Installation, Operation, and Maintenance Manual

SENTRY

Microprocessor Based
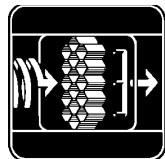**Room Pressurization Monitor & Controller**

Version 2.6X

Installation, Operation & Maintenance

**Air Monitor Corporation provides complete
technical support between the hours of
7 a.m. and 5 p.m. PST, M-F**

**Contact our Service Department
Toll Free: 1-800-AIRFLOW**

or fax us at 1-707-526-2825

**AIR MONITOR
CORPORATION**

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INSTRUMENT WARRANTY

Air Monitor Corporation (hereinafter referred to as "Seller") warrants that at the time of shipment, products sold pursuant to this contract will be free from defects in materials and workmanship, and will conform to the specifications furnished or approved in writing by Seller. No warranty is given that delivered products will conform to catalog sheets, data sheets, and the like, which are subject to change without notice.

Seller will repair or replace, at its option, any products listed under this warranty which is returned freight prepaid to Seller within the earlier of one (1) year after start-up or fifteen (15) months after shipment, and upon test and examination, proves defective within the terms of this warranty. The warranty period for any item repaired or replaced shall be for the time remaining on the warranty period of the original components. Purchaser shall notify Seller in writing of such defect within sixty (60) days of discovery of the defect.

This warranty does not extend to any product sold by Seller which has been the subject of misuse, neglect, accident, damage or malfunction caused by interconnection with equipment manufactured by others, improper installation or storage, or used in violation of

instructions furnished by Seller, nor does it extend to any product which has been repaired or altered by persons not expressly approved by Seller. Nor does Seller warrant equipment against normal deterioration due to environment; nor items such as lamps, glass, and similar items subject to wear or burnout through usage. Adjustments for items or equipment not manufactured by Seller shall be made to the extent of any warranty of the manufacturer or supplier thereof.

Seller shall not be liable for any special or consequential damages or for loss of damage, directly or indirectly arising from the use of the products.

The warranty set forth above is in lieu of all other warranties either express or implied and constitutes the full extent of Air Monitor Corporation's liability to the customer, or any other party for breach of warranty.

THERE ARE NO EXPRESS WARRANTIES EXCEPT AS SET FORTH HEREIN AND THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OF FITNESS FOR ANY PARTICULAR PURPOSE, WHICH ARE PARTICULARLY DISCLAIMED.

1 – GENERAL INFORMATION

1.1 – DESCRIPTION

Air Monitor's SENTRY Room Pressurization Monitor & Controller is designed to continuously monitor and control the differential pressure or rate of airflow between adjacent spaces in laboratories, operating rooms, and patient isolation areas to ensure the well being and safety of patients, medical staff, and laboratory personnel.

The SENTRY system is composed of three primary components: Keypad Assembly, Transmitter I/O Enclosure, and Flow/Pressure Sensing Ports. Also provided is the 14' interconnecting cable between the Keypad Assembly and Transmitter I/O Enclosure, 25' of ½" diameter signal tubing, and necessary mounting hardware.

The Keypad Assembly has a 2x16 LCD display with dual functions. During standard operation, the display shows the room mode (Positive, Negative, Unoccupied or Purge) and actual room condition in Inches w.c. or FPM. Three Room Status LEDs indicate Normal (green), Caution (yellow), and Alarm (red) conditions. All operations and setup are accomplished through the use of the six pushbuttons on the front. Room mode selection can also be selected with an optional three-position key switch. Two levels of passwords are programmable during setup to prevent unauthorized alteration of stored values. Password usage is optional and can be bypassed by DIP switch setting if the password is forgotten. There is also a local audio alarm with switches for Mute and Reset. All pushbuttons are membrane type with tactile feedback. Connection to the Transmitter I/O Enclosure is provided through a single RJ45 telephone system cable with keyed plugs to prevent improper connection.

Within the Transmitter I/O Enclosure is a high accuracy thermal massflow sensor that is capable of sensing airflow bi-directionally. The output of this sensor is electronically processed to display either pressure differential between the monitored room and a reference area in Inches w.c. or flow between them in FPM. The Transmitter I/O Enclosure also transmits a 4-20mA signal proportional to differential pressure or flow (depending on setup) for use with a BAS or data collection device. All field wiring connections for power input, transmitter output, controller output, alarm output and remote wired switching inputs, are located on a terminal strip within the Transmitter I/O Enclosure.

The Flow/Pressure Sensing Ports are designed to mount on the ceiling in both the monitored room and reference area with the tubing provided connecting the Ports to the Transmitter I/O Enclosure. Each Port has an externally accessible filter to facilitate periodic cleaning.

1.2 – THEORY OF OPERATION

The ½" diameter tubing connecting the Transmitter I/O Enclosure to the Flow/Pressure Sensors mounted in the monitored room and reference area ceilings create an airflow pathway through the bi-directional thermal massflow sensor.

The differential pressure between the monitored room and reference area creates a condition where the very low volume airflow occurring between the two Flow/Pressure Sensors is directly measured by the massflow sensor and electronically converted into pressure units of Inches w.c. or velocity units in FPM. The measured flow and directional data is compared within the microprocessor to the technician programmed operating and alarm setpoints to determine whether the room operating condition falls within normal, caution, or alarm ranges.

