 amps. Operating Voltage:	_____ _____ _____
STAGE-3	**Cool / Heat Stage 3**	Make and Model # of fan/heater: Max. Total Current Draw: Operating Voltage:	_____ _____ _____
STAGE-4	**Cool / Heat Stage 4**	Make and Model # of fan/heater: Max. Total Current Draw: Operating Voltage:	_____ _____ _____
STAGE-5	**Cool / Heat Stage 5**	Make and Model # of fan/heater: Max. Total Current Draw: Operating Voltage:	_____ _____ _____
ALARM	**Alarm**	Alarm relay connected to:	_____

* A power contactor must be used if the maximum total current draw is greater than the maximum ratings of the relay. See the maximum ratings on page 4.

GETTING TO KNOW THE SEC-HD
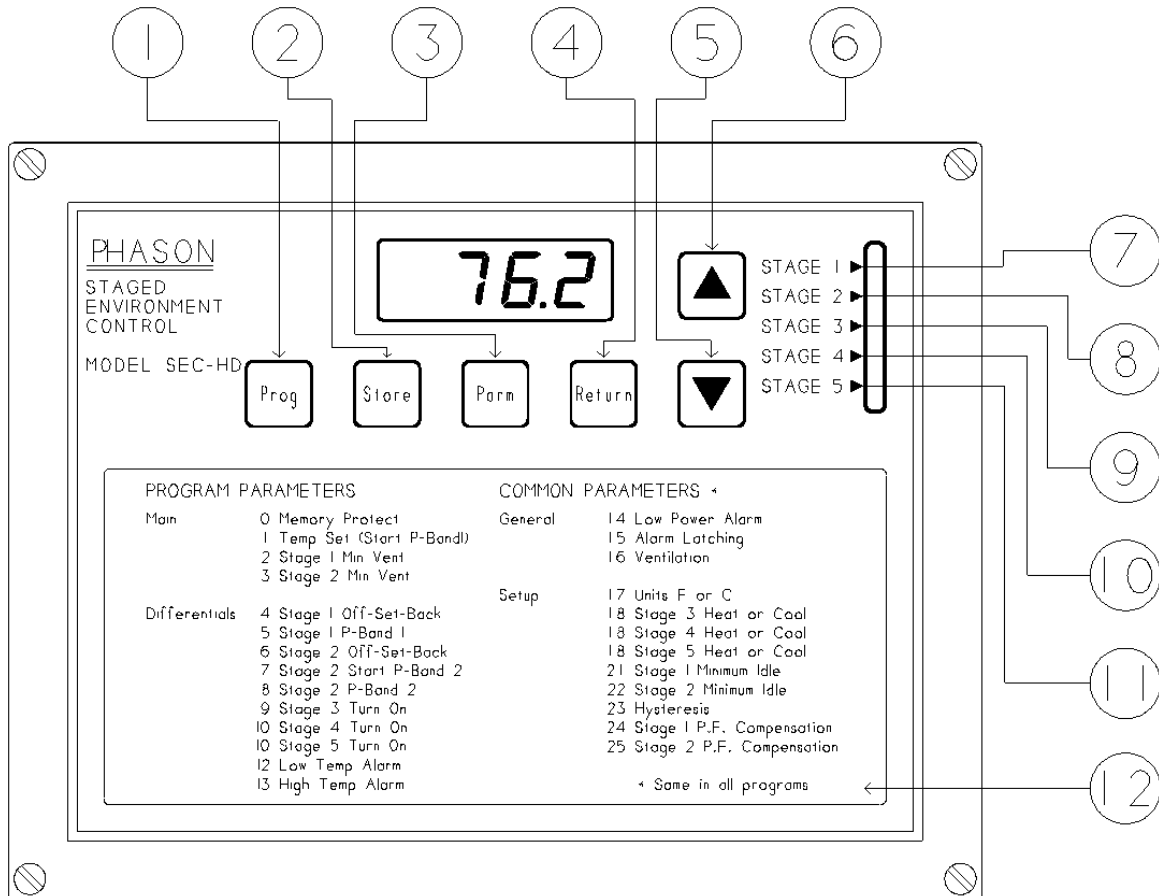
1) PROGRAM button - used to select the desired operating program.

2) STORE button - used to save selected programs and parameter settings in memory.

3) PARAMETER button - used to scroll through the parameter list.

4) RETURN button - used to bring the control back to normal operation.

5) DOWN button - used to adjust a parameter.

6) UP button - used to adjust a parameter.

7) STAGE 1 indicator light.

8) STAGE 2 indicator light.

9) STAGE 3 indicator light.

10) STAGE 4 indicator light.

11) STAGE 5 indicator light.

12) Complete parameter list.

Definition of Terms

NORMAL OPERATION   The SEC-HD is in normal operation when it is displaying room temperature. When alarms occur, the display will alternately flash the alarm signal and room temperature.

PROGRAMS   Programs consist of the Main, Differential, General and Setup parameters. The SEC-HD has seven programs which can be selected and reprogrammed by the user.

OPERATING PROGRAM   The SEC-HD operates according to the parameters in the operating program. Any one of the seven programs may be selected as the operating program.

PARAMETER LIST   The parameter list is shown on page 19, and is printed on the front of the SEC-HD control. It is a list of all the parameters that may be programmed by the user.

PARAMETERS   Parameters are the individual settings which may be programmed. Read the PARAMETER DESCRIPTIONS section on page 16 for an explanation of each of the parameter. There are four categories of parameters.

1) Main - The MAIN parameters control the main operation of the control.

2) Differential - These parameters are programmable differentials. They are the number of degrees above or below the temperature set point the particular stage starts or turns on.

3) General - GENERAL parameters are common to all programs. These parameters can have only one setting which is the same in all programs.

4) Setup - SETUP parameters control the overall operation of the unit. These parameters can have only one setting which is the same in all programs.

ADJUSTING THE SEC-HD

Selecting a New Operating Program

As livestock matures, often a change in the room climate is needed. The SEC-HD has seven different programs in memory for seven different climate settings. Any one of these programs can be the operating program. In order to change the operating program of the SEC-HD, follow the instructions below. For a list of the factory settings see Table 2, on page 20.

1) Press the **PROG** button once.

   The SEC-HD will display the current operating program, (one of A, b, C, d, E, F or g). The display will flash the program name and Pr.
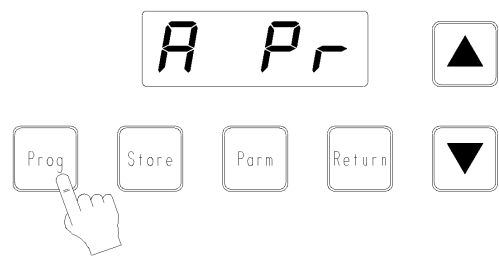
2) Press the **PROG** button a number of times until the desired program is displayed.

   By pressing the **PROG** button, the program names are displayed one after another. To change to a different operating program, press the **PROG** button until the proper program is displayed.
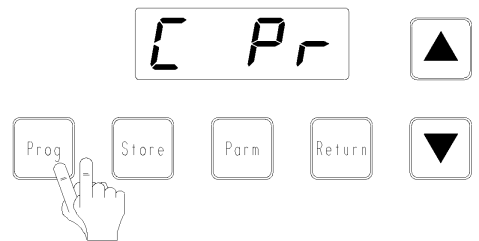
3) Press the **STORE** button to enter the desired program into memory.

   When the correct program is displayed, pressing the **STORE** button will tell the SEC-HD to use the selected Program as the operating program. After **Stor** is displayed, the SEC-HD returns to normal operation.

Changing Parameter Settings

Follow the steps below to view and/or edit the parameters in any program. After the parameters have been edited, the changes should be marked in the Blank Program Tables in Appendix D for future reference.

1) Press the **PROG** button until the program that you want to edit is displayed.

   The display will flash the program letter, (A to g) and Pr.

   ```
   A  Pr    ▲

   Prog  Store  Parm  Return  ▼
   ```
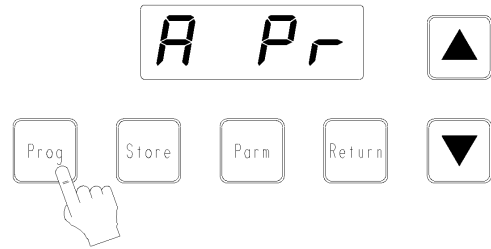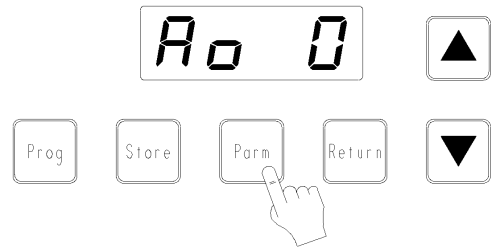
2) Press the **PARM** button once.

   The first (left most), digit shows the program letter that is being edited.

   The second digit indicates if the program is the operating program. An o means the program is the operating program, a blank means it is not the operating program.

   The two right most digits show the parameter number to be edited.

   ```
   Ao  0    ▲

   Prog  Store  Parm  Return  ▼
   ```

3) Press the **UP** or **DOWN** key to turn memory protect off.

   The display will show **Ao 0** and then **oFF** indicating memory protect has been turned off. The parameters can now be adjusted. If memory protect in not turned off, the parameters can only be viewed. Attempting to adjust the parameters while memory protect is on will result in an **Err** message being displayed.

   ```
   oFF    ▲

   Prog  Store  Parm  Return  ▼
   ```
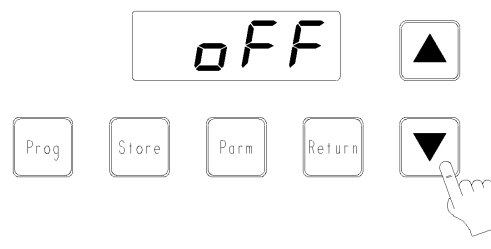
4) Press the **PARM** button to step through the parameter list until the desired parameter is reached.

    Refer to the front cover of the SEC-HD control or see Table 2 on page 20 for the parameter list.

$$Ao\ 12\quad \blacktriangle$$

Prog   Store   Parm   Return   ▼
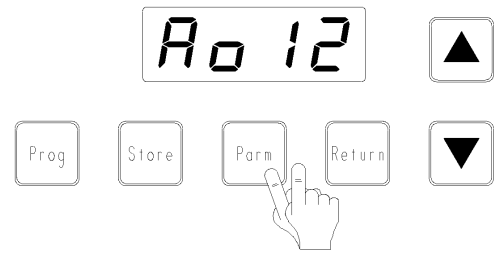
5) Use the **UP** / **DOWN** buttons to adjust the setting.

    The parameter can be adjusted to any value with in the parameter's range. The ranges can be found on page 19.

$$-\ \ \ 1.0\quad \blacktriangle$$

Prog   Store   Parm   Return   ▼
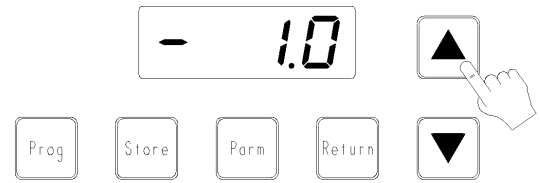
6) Press **STORE** to save the setting in memory.

    The display will show **Stor** for 1 second indicating the new setting has been stored in memory. If the **PARM** button is pressed before pressing **STORE** the next parameter will appear and the previous one will change back to its previous setting.

    Continue through the parameter list by pressing the **PARM** button and making changes to the settings where needed. Follow the same procedure shown in steps 4 to 6 above.

$$Stor\quad \blacktriangle$$

Prog   Store   Parm   Return   ▼

7) To return to normal operation (displaying of room temperature) at any time, press the **RETURN** button.

    When **RETURN** is pressed, memory protect is automatically turned back on. If a parameter has been changed but the value has not been stored, pressing **RETURN** will change the parameter's setting to the last stored setting and return the control to normal operation.

$$75.0\quad \blacktriangle$$

Prog   Store   Parm   Return   ▼

NOTE: If the SEC-HD is left displaying a parameter it will revert back to normal operation in 1 minute automatically. If **STORE** was not pressed the displayed parameter will change back to its previous value.

Setup Parameters

The setup parameters should be programmed when the installation has been completed to configure the SEC-HD, and then generally the parameters do not need to be reprogrammed. These parameters are different than the other parameters because they do not have a different setting for each program and can not be edited in the normal way. Each setup parameter setting is common to all programs. Follow the instructions below to change the setup parameters.

When the setup parameters have been programmed, the blank program table in Appendix D should be filled in with the new settings for future reference. It is important that the configuration decal, included with the SEC-HD, is marked correctly and affixed to the side of the SEC-HD when the setup parameters have been programmed. The configuration decal provides a handy reference when you need to check the mode of operation of the staged outputs.

To Edit the Setup Parameters

Press the PARM button once to enter the edit mode. If you wish to edit the setup parameters, you must turn off the memory protect now. See page 9 to turn off the memory protection.

Next, press the PROG and PARM buttons simultaneously to access the setup parameters. The Setup parameters can be adjusted as desired and stored in the same way the normal parameters can. After the setup parameters have been changed and stored, press the RETURN button to return to normal operation.
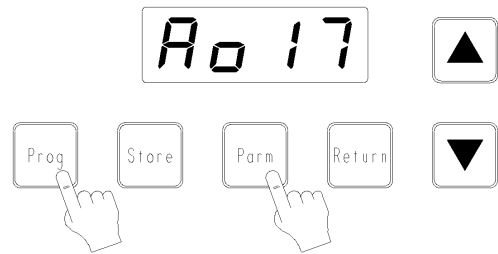
Programming Tips

Scrolling Backwards

When viewing or editing the parameters, sometimes it is helpful to scroll backwards through the parameter list. To do this, press the PARM and UP buttons simultaneously. Instead of the SEC-HD displaying the next parameter on the list, it will display the previous parameter.
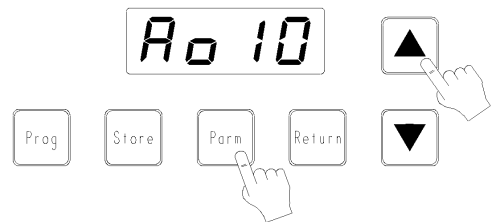
Selecting a Parameter to Edit

The parameters are stored in a table in memory which is similar to the Factory Program Table on page 20. Any parameter in any program can be edited when memory protection has been turned off. Follow these procedures when editing parameters to become more efficient.

To move down to the next parameter press the PARM button.

To move up or backwards to the previous parameter press the PARM and UP buttons simultaneously.

To move right press the PROG button until the desired program is displayed, then press the PARM button once to edit the same parameter number that was being edited before.

To Move	Button(s)
↓	PARM
↑	PARM and UP
→	PROG

An example where this method of programming is useful would be a situation where the temperature set point of each program needs to be changed. This could be done by turning off memory protection and changing the temperature set point in the operating program, (the operating program is displayed with an o and the program name). Then press the PROG button two times to edit the next program. Press the PARM button and edit the parameter. To continue to the next program press the PROG button two times again. Remember that STORE must be pressed after each change to save the new setting in memory.

Fast Editing

When editing the setting of a parameter by adjusting it up or down, hold down either button and then press the other one. This will change the setting ten times faster. If you want to increase the setting, hold down the UP button and then press the DOWN button. The setting will increase ten times faster. To decrease the setting ten times faster, hold down the DOWN button and then press the UP button.
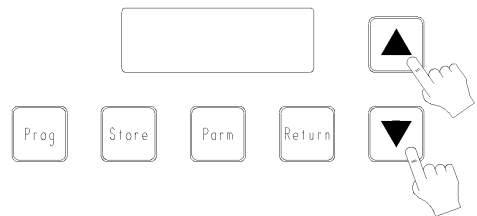
Reloading the Factory Programs

The factory programs can be reloaded if so desired, to replace the existing program. If the existing programs are not operating properly or need to be changed back to the original factory programs, follow the steps below to reload the factory programs.

When the factory programs are reloaded, the existing programs including the setup parameters will be replaced. The SEC-HD will begin with program A as the operating program. The parameters in all programs and most importantly the setup parameters will need to be reprogrammed for the equipment that is connected. Pay close attention to the setup parameters for stages 3, 4 and 5.

1) Turn off the power to the SEC-HD.

2) Hold down the PROG and STORE buttons.

3) While holding the buttons down, turn the power back on. The display will flash Stor for two seconds and then the SEC-HD will be in the normal operating mode, displaying the room temperature and a power failure alarm.
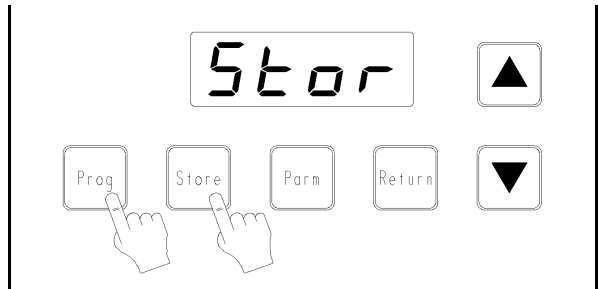
SEC-HD OPERATION

Figure 2 shows the operation of each stage of the SEC-HD. This particular diagram shows the temperatures at which the stages would turn on and off if the SEC-HD was operating according to the factory settings in program A. Some settings are listed here but the entire factory program table can be found on page 20. The circled numbers in the diagram correspond to the parameter numbers. Use these numbers to cross reference the parameters in the diagram to their descriptions. All stages except the low temperature and high temperature alarms have a programmable hysteresis, parameter # 23.

PARAMETER SETTINGS		
1	Temp Set (Start P-Band 1)	85.0°F
2	Stage 1 Min Vent	20%
3	Stage 2 Min Vent	20%
4	Stage 1 OSB	-3.0
5	Stage 1 P-Band 1	2.0
6	Stage 2 OSB	0.0
7	Stage 2 Start P-Band 2	2.0
8	Stage 2 P-Band	2.0
9	Stage 3 Turn On	5.0
10	Stage 4 Turn On	7.0
11	Stage 5 Turn On	-1.0
12	Low Temp Alarm	-3.0
13	High Temp Alarm	10.0

NOTE: When the variable speed stages turn on, they will run full speed for three seconds and then decrease to the required speed.

EXAMPLE

As an example, say the temperature is 75°F and rising. At this point Stage 5 (heat) and the Low Temp Alarm will be on. When the temperature rises to 82, the Low Temp Alarm will turn off and the Stage 1 fan will turn on. The Stage 1 fan will run at full speed for three seconds and then slow down to the Minimum Ventilation setting.

When the temperature reaches 84, Stage 5 (heat) will turn off. At 85 the Stage 1 P-Band begins. While the temperature rises in the P-Band, the Stage 1 fan will increase in speed. At 87 Stage 1 will be at full speed.

When the temperature rises to 88 the Stage 2 P-Band begins. Since the Stage 2 fan has been off until now, it will run full speed for three seconds and then slow down to the required speed. As the temperature rises, the Stage 2 fan will increase in speed. At 90 the Stage 2 fan will be at full speed.

At 90 Stage 3 (cool) will turn on.

At 92 Stage 4 (cool) will turn on.

When the temperature rises to 95 the High Temp Alarm will turn on.
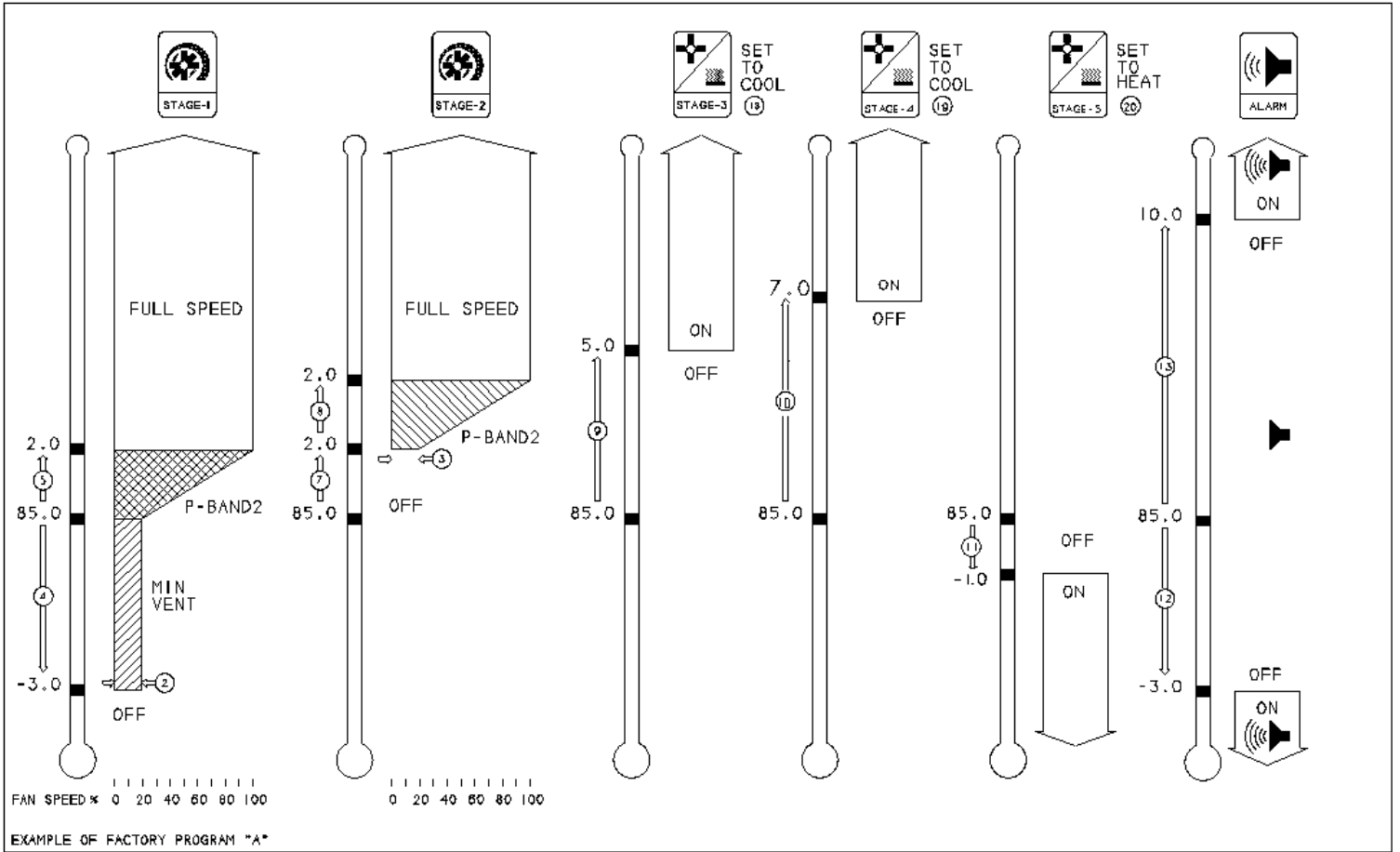
Figure 2 SEC-HD Operation diagram. Circled numbers correspond to the parameter numbers.

Parameter Descriptions

<u>Main Parameters</u>

0   **MEMORY PROTECT** [On/Off] - ensures parameters are not changed by accident. Memory protect must be turned off every time the parameters are edited. The memory protect parameter can not be stored and is turned on automatically when the control is returned to normal operation.

1   **TEMPERATURE SET (Start P-Band 1)** [32.0 - 110.0^{o}F, 0.0 - 43.3^{o}C] - is the target room temperature. All differentials and alarms are referenced to this setting. It is the starting point of the Stage 1 P-Band1 (parameter #5).

2   **STAGE 1 MINIMUM VENTILATION** [Minimum Idle (#21) - 99] - is the idle speed in % of full power at which the Stage 1 fan will idle at. It cannot be adjusted below the setting of the Minimum Idle (#21) parameter.