The optional controller function permits the SENTRY to perform single loop control, with a 4-20mA output, as well as monitor the room operating condition. The selection of tuning parameters is technician programmed via the keypad.
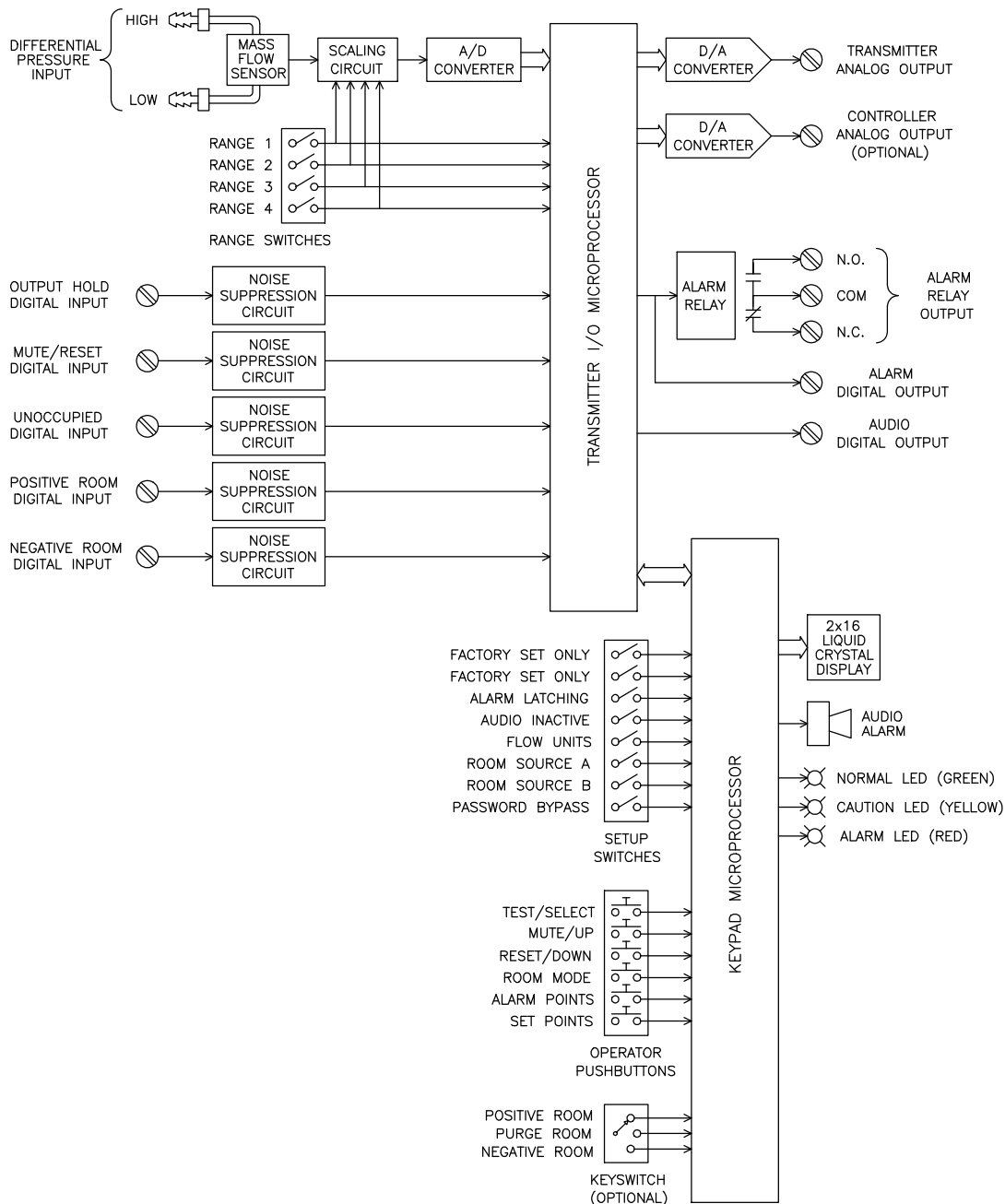
2 – PERFORMANCE SPECIFICATIONS

2.1 – TRANSMITTER

Ranges.

Pressure Selections	Velocity Selections
0 - ±.005 Inches w.c.	0 - ± 250 FPM*
0 - ±.015 Inches w.c.	0 - ± 450 FPM*
0 - ±.035 Inches w.c.	0 - ± 650 FPM*
0 - ±.100 Inches w.c.	0 - ±1150 FPM*

* ± indicates direction

Measurement Resolution. ±0.05% of full scale range (Inches w.c. or FPM).

Measurement Rate. 10 readings per second.

Sensor Response Time. 1 millisecond for a 10%-90% signal change; 3 milliseconds maximum.

Temperature Limits. −20 to 180ºF storage; +32 to 120ºF operating.

2.2 – INDICATION

Displays. Standard 2 line x 16 character LCD provides operating mode and digital display of room operating point in Inches w.c. or FPM. Separate green, yellow, and red LED's indicate Normal, Caution, and Alarm room status. Display is updated every 0.5 second.

2.3 – INPUTS/OUTPUTS

Digital Inputs. Individual dry contact remote input for alarm mute/reset, external output hold, room status select, and occupied/unoccupied. Six individual keypad push-buttons for MUTE/UP, RESET/DOWN, TEST/SELECT, ROOM MODE, SETPOINTS, and ALARM POINTS.

Analog Outputs. Transmitter and controller outputs are 4-20mA, self-powered, grounded load, 0.05% Full Scale resolution.

Digital Outputs. Form C dry contact for alarm output rated for 5 amps at 24VAC/VDC or 120VAC. Remote audio alarm and alarm light switching is rated for 100mA at 24VDC.

## 2.4 – POWER

Power Consumption. 6.0VA at 24VAC.

Circuit Protection. Power input is fused. Polarity continuity must be maintained when multiple units are powered from the same source.

Power Supply. Standard 24VAC (20-28VAC). Optional 120VAC (100-132VAC) via stand-alone auxiliary transformer.

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3 – FEATURES

3.1 – KEYPAD ASSEMBLY

• 2x16 character LCD display is used during parameter set-up, and to provide operating status information. During standard operation the LCD display shows the room mode (Positive, Negative, Unoccupied, Purge) and digital display of actual room condition in Inches w.c. or FPM. LCD updated every 0.5 second.

• Room status LED's in green, yellow, and red depicting Normal, Caution, and Alarm conditions. LED's protrude from the front of the keypad for extended visibility.

• Alarm time delay selection range is 0 to 600 seconds, in one second increments.