3   **STAGE 2 MINIMUM VENTILATION** [Minimum Idle (#22) - 99] - is the idle speed in % of full power at which the Stage 2 fan will idle at. It cannot be adjusted below the setting of the Minimum Idle (#22) parameter.

<u>Differentials</u>

4   **STAGE 1 OFF-SET-BACK** [IDLE, -20.0 - 0.0^{o}F, -11.1 - 0.0^{o}C] - is a range of degrees below the temp set where the Stage 1 fan will be at idle speed, and below this range the fan will be off. Idle means the fan will run at the Min Vent setting at all temperatures below the temp set. If Temp Set (#1), is set to 80°F and Stage 1 Off-Set-Back (#4), is set at -8°F the fan will idle when the temperature is between 80°F and 72°F, and will be off below 72°F.

5   **STAGE 1 P-BAND1** [0.0 - 16.0^{o}F, 0.0 - 8.9^{o}C] - The proportional band is a range of degrees above the Temp Set where the Stage 1 fan increases in speed proportionally to the temperature. If Temp Set (#1), is set to 80°F and Stage 1 P-Band1 (#5), is set at 5°F the variable speed fan will start to increase speed at 80°F and will be at full speed at 85°F.

6   **STAGE 2 OFF-SET-BACK** [IDLE, -20.0 - 0.0^{o}F, -11.1 - 0.0^{o}C] - is a range of degrees below the Stage 2 Start P-Band2 (#7) where the Stage 2 fan will be at idle speed, and below this range the fan will be off. Idle means the fan will run at the Min Vent setting at all temperatures below Stage 2 Start P-Band2 (#7). If Temp Set (#1), is set to 80°F, Stage 2 Start P-Band2 (#7), is set to 10°F and Stage 2 Off-Set-Back (#6), is set at -3°F, the Stage 2 fan will idle between 90°F and 87°F and will be off below 87°F.

7   **STAGE 2 START P-BAND2** [-10.0 - 15.0^{o}F, -5.5 - 8.4^{o}C, OFF] - is the number of degrees above or below the Temp Set at which the Stage 2 proportional band starts. All Stage 2 differentials are with respect to this setting. If the Temp Set (#1), is 80°F and this parameter (#7), is set to 10°F, the Stage 2 fan will turn on at 90°F.

8   **STAGE 2 P-BAND2** [0.0 - 16.0^{o}F, 0.0 - 8.9^{o}C] - The proportional band is a range of degrees above the Stage 2 Start P-Band2 where the Stage 2 fan will increase in speed proportionally to the temperature. If Temp Set (#1), is set to 80°F, Stage 2 Start P-Band2 (#7), is set to 10°F and Stage 2 P-Band2 (#8), is set at 5°F, the Stage 2 variable speed fan will start to increase speed at 90°F and will be at full speed at 95°F.

9 **STAGE 3 TURN ON** [-10.0 - 15.0^{o}F, -5.5 - 8.4^{o}C, OFF] - The number of degrees above or below the Temp Set at which Stage 3 will turn on. If the Temp Set (#1), is set to 80°F and On Stage 3 (#9), is set to 5°F, Stage 3 will turn on at 85°F. The Stage 3 Operation (#18) parameter regulates what mode Stage 3 operates as, heat or cool.

10 **STAGE 4 TURN ON** [-10.0 - 15.0^{o}F, -5.5 - 8.4^{o}C, OFF] - The number of degrees above or below the Temp Set at which Stage 4 will turn on. If the Temp Set (#1), is set to 80°F and On Stage 4 (#10), is set to 10°F, Stage 4 will turn on at 90°F. The Stage 4 Operation (#19) parameter regulates what mode Stage 4 operates as, heat or cool.

11 **STAGE 5 TURN ON** [-10.0 - 15.0^{o}F, -5.5 - 8.4^{o}C, OFF] - The number of degrees above or below the Temp Set at which Stage 5 will turn on. If the Temp Set (#1), is set to 80°F and On Stage 5 (#11), is set to -5°F, Stage 5 will turn on at 75°F. The Stage 5 Operation (#20) parameter regulates what mode Stage 5 operates as, heat or cool.

12 **LOW TEMPERATURE ALARM** [OFF, -36.0 - 0.0^{o}F, -20.0 - 0.0^{o}C] - The number of degrees below the Temp Set that a low temperature alarm will be generated, (A Lt). This alarm may be disabled by adjusting it to OFF.

13 **HIGH TEMPERATURE ALARM** [0.0 - 36.0^{o}F, 0.0 - 20.0^{o}C, OFF] - The number of degrees above the Temp Set that a high temperature alarm will be generated, (A Ht). This alarm may be disabled by adjusting it to OFF.

General Parameters

General parameters have one setting common to all programs. When they are changed in one program, they change in all programs.

14 **LOW POWER ALARM** [ON - OFF] - When the line voltage drops below the proper operating level, a low power alarm will be displayed (A LP). This alarm may be disabled by adjusting it to OFF. When disabled, the display will still flash A LP but the alarm relay will not activate.

15 **LATCHING ALARMS** [ON - OFF] - When this parameter is turned ON, all alarms will be displayed on the SEC-HD and will continue to flash after the alarm condition is gone. They can be reset by pressing the RETURN button. This feature is useful to keep track of the alarms that occur during times when the control is not being supervised. For example; in the morning, the SEC-HD could be checked for alarms that occurred during the night and then the alarms could be cleared. If this parameter is turned OFF, the display will only show the alarm when the condition is present. When the alarm condition is gone, the alarm will no longer be displayed.

16 **VENTILATION** [ON - OFF] - When this parameter is turned OFF, the variable speed outputs and cooling stages are turned off completely and all alarms will not be displayed. The heating stages are not affected. Ventilation may be turned OFF when a room is vacant to conserve energy. When it is turned OFF the SEC-HD will display VoFF. DO NOT use this to shut down fans to work on the wiring - ensure the breakers are turned off.

Setup

The setup parameters are common to all programs and can only have one setting. They can not be accessed by the same procedure as the normal parameters. This has been done to protect these parameters from accidentally being changed. Follow the instructions on page 11 to reprogram these parameters.

17 **TEMPERATURE UNITS** [^{o}F - ^{o}C] - This parameter programs the SEC-HD to display the temperature in Fahrenheit or Celsius.

18 **STAGE 3 OPERATION** [HEAT - COOL] - This parameter programs the Stage 3 output to operate as a heating stage or a cooling stage. When it is set to HEAT, the stage will be on below the Stage 3 Turn On (parameter #9). If it is set to COOL, the stage will be on above the Stage 3 Turn On (#9).

19 **STAGE 4 OPERATION** [HEAT - COOL] - This parameter programs the Stage 4 output to operate as a heating stage or a cooling stage. When it is set to HEAT, the stage will be on below the Stage 4 Turn On (parameter #10). If it is set to COOL, the stage will be on above the Stage 4 Turn On (#10).

20 **STAGE 5 OPERATION** [HEAT - COOL] - This parameter programs the Stage 5 output to operate as a heating stage or a cooling stage. When it is set to HEAT, the stage will be on below the Stage 5 Turn On (parameter #11). If it is set to COOL, the stage will be on above the Stage 5 Turn On (#11).

21 **STAGE 1 MINIMUM IDLE** [0 - 99] - This is the minimum idle preset in percent of full speed. The Stage 1 Min Vent (#2) can not be adjusted below this setting. If it is programmed to 20 the Stage 1 Min Vent (#2) parameter can not be adjusted below 20. It is recommended that this parameter be programmed to correspond to the lowest speed at which the motor can safely operate.

22 **STAGE 2 MINIMUM IDLE** [0 - 99] - This is the minimum idle preset in percent of full speed. The Stage 2 Min Vent (#3) can not be adjusted below this setting. If it is programmed to 20 the Stage 2 Min Vent (#3) parameter can not be adjusted below 20. It is recommended that this parameter be programmed to correspond to the lowest speed at which the motor can safely operate.

23 **HYSTERESIS** [0.5 - 2.5^{o}F, 0.3 - 1.4^{o}C] - This is the number of degrees of difference between the turn-on point and turn-off point for all stages. It is the number of degrees above the turn-on point that a heating stage will turn off, and the number of degrees below the turn-on point that a cooling stage will turn off.

24 **STAGE 1 POWER FACTOR COMPENSATION** [0.5 - 2.5] - This is set at the factory to 1.0 and should only be adjusted if the Stage 1 variable speed fan does not operate properly with the SEC-HD.

25 **STAGE 2 POWER FACTOR COMPENSATION** [0.5 - 2.5] - This is set at the factory to 1.0 and should only be adjusted if the Stage 2 variable speed fan does not operate properly with the SEC-HD.

Parameter Ranges

#	PARAMETERS	RANGES	
	MAIN	°F	°C
0	Memory Protect	ON / OFF	
1	Temp Set (Start P-Band1)	32.0 to 110.0	0.0 to 43.3
2	Stage 1 Min Vent	Min Idle (parm #21) - 99	
3	Stage 2 Min Vent	Min Idle (parm #22) - 99	
	DIFFERENTIAL		
4	Stage 1 Off-Set-Back	IDLE, -20.0 to 0.0	IDLE, -11.1 to 0.0
5	Stage 1 P-Band1	0.0 to 16.0	0.0 to 8.9
6	Stage 2 Off-Set-Back	IDLE, -20.0 to 0.0	IDLE, -11.1 to 0.0
7	Stage 2 Start P-Band2	-10.0 to 15.0, OFF	-5.5 to 8.4, OFF
8	Stage 2 P-Band2	0.0 to 16.0	0.0 to 8.9
9	Stage 3 Turn On	-10.0 to 15.0, OFF	-5.5 to 8.4, OFF
10	Stage 4 Turn On	-10.0 to 15.0, OFF	-5.5 to 8.4, OFF
11	Stage 5 Turn On	-10.0 to 15.0, OFF	-5.5 to 8.4, OFF
12	Low Temp Alarm	OFF, -36.0 to 0.0	OFF, -20.0 to 0.0
13	High Temp Alarm	0.0 to 36.0, OFF	0.0 to 20.0, OFF
	GENERAL		
14	Low Power Alarm	ON / OFF	
15	Alarm Display Latching	ON / OFF	
16	Ventilation	ON / OFF	
	SETUP		
17	Units °F or °C	°F / °C	
18	Stage 3 Operation	HEAT / COOL	
19	Stage 4 Operation	HEAT / COOL	
20	Stage 5 Operation	HEAT / COOL	
21	Stage 1 Minimum Idle	0 to 99	
22	Stage 2 Minimum Idle	0 to 99	
23	Hysteresis	0.5 to 2.5	0.3 to 1.4
24	Stage 1 P.F. Compensation	0.5 to 2.5	
25	Stage 2 P.F. Compensation	0.5 to 2.5	

Table 1 Adjustable ranges of the parameters.

Factory Programs

The SEC-HD is programmed with the factory settings as shown below. See the ADJUSTING THE SEC-HD section for instructions to change the operating program. Select the most useful program and make changes where it is necessary.

#	PARAMETERS	PROGRAM NAMES						
		A	b	C	d	E	F	g
	MAIN							
1	Temp Set (Start P-Band1)	85.0	80.0	75.0	70.0	65.0	65.0	65.0
2	Stage 1 Min Vent	20	20	20	20	20	20	20
3	Stage 2 Min Vent	20	20	20	20	20	20	20
	DIFFERENTIAL							
4	Stage 1 Off-Set-Back	-3.0	-3.0	-4.0	-5.0	-5.0	-5.0	-5.0
5	Stage 1 P-Band1	2.0	2.0	2.5	3.0	3.0	3.0	3.0
6	Stage 2 Off-Set-Back	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Stage 2 Start P-Band2	2.0	2.0	2.5	3.0	3.0	3.0	3.0
8	Stage 2 P-Band2	2.0	2.0	2.5	3.0	3.0	3.0	3.0
9	Stage 3 Turn On (Cool)	5.0	5.0	6.0	7.0	7.0	7.0	7.0
10	Stage 4 Turn On (Cool)	7.0	7.0	8.0	9.0	9.0	9.0	9.0
11	Stage 5 Turn On (Heat)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
12	Low Temp Alarm	-3.0	-4.0	-5.0	-5.0	-5.0	-5.0	-5.0
13	High Temp Alarm	10.0	10.0	12.0	15.0	15.0	15.0	15.0
	GENERAL							
14	Low Power Alarm	ON						
15	Alarm Display Latching	ON						
16	Ventilation	ON						
	SETUP							
17	Units ^oF or ^oC	^oF						
18	Stage 3 Operation	COOL						
19	Stage 4 Operation	COOL						
20	Stage 5 Operation	HEAT						
21	Stage 1 Minimum Idle	20						
22	Stage 2 Minimum Idle	20						
23	Hysteresis	0.5						
24	Stage 1 P.F. Compensation	1.0						
25	Stage 2 P.F. Compensation	1.0						

Table 2 Factory Programs

METHODS OF USE

The SEC-HD has seven programs which can be selected as the operating program. To take advantage of the programs, adjust them for different climate settings. They can be used for different kinds of livestock or used at different stages of maturity of the particular livestock. Time is saved by simply changing the program, instead of adjusting every parameter. Remember to mark all changes to the programs in the Blank Program Tables in Appendix D to keep track of the settings.

ALARM MESSAGES

ALARM	DESCRIPTION
Err	**Err**or - an incorrect key has been pressed
$A\ Ht$	**A**larm **H**igh **T**emperature - temperature is above the high temp alarm setting
$A\ Lt$	**A**larm **L**ow **T**emperature - temperature is below the low temp alarm setting
$A\ LP$	**A**larm **L**ow **P**ower - the line voltage is low
$A\ Pd$	**A**larm **P**robe **D**isconnect - the temperature sensor is disconnected
$A\ PS$	**A**larm **P**robe **S**hort - The temperature sensor is short circuited
$A\ PF$	**A**larm **P**ower **F**ailure - the power has been interrupted
$A\ IE$	**A**larm **I**nternal **E**rror - indicates an internal error has occurred
$UoFF$	**V**entilation **Off** - ventilation has been turned off in the program

Reasons For Alarms To Activate

Err
The Err message appears when an incorrect key has been pressed or if an attempt has been made to change a parameter while memory protect is on. The Err message will appear for 2 seconds and then disappear.

$A\ Ht$
The high temperature alarm appears when the room temperature is above the high temperature alarm setting (parameter #13). Check if the fans are operating properly. This alarm may occur on very hot days when the desired room temperature can not be maintained.

$A\ Lt$
The low temperature alarm appears when the room temperature is below the low temperature alarm setting (parameter #12). Check if the heater is operating properly.

$A\ LP$
The low power alarm turns on when the line voltage drops below 190 for 230 VAC operation or below 95 for 120 VAC operation. This indicates a problem with the electrical service of the building. The control may operate erratically if the voltage drops below these levels.

`A Pd` This indicates the temperature sensor is disconnected. The sensor wire may be broken or damaged somewhere.

`A PS` This alarm indicates the temperature sensor is short circuited. The sensor or wire may be damaged somewhere.

NOTE: When a A Pd or a A PS alarm occurs, the heating and cooling stages will turn off and the variable stages will run at idle speed.

`A PF` The Power Failure alarm appears when there has been an interruption in the power. The control will continue to operate normally and the alarm can be cleared by pressing the RETURN button.

`A IE` When this alarm appears it indicates an internal error has occurred. To clear this alarm check through the parameters; adjust and store the ones that are incorrect. Next, turn the power off and then back on and the alarm will be cleared. NOTE: A parameter must be changed and stored and the power turned off and on before the alarm will be cleared. Another way to clear the alarm is downloading the factory programs. This will reset all the parameters to the factory settings and then they must be programmed to the desired settings again. Consult your dealer or Phason for information to prevent this problem from happening again.

`UoFF` VoFF is displayed when VENTILATION (parameter #16), is turned OFF. When this is displayed, the variable speed stages and the cooling stages will be turned off. The heating stage(s) will operate normally.

CARE AND MAINTENANCE

Moisture will not cause a problem with the control if the proper care is taken in installation. The control's enclosure is made of fire retardant plastic and is sealed with a rubber gasket. The sensor entry is sealed with a liquid tight cable connector.

Caution should be taken when washing the room with a high pressure washer. **DO NOT** direct a high pressure washer at the control. In order to clean the control, wipe it with a damp cloth.

 Be sure power is off before cleaning to avoid electrical shock.

MAINTENANCE

1) To prevent damage to the control, after the first two weeks of operation remove the cover from the unit and check for moisture inside. Be sure to turn off the power to the control before opening the cover.

2) If moisture is present, wipe it out with a dry cloth and check the cable entry points and rubber gasket for proper sealing.

3) If the cable connectors are not sealing, apply RTV or Silicon II sealant around the cable.
    WARNING: If a sealant is used, be aware that some silicone sealants release acetic acid while curing. This can cause corrosion damage to the control. Let silicone cure completely (one to three days), before closing the control or the control may be damaged and the warranty will be VOID.

4) Check the control again after two weeks to verify that it is properly sealed.

The control should be opened and inspected once a year for moisture. Proper care and maintenance will extend the life of the control.

POWER FACTOR CORRECTION

Adjusting the P-Band to correct for a particular power factor may improve your ventilation system's performance. Power factor correction is generally unnecessary and there is no danger of damage being done to the control or motor if it is not done. As a result of different power factors between the many makes and models of fan motors, the actual P-Band may be less then the P-Band setting displayed by the control.

If the power factor of the motor is available, use the chart of correction numbers, (listed in the table below), and CALC 1 below to calculate the P-Band setting required in order to get the desired P-Band. A power factor of 0.8 or greater will cause an insignificant change to the P-Band and does not need to be corrected.

CALC 1: P-BAND SETTING = DESIRED P-BAND x CORRECTION NUMBER

Example 1: To have a 6°F P-Band with a motor which has a power factor of 0.7, set the P-Band to 7.5^{o}F. ie. 6°F x 1.25 = 7.5^{o}F

POWER FACTOR	CORRECTION NUMBERS
1.0	1.00
0.9	1.05
0.8	1.10
0.7	1.25
0.6	1.33
0.5	1.60

Table 4

If the power factor is not known the correction number may be measured. Follow the steps below.

1) Set the Minimum Ventilation parameters, (# 2 and 3) to the desired value.

2) Set the P-Band(s) to 10°F, parameters # 5 and 8.

3) Observe the ROOM TEMPERATURE.

4) Adjust the TEMP SET, (parameter # 1) to equal the ROOM TEMPERATURE and Stage 2 Start P-Band2, (parameter # 7) to 0. Now, the Stage 1 and Stage 2 fans will be running just above minimum ventilation.

5) Slowly decrease the TEMP SET, (parameter # 1) and listen to the fans increase in speed.

6) Observe the TEMP SET, (**FULL SPEED TEMP SET**) at which the motors reach full speed.

7) Calculate the Correction number for the motors as follows:

CALC 2:

$$\frac{10^oF}{\text{FULL SPEED TEMP SET - ROOM TEMPERATURE}} = \text{Correction number}$$

Example 2: **ROOM TEMP** = 75°F and **FULL SPEED TEMP SET** = 82°F

Correction Number = $\dfrac{10^oF}{82^oF - 75^oF}$ = 1.43   Now use CALC 1 above to find the P-Band setting.

APPENDIX A - WIRING DIAGRAMS

CONTENTS

INSTALLATION OVERVIEW

TEMP SENSOR See pages 31 and 32	ALARM RELAY See page 33	HEAT / COOL STAGES See pages 34 and 35	VARIABLE SPEED STAGES See page 36

Wiring diagrams and instructions for the different stages are located on the pages listed above. First read the General Warnings and Mounting Instructions sections, then follow the diagrams for each stage.

GENERAL WARNINGS

BE SURE POWER IS OFF BEFORE DOING ANY WIRING.
The SEC-HD should be installed by a qualified electrician. It's
Install all equipment according to the applicable local electrical codes.

Most variable speed fan motors draw more current at fractional speeds than at full speed. Fan motor specifications show current draw at full speed. The increase in current draw may be as much as two times the rated current. Current over 10.0 Amps will cause overheating and eventual failure of the SEC-HD. Please check current requirements for the fan motor by either measuring current draw at all speeds from idle to full speed or consult the dealer for information on the particular fan.

CAUTION: Only permanent split capacitor motors appropriate for variable speed control, or shaded pole motors, can be used on the variable stages.

ATTENTION: Seulement moteurs du condensateur fendus permanents approprient pour contrôle de la vitesse variable ou ont ombragé des moteurs de la perche, peut être utilisé sur les étapes variables.

DO NOT mount power contactors inside the SEC-HD enclosure. Power contactors create electrical noise which may cause the SEC-HD to work improperly.

Warning: Phason controls are designed and manufactured to provide reliable performance, but they are not guaranteed to be 100% free of defects. Even reliable products may experience occasional failures, and this possibility should be recognized by the user. If Phason products are used in a life support ventilation system where failure could result in loss or injury, the user should provide adequate back-up ventilation, supplementary natural ventilation or an independent failure alarm system. The user's lack of such precautions acknowledges their willingness to accept the risk of such loss or injury.

Electrical noise varies according to the type of equipment installed, the wiring layout and many other factors. It's effects are not apparent in most installations but over time it can cause degradation of electronic circuits and of relays and power contactors. These transients can cause unreliable operation of your equipment if they are not properly controlled. A false 'A PF' alarm is due to electrical noise caused by high voltage transients in certain installations. Therefore, snubbing filters must be installed on all inductive loads for installations of this type. The filters must be connected in parallel with the load so the snubbing filter may absorb the transient energy.

PHASON has snubbing filters available.

MOUNTING INSTRUCTIONS

To mount the SEC-HD, remove the four screws in the front cover and lift off the cover. The cover can be unplugged from the bottom to make wiring easier. Mount the box to the wall with the four wood screws provided with the control. Insert the screws into the large holes in each corner of the box and tighten.

Use the knockouts provided at the bottom of the enclosure for mounting cable connectors. DO NOT make additional holes in the enclosure. This should not be done and will void the warranty! All wires should enter the enclosure through the electrical-knockout holes provided and all grounds should be connected to the ground plate. When installing a control, close attention should be taken to route the wires, inside the control, away from the control's electronics so that wires are not draped across the components which may result in a part being broken or damaged which will affect the reliability of your control.

DO NOT mount the bottom enclosure rotated 180° which places the electric-knockouts at the top of the enclosure. When this is done corrosion causing moisture is more likely to enter the control and wiring will be prone to contact with the electronic circuitry which may cause damage to components as stated above.

GROUNDING AND SEALING

A - Connect all ground wires to ground studs.

B - Use 3/4" liquid tight wire connectors for large holes.

C - Use 1/2" liquid tight wire connectors for small holes.

D - Use RTV silicone or Silicon II sealant to seal cable entry points if liquid tight wire connectors are not used.