• Keypad dimensions are 5.25"(h) x 6.38"(w) x 1.25"(d), and mounts directly to a standard 2x4 electrical junction box.

• Choice of operating in Inches w.c. or FPM.

• Local audio alarm with mute and reset buttons. Audio alarm active/inactive and alarm latching/non-latching is technician selected during set-up via keypad DIP switch.

• Separate Unoccupied setpoints for Positive Room and Negative Room.
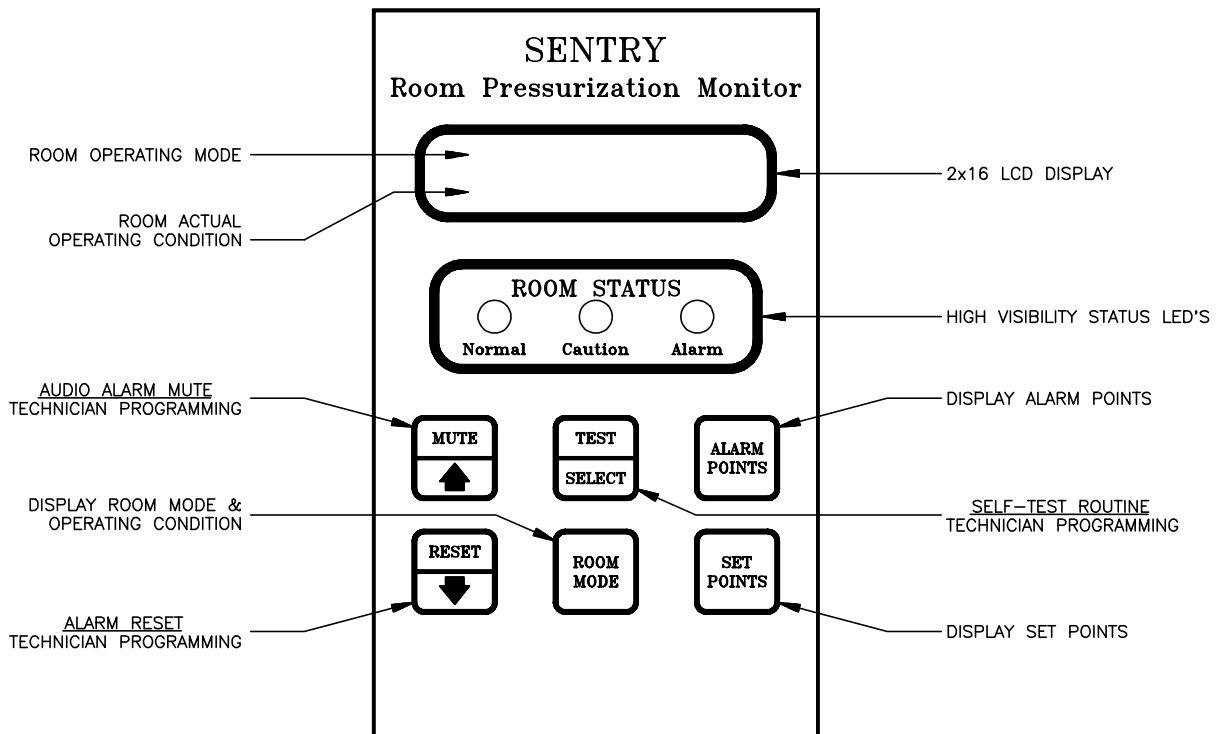
3.1 – KEYPAD ASSEMBLY (con't)

• Technician selectable control setpoints for positive and negative room modes, with individual High and Low alarm points for each room pressurization control setpoint. Preset purge mode at maximum controller output.

• Choice of three different methods for selecting room mode. Local selection of room mode can be performed via the keypad (password protected) or optional three position key switch. External selection of room mode via the BAS or nurse's station can be accomplished by a three position switch.

• Two levels of password: Operator and Technician. Passwords are technician programmed via keypad during set-up. An internal keypad DIP switch permits bypass and resetting passwords if custom selections are forgotten. Passwords are four character alpha; usage is optional and can be bypassed via DIP switch.

3.2 – TRANSMITTER I/O ENCLOSURE

• Accepts dry contact input to "hold" controller output during entry into room.

• A choice of four range selections are available, technician selected during set-up via DIP switch. For pressure, the choices are ±0.005", ±0.015", ±0.035", and ±0.10". For FPM, the choices are: ±250, ±450, ±650, and ±1150 FPM.

• Contains a high accuracy, thermal massflow sensor capable of sensing transfer airflow rate bi-directionally.

• All field input and output wiring, flow/pressure signal and power connections terminate in the Transmitter I/O Enclosure.

• On-board microprocessor manages all monitor and controller functions.

• Transmitter range is technician selected via DIP switch.

• The analog output signals for the transmitter and controller are 4-20mA, self-powered, grounded load.

• The digital output for alarm transmission to the BAS is a Form C dry contact rated for 5 amps at 24VAC/VDC or 120VAC. Digital outputs are provided to activate alarm light and audio at a remote nurse's station.

• Digital inputs can be received from the BAS or nurse's station to permit remote change of alarm mute/reset, and remote selection of Positive, Negative, Unoccupied or Purge Room mode.

• Standard power requirement is 24VAC. A 120VAC option is available via a stand-alone auxiliary transformer.

• Enclosure is 9½" x 9½" x 3", NEMA 1 rated.

3.3 – FLOW/PRESSURE SENSING PORTS

• Designed for ease of installation in the room and reference area ceilings.

• Small size is visually unobtrusive to permit selection of optimum location.

• Sensor inlet screen protects the massflow sensor from airborne particulate.

• Below ceiling access facilitates periodic cleaning.

3.4 – NURSE'S STATION (optional)

Custom nurse's station monitoring panels will be designed on a per application basis to meet customer specifications for wall or table mount, number of monitored units, color, etc. Each room could have any or all of the following at the nurse's station.

• Green/red light to indicate safe/alarm condition.