If silicone is used, be aware that some silicone sealants release acetic acid while curing. This can cause corrosion damage to the control. Let the silicone cure completely (1 to 3 days), before closing the control or the control may be damaged and the warranty VOID.
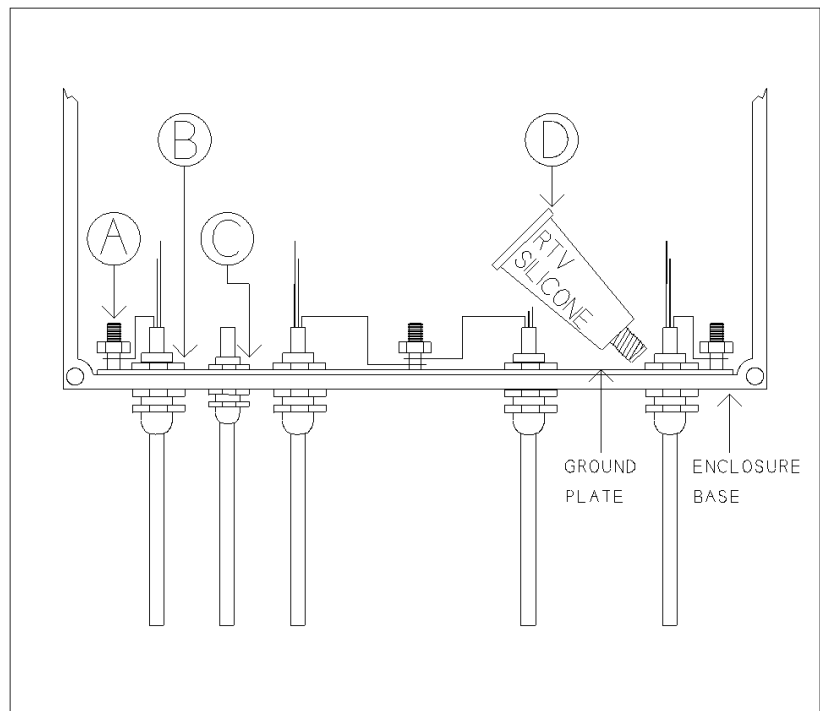
230 VAC CONTROL POWER

Connect power to terminals 1 and 2.

A) Set switch to 230 VAC position.

See page 37, for instructions for connecting the SEC-HD to three phase power.
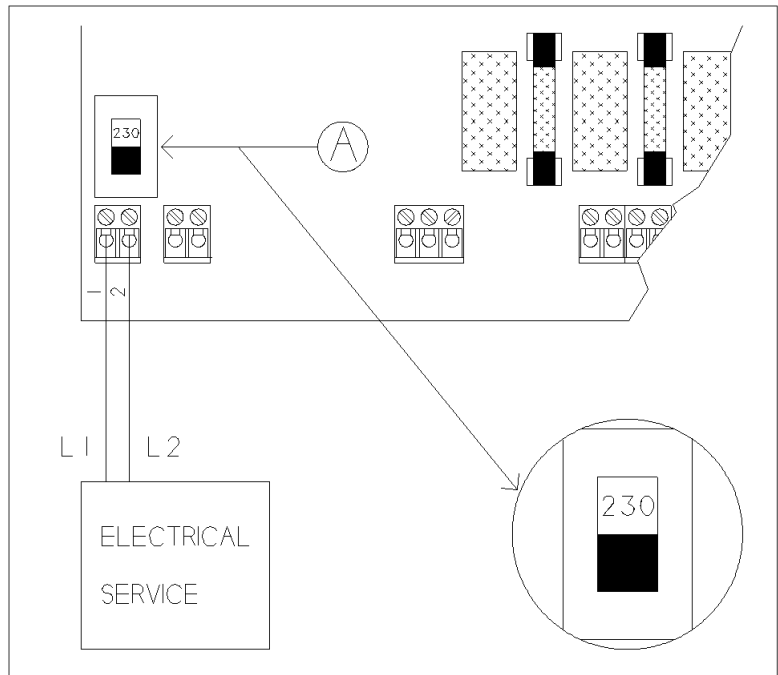
120 VAC CONTROL POWER

Connect power to terminals 1 and 2.

A) Set switch to 115 VAC position.
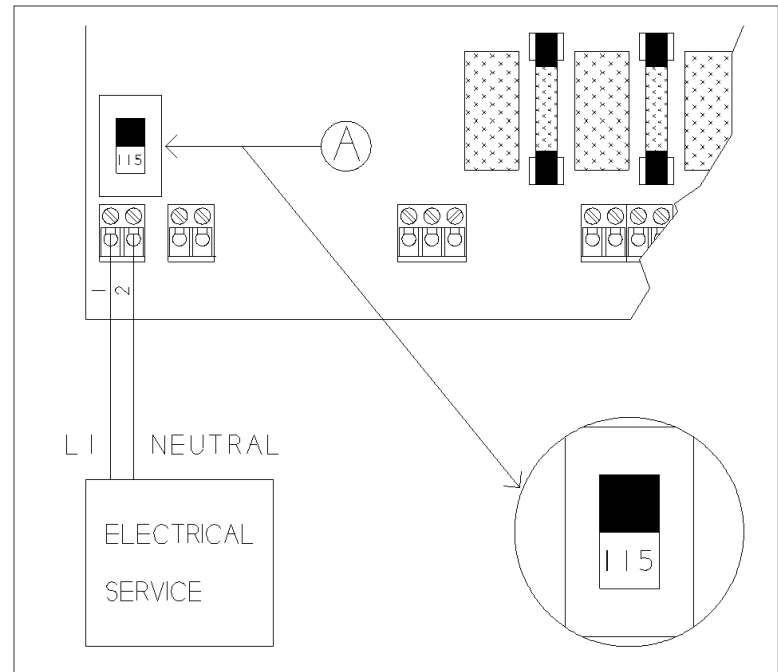
TEMPERATURE SENSOR
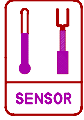
Connect sensor to terminals 4 and 5.

A) The temperature sensor can be extended if so desired. An extended sensor can be ordered from PHASON. To manually extend the sensor, follow the instructions on page 32.

When installing the extended sensor, do not run the cable next to other power cables and when crossing over other cables, run the sensor perpendicular to them.
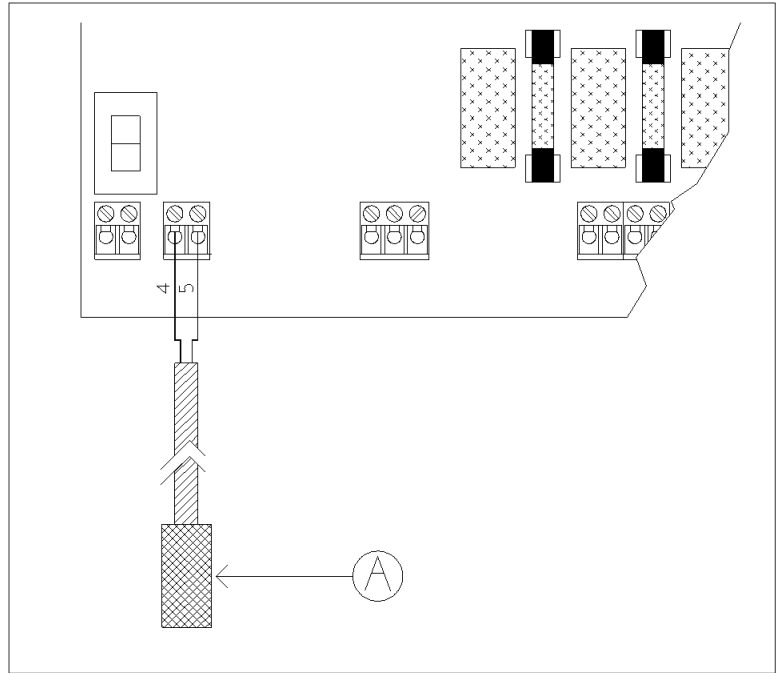
4 ZONE AVERAGING
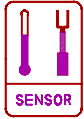
Connect sensor to terminals 4 and 5.

The SEC-HD is capable of monitoring the temperature in four areas and operating according to the average. To take advantage of this option, you must connect four temperature sensors to the unit.

A) The SEC-HD can operate with one or four probes connected.
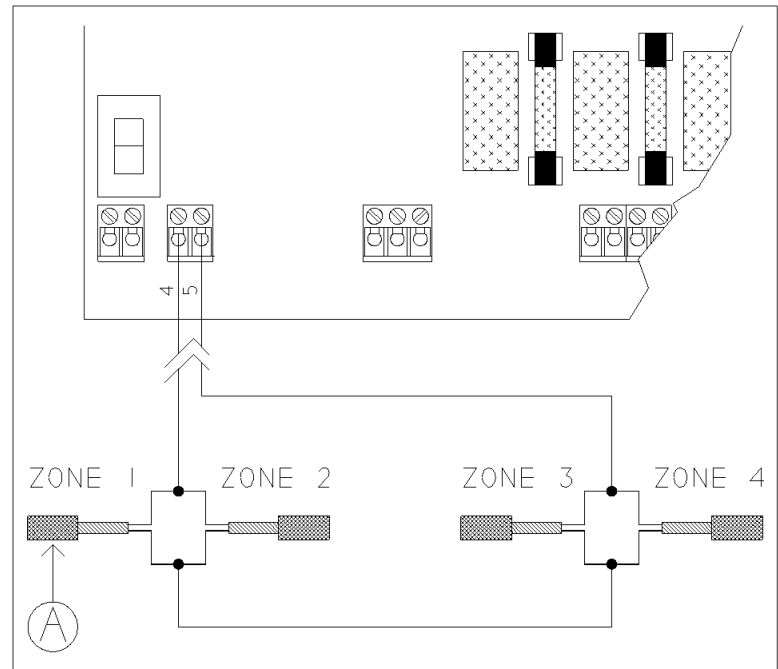
MANUALLY EXTENDING SENSOR
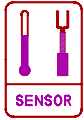
To extend the sensor, use 2 wire 18 or 20 AWG jacketed cable. To splice two wires together follow the steps below and refer to the diagram.

A) Slide pieces of heat shrink tubing on the wire ends as shown.

B) Strip the ends of wire and twist together.

C) Using a soldering iron and solder, connect the twisted wire ends together.

D) Slide the heat shrink tubing over the soldered connection.

E) Heat tubing with a hot air gun (paint stripper).

F) When finished, the splice should be completely sealed.

NOTE: If the unit operates erratically with the extended sensor, try running the extended sensor on a different path or shortening it. Check to be sure that the sensor cable is not run alongside other electrical wires or near electrical equipment. When crossing electrical wires, it is best to cross at 90°.
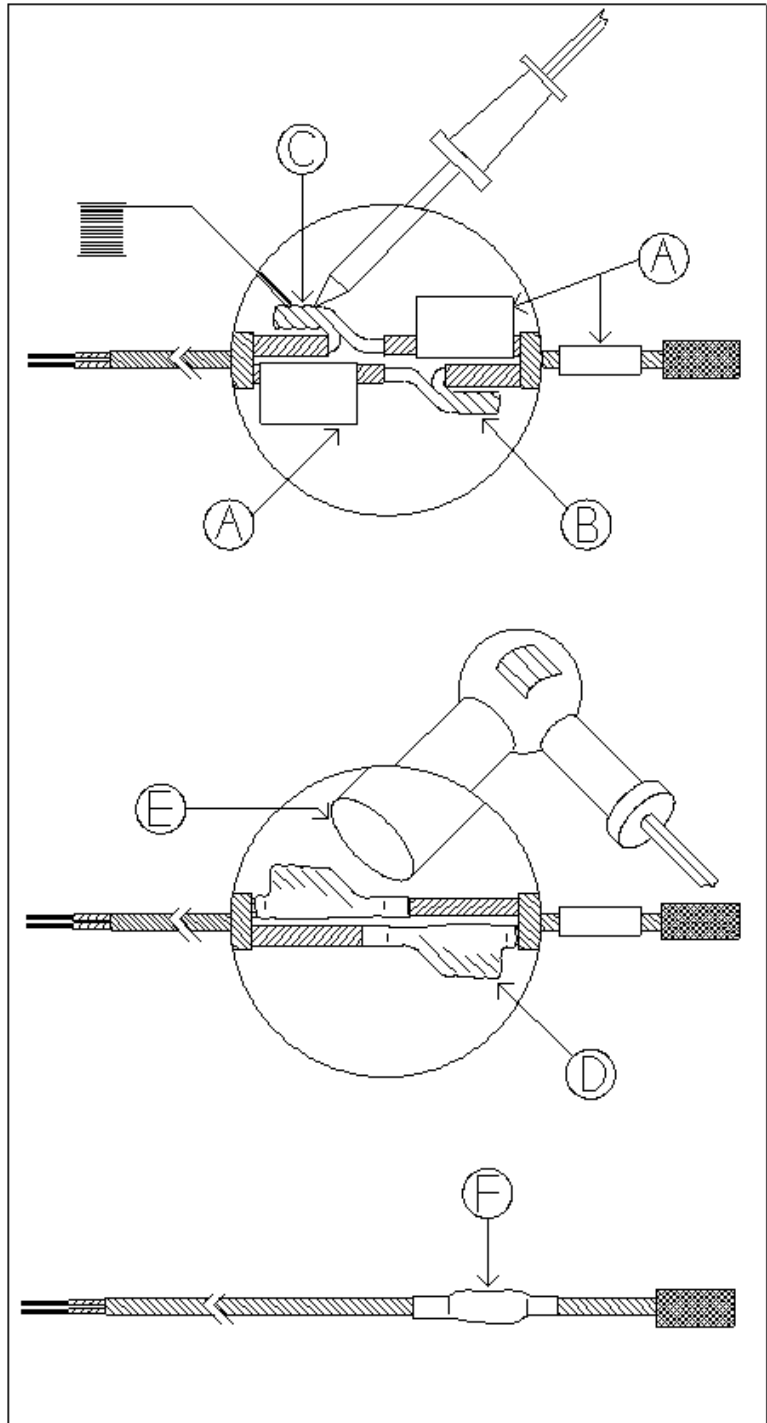
ALARM SIREN INSTALLATION

Connect alarm to terminals 14, 15 and 16.
14 - COMMON
15 - NORMALLY OPEN
16 - NORMALLY CLOSED

A - See the SEC-HD Electrical Ratings section for the alarm relay ratings.

B & C - Use a backup battery and an appropriate charging system.

D - The siren ratings must not be greater than the alarm relay ratings.

E - Alarm disable switch.
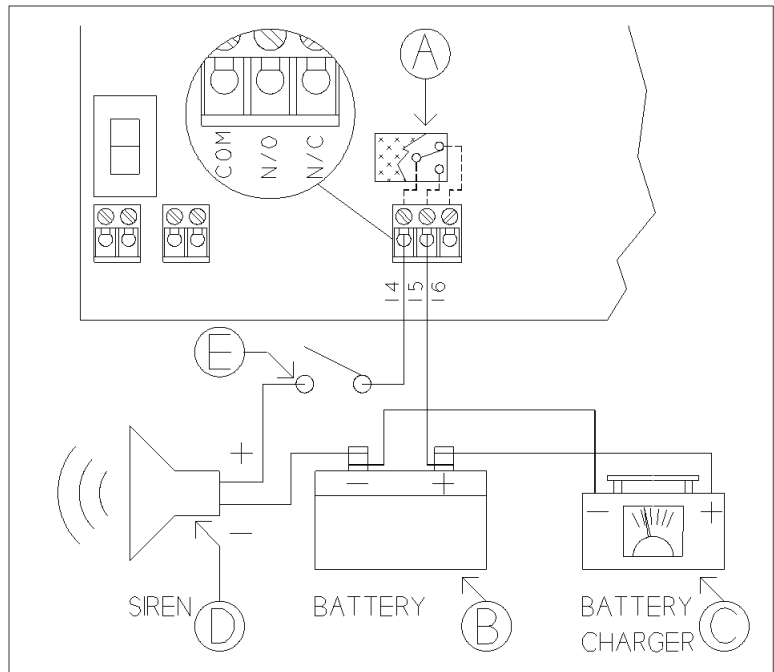
ALARM PANEL INSTALLATION

Connect the alarm panel / auto-dialer to terminals 14, 15 and 16.
14 - COMMON
15 - NORMALLY OPEN
16 - NORMALLY CLOSED

A - See the SEC-HD Electrical Ratings section for the alarm relay ratings.

B - Consult the Alarm Panel / Auto-dialer owner's manual for proper installation guidelines.
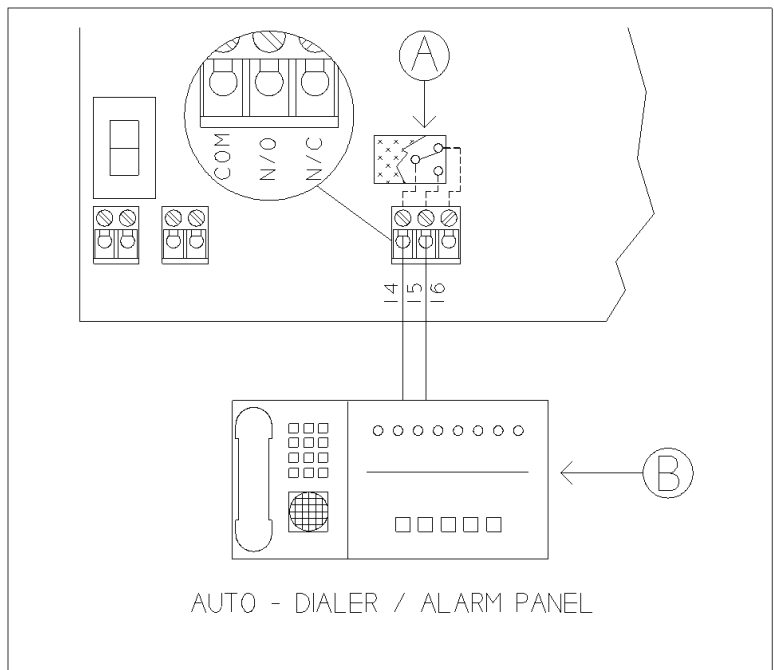
230 VAC HEAT/COOL STAGES
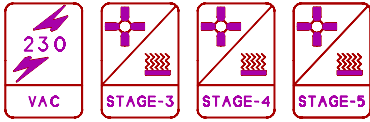
Connect Stage 3 to terminals 30 and 31.
Connect Stage 4 to terminals 24 and 25.
Connect Stage 5 to terminals 22 and 23.

A - Normally Open Relay Contact
Rating: 6 A at 120/230 VAC, general-purpose (resistive)
1/3 HP at 120 VAC, 1/2 HP at 230 VAC
360 W tungsten at 120 VAC
Fuses F1, F4, F5: 12 A, 250 VAC ABC-type ceramic

B - 230 VAC power contactor.
C - Load type: fan or heater.
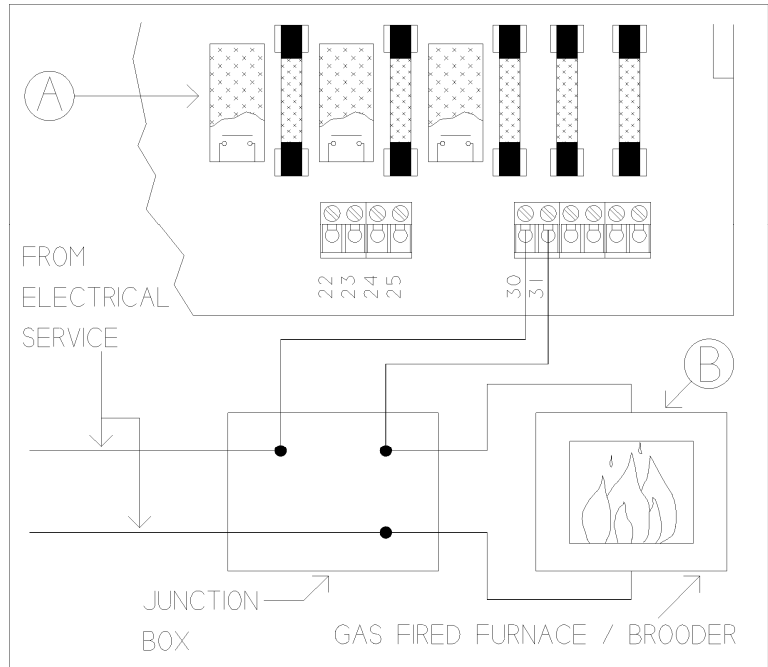
Install according to applicable local electrical codes.
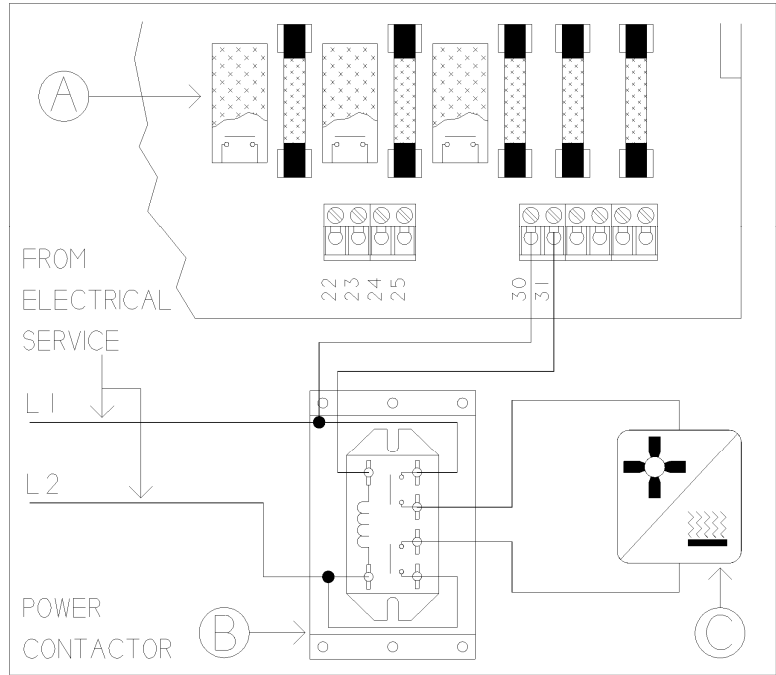
120 VAC HEAT/COOL STAGES
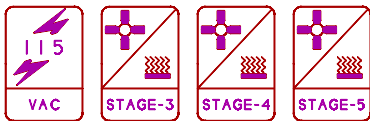
Connect Stage 3 to terminals 30 and 31.
Connect Stage 4 to terminals 24 and 25.
Connect Stage 5 to terminals 22 and 23.

A - Normally Open Relay Contact
Rating: 6 A at 120/230 VAC, general-purpose (resistive)
1/3 HP at 120 VAC, 1/2 HP at 230 VAC
360 W tungsten at 120 VAC
Fuses F1, F4, F5: 12 A, 250 VAC ABC-type ceramic

B - 120 VAC power contactor.
C - Load type: fan or heater.

Install according to applicable local electrical codes.
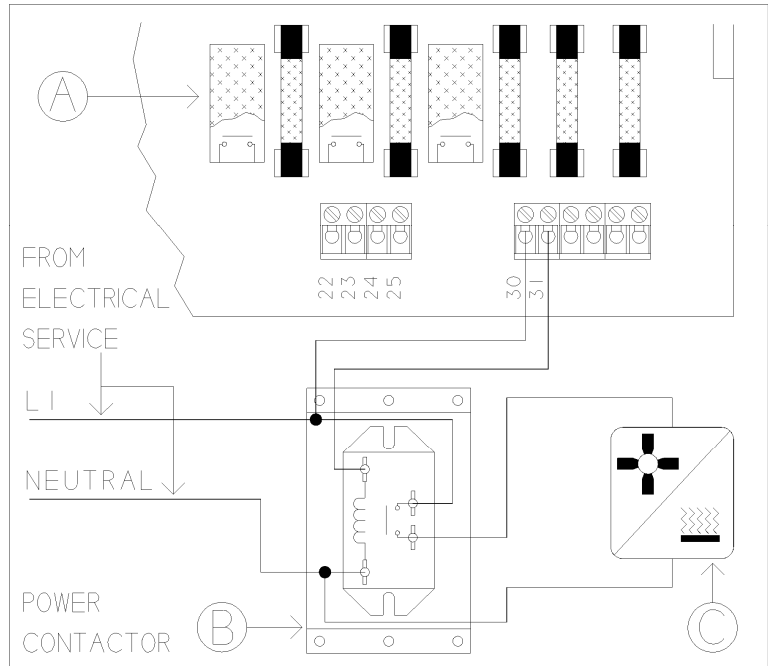
HEAT/COOL STAGE FURNACE
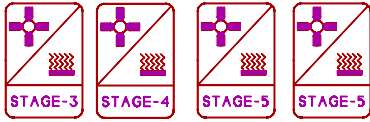
Connect Stage 3 to terminals 30 and 31.
Connect Stage 4 to terminals 24 and 25.
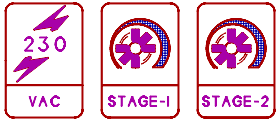Connect Stage 5 to terminals 22 and 23.