• Audio alarm.

• Pushbutton for alarm/mute, and reset.

• Engraved labels for room and function identification.

• 3-way key switch to change room mode between Positive, Negative, and Purge.

• Switch to change room between Occupied and Unoccupied modes.

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4 – INSTALLATION

4.1 – RECEIVING AND INSPECTION

- Carefully remove the SENTRY from its shipping container taking ESD (electrostatic discharge) precautions.
- Inspect for any damage. If damaged, contact freight company.
- Verify that all of the following items have been shipped:
    - 1 each Transmitter I/O Enclosure
    - 1 each Keypad Assembly
    - 1 each connecting cable (14 feet in length),
    - 1 each coil of 1/2" OD tubing (25 feet in length)
    - 1 each Flow/Pressure Sensing Port Kit. Contents:
        - 2 each 1/2" OD tube X 1/2" MPT Fitting
        - 4 each Tube Inserts
        - 2 each Cover Plate
        - 2 each Base
        - 2 each Backup Plate
        - 2 each Filter
        - 4 each 10-32 X 2-1/2" Flat Head Screws
        - 4 each 8-32 X 5/16" Flat Head Screws
        - 2 each 6-32 x 3/4" Pan Head Screws (used with Keypad Assembly)

4.2 – LOCATION

- Figure 4.1 shows the general arrangement for installing the various components of the SENTRY.
- The Keypad Assembly should be located near to the door leading into the monitored room.
- The Flow/Pressure Sensing Ports must be mounted in the ceiling of the monitored room and the reference area.

- The Transmitter I/O Enclosure must be mounted in the proximity of the monitored room and reference area (see Section 4.3), and the Keypad Assembly can be mounted up to 14 feet away from the Transmitter I/O Enclosure. See Figure 4.1.
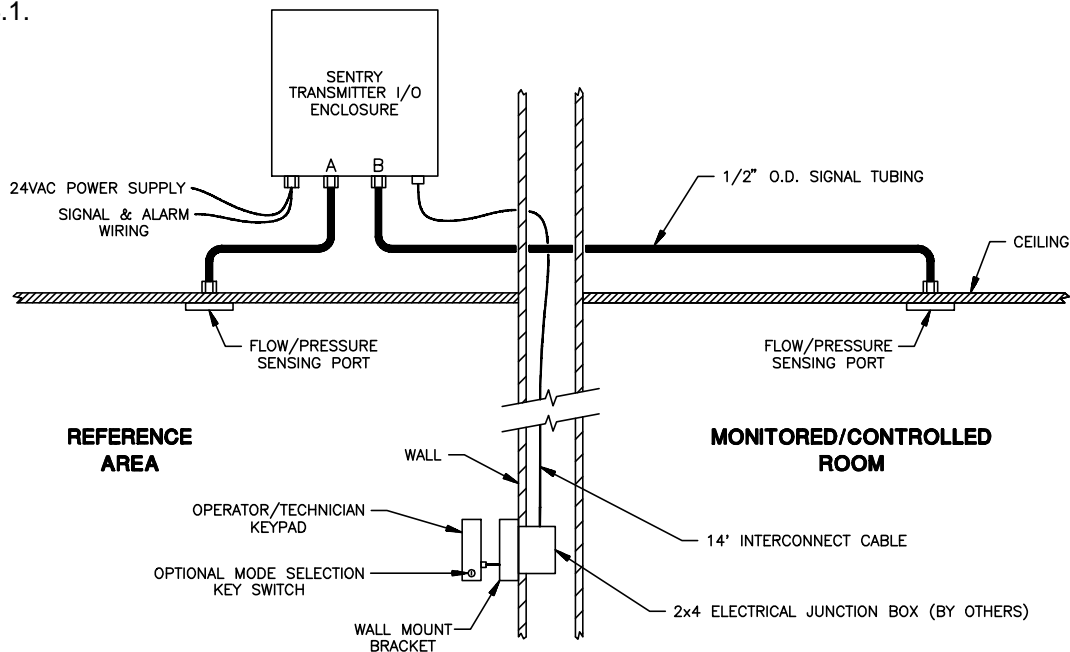

Figure 4.1

4.2 – LOCATION (con't)

• Both the Transmitter I/O Enclosure and the Keypad assembly are housed in NEMA 1 enclosures which provides some degree of protection which is sufficient for most clean indoor installations.
• The ambient temperature of the selected mounting location must be between 40-120º F for the Transmitter I/O Enclosure and the Keypad assembly.
• The selected mounting locations should be rigid and free of vibration.

4.3 – MOUNTING

Tools Required: Electric Drill, 7/32" drill, 1.25" diameter hole saw, and Phillips screwdriver.

4.3.1   Flow/Pressure Sensing Ports:

The following instructions are applicable to mounting the Flow/Pressure Sensing Port in either the monitored room or the reference area.

In the room or the area, locate a place in the ceiling that is away from doors, windows, heat or air conditioning registers, or return air intakes. Corners near walls make good locations.

> NOTE: The distance between the two selected mounting locations must be less than 25 feet. The 25 feet of tubing provided must be proportioned between the monitored room to the Transmitter I/O Enclosure and the reference area to the Transmitter I/O enclosure (see Figure 4.1). ***All 25 feet of 1/2" O.D. tubing must be used.***

Before installing one Flow/Pressure Sensing Port, locate the mounting location of the other one, and verify that the above requirement will be met.

1.   At the mounting location, hold the aluminum base plate as a template and mark on the ceiling the center point and the location of the two countersunk mounting holes.

2.   To the center point drill a 1-1/4" diameter clearance hole

3.   At the mounting holes, drill 7/32" diameter holes.

4.   Screw fitting into base plate as shown in Figure 4.2 (see following page). Only hand tighten fitting.

5.   Place a piece of tape over the tube end of the fitting to prevent debris from entering during the remainder of the installation.

6.   Secure the base plate with fitting to the ceiling using the galvanized backup plate and two #10-32 X 2-1/2" flat head screws. See Figure 4.2.