A - Relay Ratings: 6 A at 120/230 VAC,
general-purpose (resistive)
1/3 HP at 120 VAC, 1/2 HP at 230 VAC
360 W tungsten at 120 VAC
Fuses F1, F4, F5: 12 A, 250 VAC ABC-type
ceramic

B - This configuration shows the SEC-HD connected to the power connections for a gas fired furnace or brooder.

230 VAC VARIABLE SPEED FAN

Connect Stage 1 to terminals 34 and 35.
Connect Stage 2 to terminals 32 and 33.

A - Fuses F2 and F3: 15 A, 250 VAC ABC-type ceramic
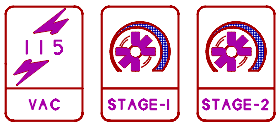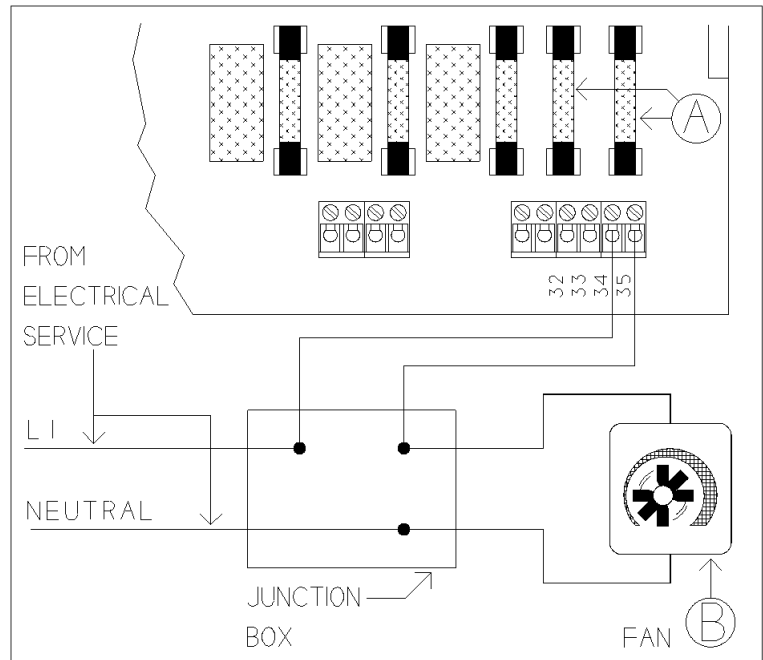
B - Variable speed fan.

 Wire according to applicable local electrical codes.

 For 3 phase wiring instructions, see page 37.
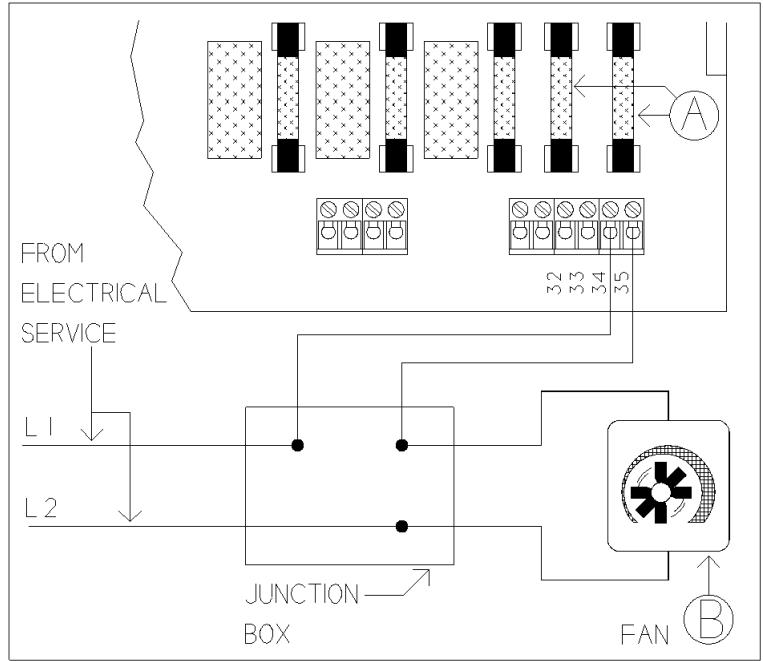
120 VAC VARIABLE SPEED FAN

Connect Stage 1 to terminals 34 and 35.
Connect Stage 2 to terminals 32 and 33.

A - Fuses F2 and F3: 15 A, 250 VAC ABC-type ceramic

B - Variable speed fan.

 Wire according to applicable local electrical codes.

CORRECT 3 PHASE WIRING

When connecting the SEC-HD to a 3 phase power system, the control power and Stage 1 and 2 must be connected to the same circuit. If this is not done the variable speed fans will run erratically.

DO NOT connect 120 VAC power to terminals 1 and 2 on the SEC-HD and power the fans with 230 VAC.

L 1

208 VAC

L 2

L 3
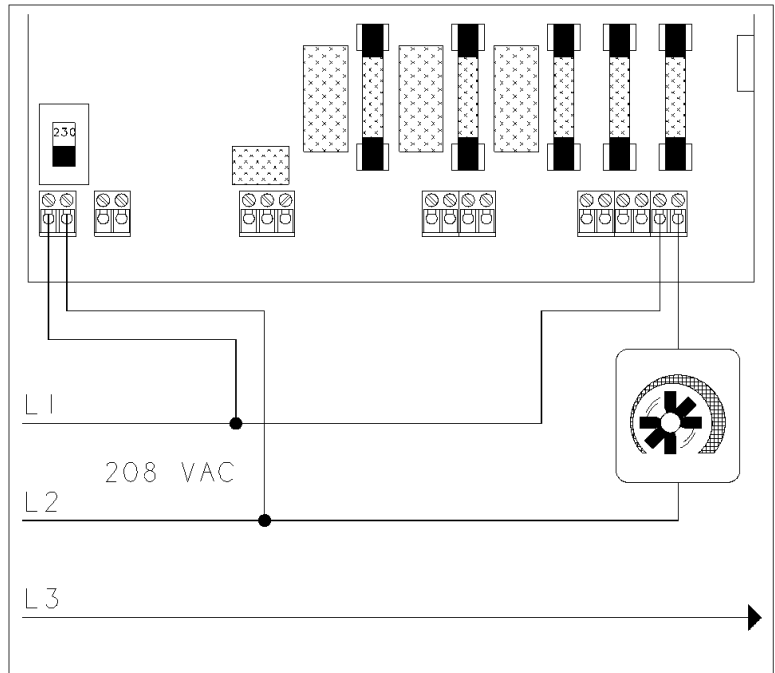
INCORRECT 3 PHASE WIRING

If the control power and the variable speed stages are wired to different phases, the fans will operate erratically. This will also happen if the SEC-HD is powered with 120 VAC and the variable speed fans are powered with 230 VAC.
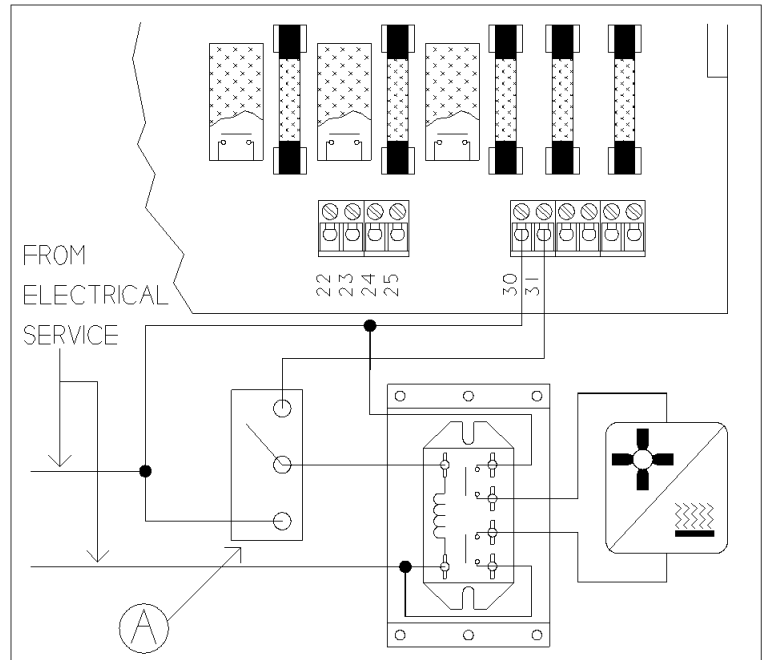
L 1

208 VAC

L 2

L 3
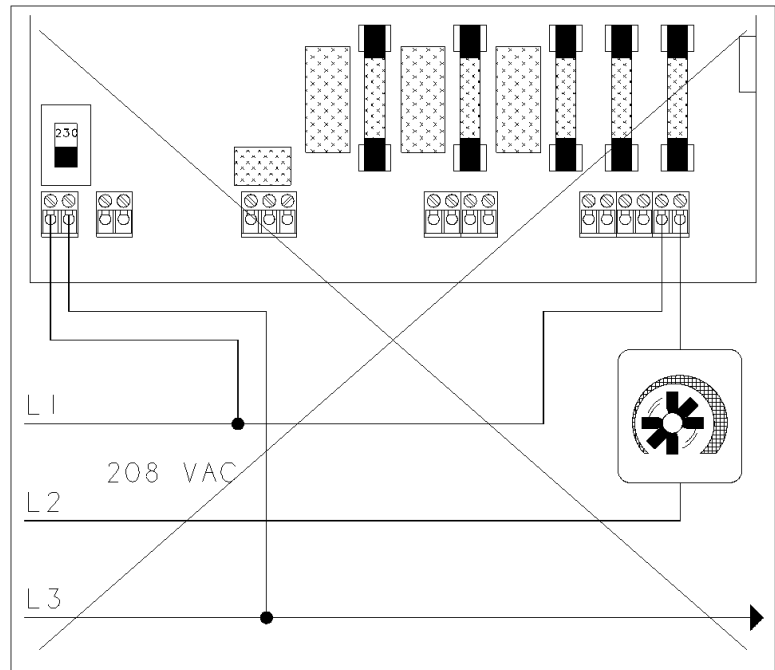
HEAT/COOL BYPASS SWITCH
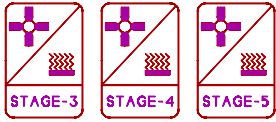
A - A bypass switch may be installed so the stage can be operated manually, turned off, or controlled automatically by the SEC-HD. When the switch is in the upper position the stage will be controlled automatically. When the switch is in the center position the stage will be off, and when the switch is in the lower position (manual position) the stage will be on.

Phason power contactor units have a bypass switch included.

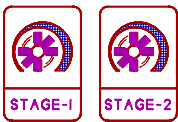This switch is NOT a disconnect switch.

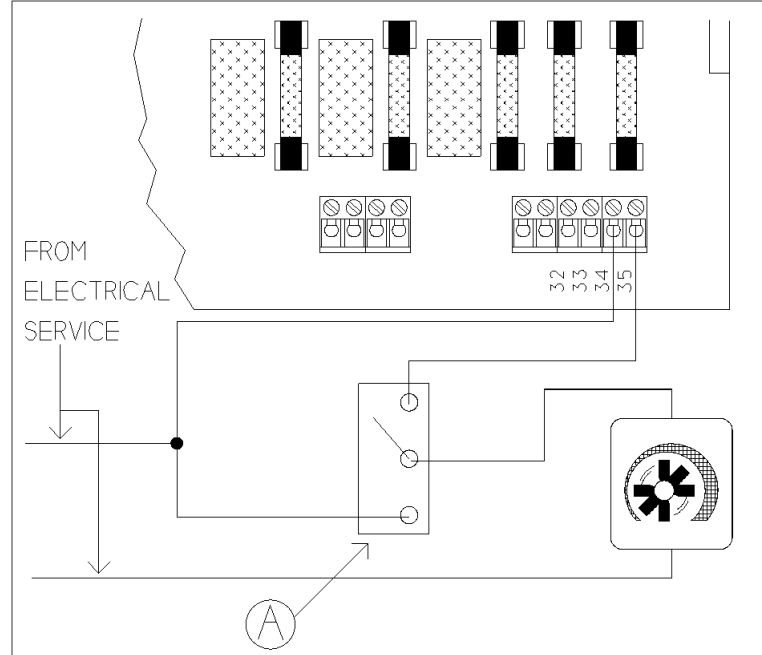

VARIABLE STAGE BYPASS SWITCH

A - A bypass switch may be installed so the fan can be operated manually, turned off, or controlled automatically by the SEC-HD. When the switch is in the upper position the fan will be controlled automatically. When the switch is in the center position the fan will be off, and when the switch is in the lower position (manual position) the fan will be on full speed.

Connect a "SPDT center off" switch.

This switch is NOT a diconnect switch.

# APPENDIX B - TEST PROCEDURE

CONTENTS

BUILT-IN TEST PROCEDURE

The SEC-HD has a built in test procedure. The test should be performed after the control has been installed and may be used at any time to check the operation of the control. The test procedure tests the circuitry in the control and each stage individually. Follow the instructions below to step through the test procedure.

If an alarm system is connected, be aware that it is normal for the alarm be activated during most of the test procedure.

In order to start the test procedure, the power to the SEC-HD must be off. Then, while holding the UP and DOWN buttons in, turn on the power. The SEC-HD will start up in the test mode.
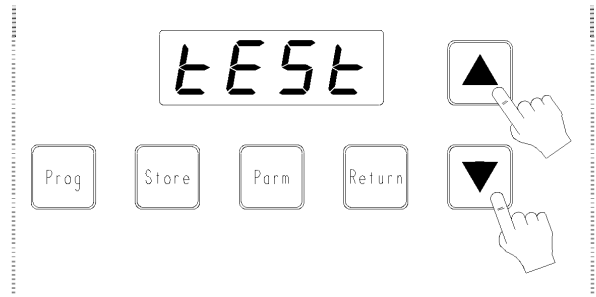
INPUT TEST

1) Press the PROG button once. The SEC-HD will display a number. This number should be between 100.0 and 125.0.

Press the PROG button again. The SEC-HD will display the temperature. If the temperature displayed is not correct, make sure that the sensor is installed properly.

MEMORY TEST

2) Press the STORE button. The SEC-HD will display PASS if the factory programs are in the memory. It will display FAIL if the programs have been changed in any way from the factory settings. See Reloading the Factory Programs under the Adjusting The SEC-HD section in this user's guide to reload the factory programs.
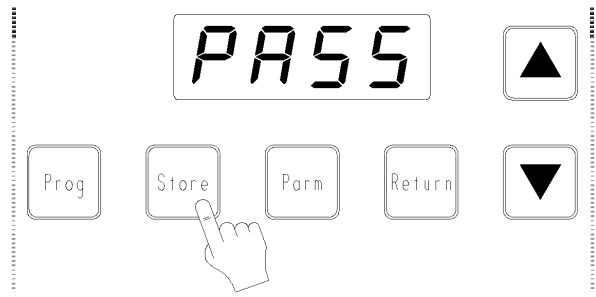
DISPLAY TEST

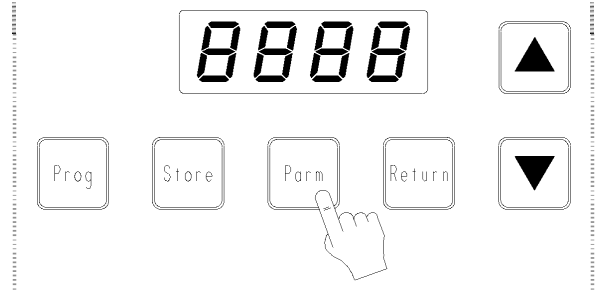3) Press the PARM button to perform the display test. The SEC-HD will display 8888 and then will count from 0 to 9 on each digit. After the display test is done the SEC-HD will display "t ds" which stands for "test display".

```
8888   ▲
Prog  Store  Parm  Return   ▼
```

VARIABLE STAGE TEST

4) Press the UP button once. This will start the variable speed fan test. The display should be flashing tSP1 and oFF, ("tSP1" means "test variable speed stage 1"). Press the UP button again. Now the display should flash tSP1 and FuLL, and the Stage 1 fan should be running full speed. Press UP again and the fan should be running at half speed, and the display should flash tSP1 and HALF. Press UP again and the fan will run at low speed. The display will flash tSP1 and Lo, (some fans can not operate at this low speed).
Pressing the UP button four more times will cycle through the Stage 2 fan test. The display will flash tSP2 and the speed, ("tSP2" means

```
tSP1   ▲
Prog  Store  Parm  Return   ▼
```

"test variable speed stage 2"). The Stage 2 variable speed fan will run at oFF, FuLL, HALF and Lo speeds, like the Stage 1 test. Pressing the UP button again will restart the Stage 1 fan test.

If at any time during this test the fans do not operate properly, refer to the trouble shooting guide in Appendix C.

RELAY TEST

5) Press the DOWN button to start the relay test. The display will flash t rL and ALAr, ("t rL" stands for "test relay"), and the alarm should be on. Press the DOWN button again and the display will flash t rL and St 3. Now Stage 3 should be on and the alarm will be off. Press DOWN again and the display will flash t rL and St 4, and Stage 4 will turn on and Stage 3 will turn off. Pressing DOWN again will turn off Stage 4 and turn on Stage 5. The display will flash t rL and St 5. Press the DOWN button again and the display will flash t rL and ALL. Now Stages 3, 4 and 5 will be on. Pressing DOWN again will restart the relay test cycle.

```
t rL   ▲
Prog  Store  Parm  Return   ▼
```
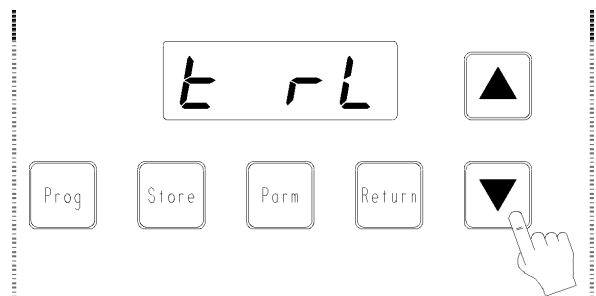
If any of the stages did not function properly when activated, refer to the trouble shooting guide in Appendix C.

RESET TEST

6) Press the RETURN button. This will return the SEC-HD to normal operation. The display will flash t SA for one second and then reset, ("t SA" stands for "test sanity circuit"). When the control is in normal operation the display will be flashing the room temperature and a power failure alarm, (A PF). Press the RETURN button to clear the alarm. Other alarms might be displayed if the SEC-HD has not yet been programmed.
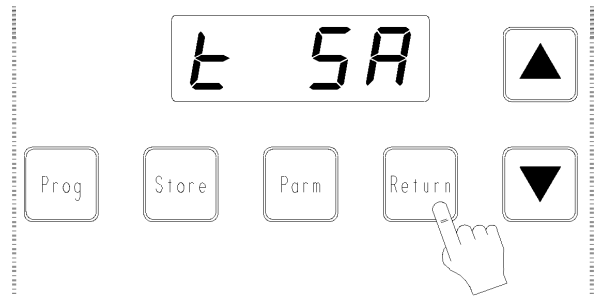
This completes the built-in test procedure in the SEC-HD. If at any point during this test, the SEC-HD or equipement did not function properly, refer to the trouble shooting guide in Appendix C.

APPENDIX C - Troubleshooting Guide

CONTENTS

Troubleshooting

PROBLEM	CAUSE	SOLUTION
No Power/Display	Circuit breaker at service panel off or tripped	Reset circuit breaker
	Wiring incorrect	Correct wiring
	Display board inter-connect cable unplugged from power supply board	Plug in display board cable
	115/230 VAC switch in the wrong position	Set switch to the correct setting
Stage 1/Stage 2 Fans not running	Wiring incorrect	Correct wiring
	15 A, 250 VAC ABC-type ceramic Fuse(s) open	Replace fuse(s)
	Display board inter-connect cable is not plugged into the power supply board properly	Be sure the inter-connect cable is firmly plugged in
	Minimum ventilation settings too low (Parameters 2/3)	Increase minimum ventilation settings
	Stage 1/Stage 2 Minimum Idle setting too low (Parameters 21/22)	Increase minimum idle setting
	Temperature Set setting above room temperature (Parameter 1)	Adjust Temperature Set to desired temperature
	Room temperature below range of Stage 1 / Stage 2 Off-Set-Back (Parameters 4/6)	Adjust Off-Set-Back to cover required range
	Ventilation is turned off (V off) (Parameter 16)	Change Ventilation to on
	Fan is faulty	Replace fan

PROBLEM	CAUSE	SOLUTION
Stage 1/Stage 2 fan(s) run full speed	Wiring incorrect	Correct wiring
	Minimum ventilation settings too high (Parameters 2/3)	Decrease minimum ventilation settings
	Stage 1/Stage 2 P-Band set to 0 (Parameters 5/8)	Increase Stage 1/Stage 2 P-Band
	Room temperature above Temperature Set (Parameter 1)	Adjust Temperature Set to desired temperature
Stage 1/Stage 2 fan(s) run erratically	P.F. Compensation is not set correctly	Adjust P.F. Compensation (Parameters 24/25)
Stages 3, 4 or 5 Relay(s) not operating loads	Wiring incorrect	Correct wiring
	12 A, 250 VAC ABC-type ceramic Fuse(s) open	Replace fuse(s) with 12Amp, 250VAC
	Display board inter-connect cable is not plugged into the power supply board properly	Be sure the inter-connect cable is firmly plugged in
	Turn-On settings for stages incorrect (Parameters 9/10/11)	Adjust Turn-On settings
	Wrong Setup parameters selected (Parameters 18/19/20)	Correct Setup Parameters settings
	Ventilation is turned off (V off) (Parameter 16) Note: This is only applicable to stages in cooling mode	Change Ventilation to on
	Fan/Heater is faulty	Replace Fan/Heater
Alarm relay not operating alarm system	Wiring incorrect	Correct wiring
Alarm message on display	Alarm condition present	See Alarm section. Clear alarm condition by pressing RETURN

APPENDIX D - Blank Program Tables

CONTENTS

Blank Parameter Chart

When changes to the programs are made the changes should be marked in the tables below. This will provide a quick reference chart to refer to when reprogramming the SEC-HD in the future.

#	PARAMETERS	PROGRAM NAMES						
		A	b	C	d	E	F	g
	MAIN							
1	Temp Set (Start P-Band 1)							
2	Stage 1 Min Vent							
3	Stage 2 Min Vent							
	DIFFERENTIAL							
4	Stage 1 Off-Set-Back							
5	Stage 1 P-Band 1							
6	Stage 2 Off-Set-Back							
7	Stage 2 Start P-Band 2							
8	Stage 2 P-Band 2							
9	Stage 3 Turn On (Cool)							
10	Stage 4 Turn On (Cool)							
11	Stage 5 Turn On (Heat)							
12	Low Temp Alarm							
13	High Temp Alarm							
	GENERAL							
14	Low Power Alarm							
15	Alarm Display Latching							
16	Ventilation							
	SETUP							
17	Units ^{o}F or ^{o}C							
18	Stage 3 Operation							
19	Stage 4 Operation							
20	Stage 5 Operation							
21	Stage 1 Minimum Idle							
22	Stage 2 Minimum Idle							
23	Hysteresis							
24	Stage 1 P.F. Compensation							
25	Stage 2 P.F. Compensation							

Table 1 Blank Parameter Chart