7.   Place the filter into the recess in the nylon cover plate, and install cover plate to the base plate using two #8-32 x 5/16" flat head screws. See Figure 4.2.

4.3 – MOUNTING (con't)

$\frac{1}{2}$" O.D. TUBE

BACKUP PLATE

TUBE INSERT

CEILING

LOCKING RING

FITTING

BASE PLATE

2X #10-32 x 2$\frac{1}{2}$"

FILTER

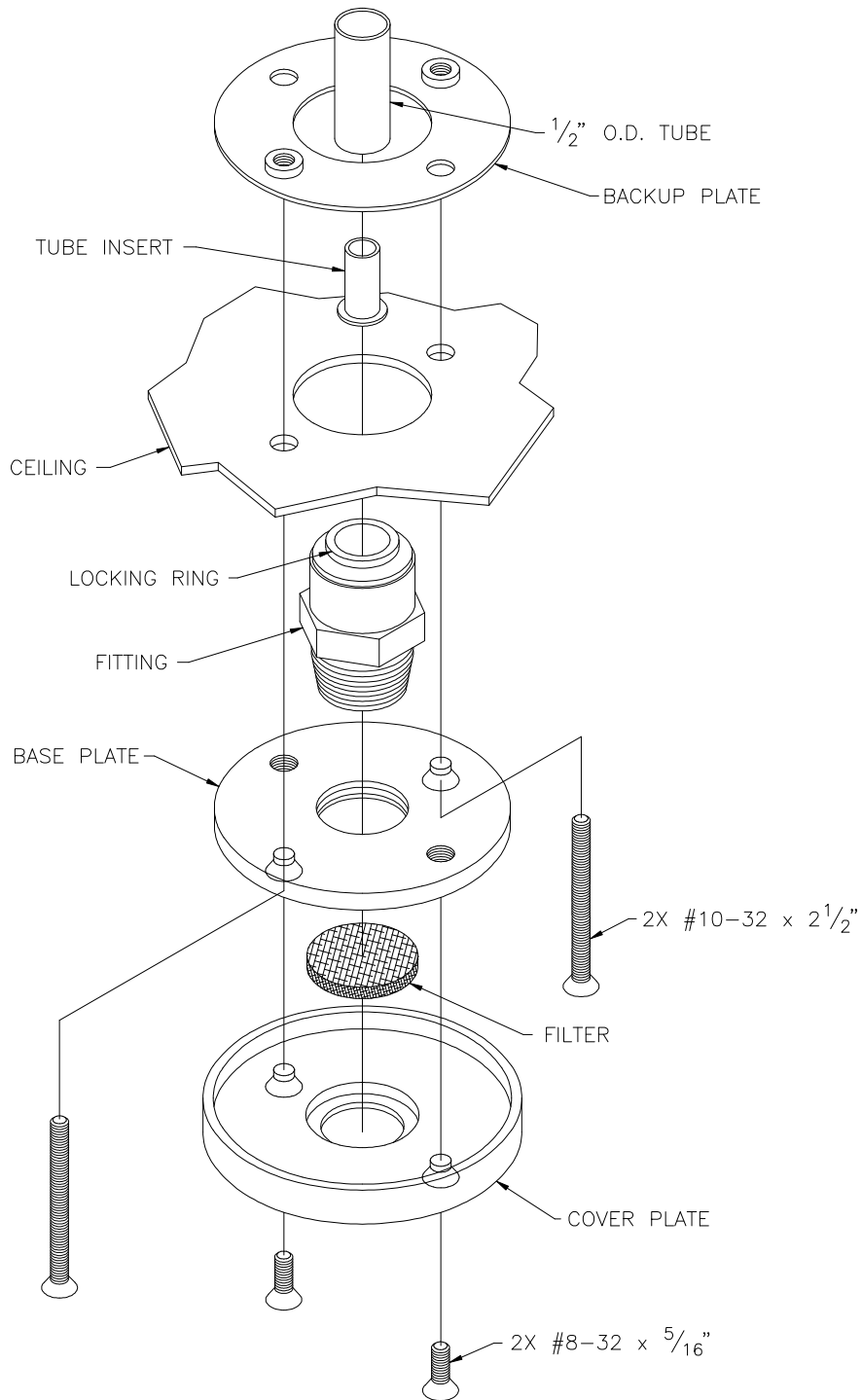COVER PLATE

2X #8-32 x $\frac{5}{16}$"

Figure 4.2

4.3 – MOUNTING (con't)

4.3.2   Transmitter I/O Enclosure:

The Transmitter I/O Enclosure can be mounted in any position (i.e. vertical or horizontal).

1. Locate a convenient mounting location for the Transmitter I/O Enclosure that allows both Flow/Pressure Sensing Ports to be connected with the supplied 25 feet of 1/2" O.D. tubing. The Transmitter I/O Enclosure is secured using the four mounting holes in the back of the enclosure.

2. Remove the two screws on the cover of the Transmitter I/O Enclosure and remove cover.

3. Holding the Transmitter I/O Enclosure in the desired location, mark the four mounting screw locations onto the mounting surface.

4. At the four marked locations drill 0.125" diameter pilot holes.

5. Use four #8 pan head screws to secure the Transmitter I/O Enclosure.

6. Reattach enclosure cover.

7. Determine the length of 1/2" O.D. tubing required to reach from the Transmitter I/O Enclosure to each Flow/Pressure Sensing Port. Cut the 25 foot length of tubing into the appropriate lengths making sure the cut is clean and square to the end of the tube.

    NOTE: All of the 25 feet must be used. Reducing the total length will result in a reduction of system accuracy.

8. Install tube inserts into each end of 1/2" O.D. tube. Total of 4. See Figure 4.2.

9. Remove tape on fitting of Flow/Pressure Sensing Port in the reference area and install the appropriate piece of tubing by firmly pushing tube into fitting. Verify proper connection by pulling on tubing. Tubing should not pull out of fitting.

    NOTE: To remove tubing from fitting, press the locking ring against the fitting while pulling on the tubing.

10. Connect the other end of tubing to the fitting labeled "A" on the Transmitter I/O Enclosure.

11. Repeat Step 8 for the Flow/Pressure Sensing Port in the monitored room and connect to the fitting labeled "B" on the Transmitter I/O Enclosure.

4.3 – MOUNTING (con't)

4.3.3   Keypad Assembly:

The Keypad Assembly is designed to be mounted in a standard 2 x 4 junction box.

1.   Determine an appropriate mounting location for the Keypad Assembly that is within the 14 feet cable length of the Transmitter I/O Enclosure and convenient for operator use.
2.   Open one knockout in the junction box and install.
3.   Remove the two #4-40 x 1/4" pan head screws on the sides of the Keypad Assembly and separate the wall mount bracket from the Keypad Assembly (see Figure 4.3).
4.   Install wall mount bracket to the junction box using the two #6-32 x 3/4" pan head screws.
5.   Connect the plug on one end of the interconnect cable to connector P6 on the circuit board at the back of the Keypad Assembly (see Figure 4.3 and 5.4). Make sure the plug is oriented properly in receptacle.
6.   Insert the free end of the interconnect cable into the junction box, and feed all the cable through until Keypad Assembly is flush with the wall mount bracket.
7.   Position Keypad Assembly onto the wall mount bracket and install the two #4-40 x 1/4" pan head screws removed in step 3.
8.   Route the free end of the interconnect cable to the Transmitter I/O Enclosure.

Caution: Do not shorten interconnect cable by cutting. Loop and secure any excess cable at a convenient location.

9.   Feed interconnect cable through one of the conduit knockouts on the side of the Transmitter I/O Enclosure and install plug into connector P4 on the Transmitter I/O circuit board. (See Figure 5.3)
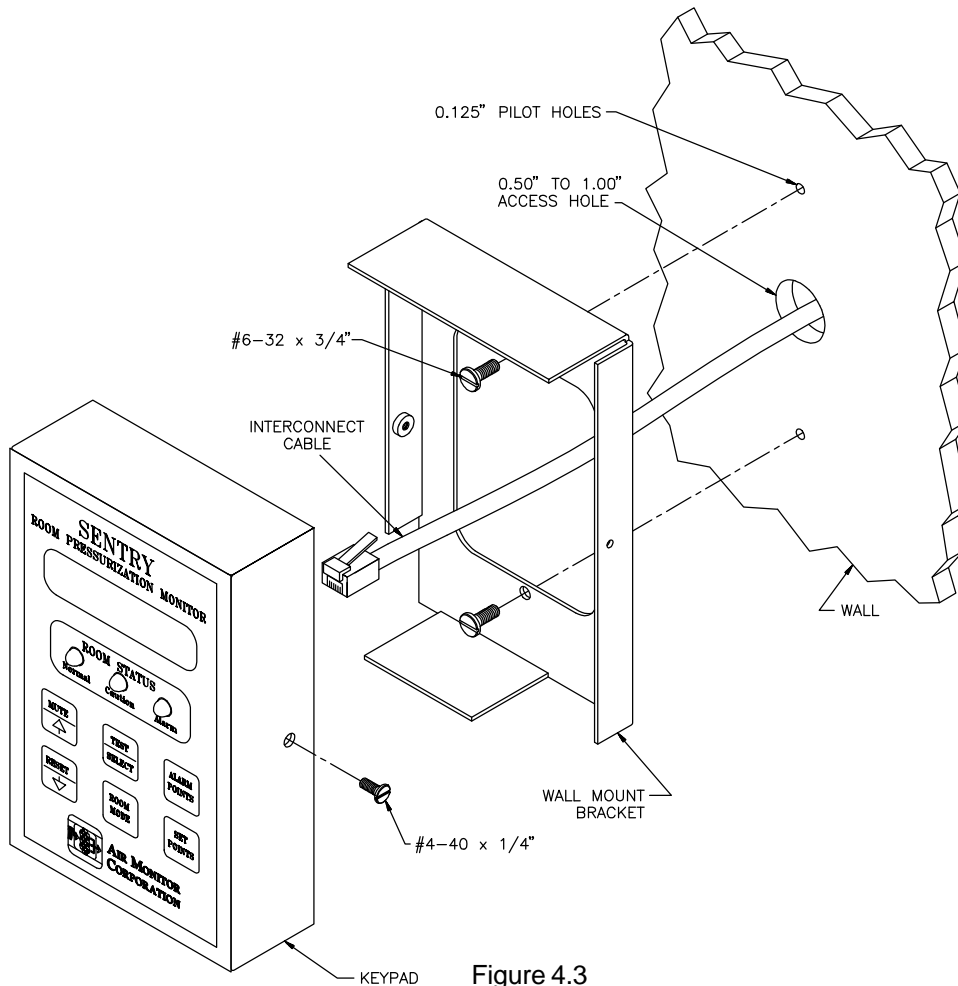
Figure 4.3

4.4 – POWER/SIGNAL CONNECTIONS

All power and signal wiring is done at the terminal strip on the circuit board in the Transmitter I/O Enclosure. To gain access to the terminal strip, remove the two screws on the Transmitter I/O Enclosure cover and remove cover. All power and signal wiring should be routed through one or more of the knockouts on the sides of the Transmitter I/O Enclosure. To open a knockout, firmly press a screwdriver against the slug until it breaks free. Figure 4.4 below represents the terminal strip and the connections for power input and the various input/outputs available (review Factory Set-up Information Sheet in the back of this manual for which inputs/outputs are included with your unit).
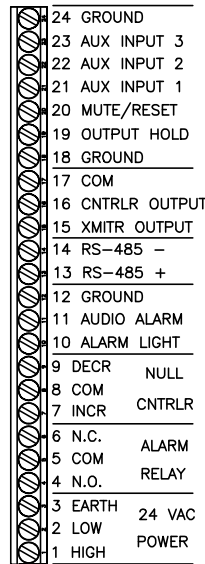
```
24  GROUND
23  AUX  INPUT  3
22  AUX  INPUT  2
21  AUX  INPUT  1
20  MUTE/RESET
19  OUTPUT  HOLD
18  GROUND
17  COM
16  CNTRLR  OUTPUT
15  XMITR  OUTPUT
14  RS−485  −
13  RS−485  +
12  GROUND
11  AUDIO  ALARM
10  ALARM  LIGHT
 9  DECR        NULL
 8  COM
 7  INCR        CNTRLR
 6  N.C.
 5  COM         ALARM
 4  N.O.        RELAY
 3  EARTH       24  VAC
 2  LOW
 1  HIGH        POWER
```

Figure 4.4

CAUTION
Turn power OFF prior to connecting or disconnecting any wiring to the Transmitter I/O Enclosure.

It is recommended that all power wiring be 14 awg to 18 awg, and any signal/control wiring be 14 awg to 22 awg. 14 awg is the maximum wire gauge that the terminal strip can accommodate.

No more than two wires should be connected to any one terminal. 18 awg is the maximum gauge wire that can be doubled up in one terminal.

POWER INPUT (Terminals 1, 2, & 3). 24 VAC power required by the SENTRY must be connected to Terminals 1 and 2. Earth ground should be connected to Terminal 3. When powering multiple units from one power supply, polarity must be maintained.

CAUTION
Power for damper actuators (if utilized) must be supplied
from a power supply other than the one used to power the SENTRY.

ALARM (Terminals 4, 5, & 6). Customer to connect according to desired alarm logic. Figure 4.4 indicates de-energized (alarm off) state. Alarm contacts are rated for 5 amps at 24 VAC/VDC.

4.4 – POWER/SIGNAL CONNECTIONS (con't)

LIGHT & AUDIO ALARM (Terminals 10, 11, & 12). Customer to connect to Air Monitor designed and supplied Nurse's Station. See custom drawings supplied with Nurse's Station for wiring details.

TRANSMITTER OUTPUT (Terminals 15 & 17). This 4.00 to 20.00 mA output is sourced (powered) by the SENTRY. Maximum load resistance is dependent on the power supply voltage, see load graph (Figure 4.5).
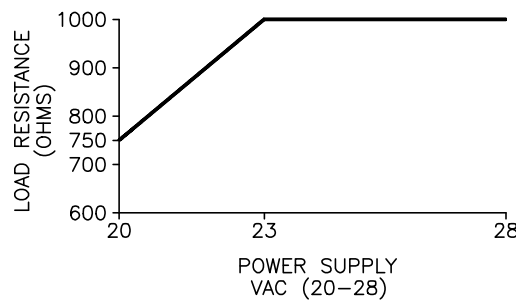
> Note: 4.00mA represents maximum negative pressure or flow; 12.00mA represents zero pressure or flow; and, 20.00mA represents maximum positive pressure or flow.

3-MODE CONTROLLER OUTPUT (Terminals 16 & 17). This 4.00 to 20.00 mA output is sourced (powered) by the SENTRY. Maximum load resistance is dependent on the power supply voltage, see load graph (Figures 4.5).

Figure 4.5

OUTPUT HOLD (Terminals 18 & 19). Customer to provide a maintained contact closure (unpowered) indicating room entry/exit. Holds transmitter output, display, and controller output (if option is installed) steady at last value during the contact closure.

REMOTE ALARM MUTE/RESET (Terminals 18 & 20). Customer to provide momentary contact closure (unpowered) to mute both local and remote alarms if alarm condition exists. A subsequent momentary contact closure when alarm condition still exists, will unmute remote alarm but not the local alarm. (The only way to unmute a local alarm is by pressing [MUTE ▲]). If the alarm is latching (see Section 5.4.2), a momentary contact closure after the alarm condition has cleared will reset all alarms.

AUX INPUT 1 - Unoccupied (Terminals 21 & 24). Customer to provide a maintained contact closure (unpowered) to change room operating mode to Unoccupied. Removal of contact closure will return room operating mode to Occupied. This feature will only function if remote activation was selected via switch 6 & 7 of DIP S3 (see Section 5.4.2).

AUX INPUT 2 - Positive Room (Terminals 22 & 24). Customer to provide a maintained contact closure (unpowered)* for the room to operate in the Positive mode. This feature will only function if remote activation was selected via switch 6 & 7 of DIP S3 (see Section 5.4.2).

AUX INPUT 3 - Negative Room (Terminals 23 & 24). Customer to provide maintained contact closure (unpowered)* for the room to operate in the Negative mode. This feature will only function if remote activation was selected via switch 6 & 7 of DIP S3 (see Section 5.4.2).

 * If no contact closure exists at either AUX INPUT 2 or 3, SENTRY will operate in Purge mode.

5 – OPERATION

The SENTRY has been configured and calibrated at the Factory to customer specified parameters which are recorded on the Factory Set-Up Information Sheet, included at the end of this manual. Review this information and verify that the SENTRY set-up is correct for your application.

5.1 - START-UP

After installation has been verified in accordance with Section 4, apply power to the SENTRY. Display will indicate current room operating mode and current room pressurization in Inches of w.c. (or FPM). One of the three status LED's will indicate room condition relative to the setpoint. See Figure 5.1.
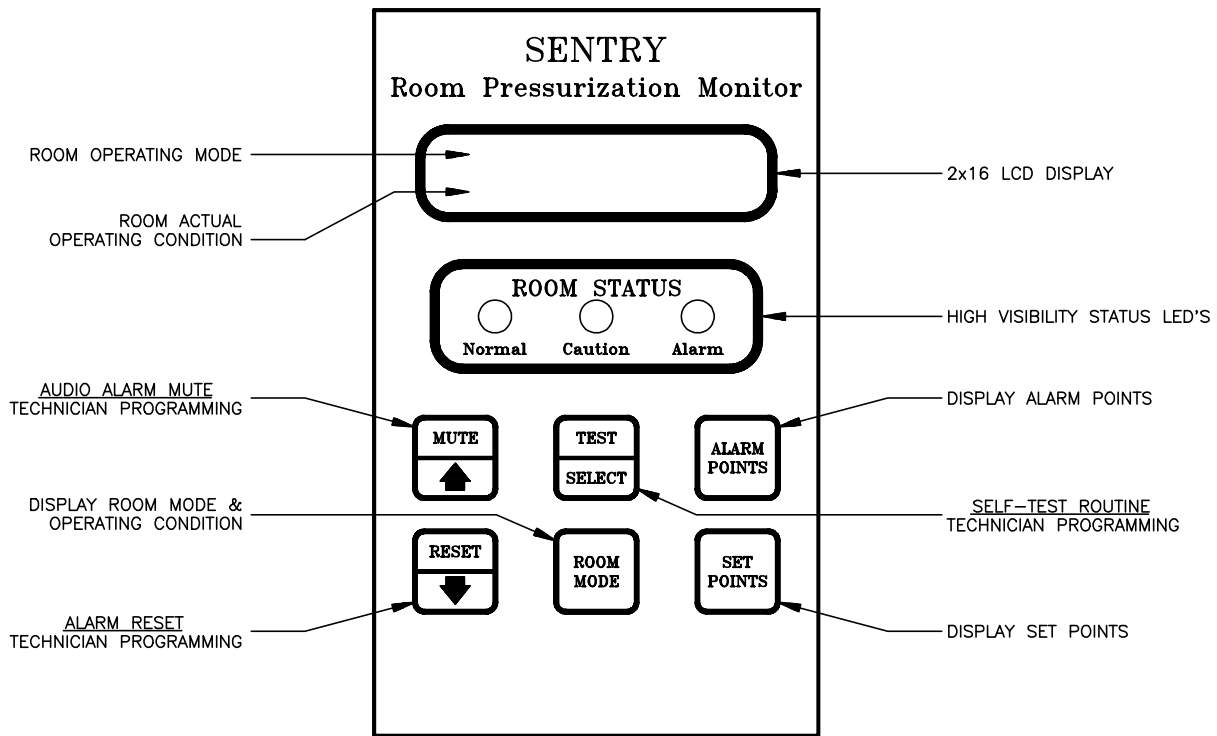
Figure 5.1

5.2 - KEYPAD DEFINITIONS

The following describes the functions of the six buttons on the Keypad Assembly. Descriptions include both standard operation mode and parameter set-up mode. See Figure 5.1 for the locations of the buttons. Buttons are momentary type and should be quickly pushed and released to initiate desired change, unless otherwise instructed to push and hold.

TEST SELECT	Enters user into the parameter set-up menu. Selects and stores desired value or state when in a parameter menu item. When in standard operation mode, pushing and holding will initiate the self-diagnostic test routine.
ROOM MODE	Changes display from current room operating mode and condition to indicating SENTRY only. Pushing again will return display to room operating mode and condition.
SET POINTS	Push and hold, displays setpoint of current room operating mode. Button has no effect when in parameter set-up menu.
ALARM POINTS	Push and hold, displays the alarm setpoints (High and Low for Positive and Negative modes, Low only for all other modes) for the current room operating mode. Repeatedly depressing button, scrolls through these values. While in parameter set-up menu, button will return SENTRY to standard operating mode, and while displaying parameter value or state will return to menu item without entering any changes to value or state.
MUTE ▲	Mutes local audio alarm. Used to scroll up through menu items or values/states when in parameter set-up menu.
RESET ▼	Resets all latched alarms.* Used to scroll down through menu items or values/states when in parameter set-up menu.
ALARM POINTS + **MUTE ▲**	Pushing and holding both buttons at the same time will display the software version number. (To prevent changing the mute status, push and hold **ALARM POINTS** first, and release last.)

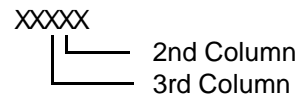*Will not work if method of room mode selection is Remote.

The following button combinations can be used to more quickly set user selected values (i.e., Controller Parameters, Alarm Delay, and Span Value).

MUTE ▲ * + **TEST SELECT**	Increases the 2nd column digit.
RESET ▼ * + **TEST SELECT**	Decreases the 2nd column digit.
MUTE ▲ * + **RESET ▼**	Increases the 3rd column digit.
RESET ▼ * + **MUTE ▲**	Decreases the 3rd column digit.

XXXXX
— 2nd Column
— 3rd Column

*Must be pressed and held before other pushbutton is pressed.

5.3 – STANDARD OPERATION MODE

In standard operation mode, the SENTRY's display will continuously indicate current room operating mode and room condition in Inches w.c. (or FPM) or `SENTRY`. Additionally, LEDs will indicate status of current room pressurization (Normal, Caution, or Alarm) relative to the setpoint. Alarms will activate as necessary and controller output (if option has been installed) will continuously modulate to maintain setpoint pressure (or flow). See Figure 5.1 for location of the displayed information.

The following are more detailed descriptions of displays and user interface in the standard operation mode.

ROOM OPERATING MODE

- The top line of the display will indicate the current room operating mode: `Positive Room`, `Negative Room`, `Unoc Positive Room`, `Unoc Negative Room`, or `Purge`.

- The method of changing the current room mode depends on the method of room mode selection (see Section 5.4.2).

- If room mode selection is Keypad, the room operating mode can be changed by entering the parameter set-up menu (see Section 5.5).

- If room mode selection is Keyswitch, the room operating mode can be changed via the keyswitch on the side of the Keypad Assembly, and a customer installed two position switch (to select Unoccupied). This is applicable only if keyswitch option has been installed.

- If room mode source is Remote, the room operating mode can be changed via customer installed three position switch and two position switch (to select Unoccupied).

`Positive Room` mode monitors and controls (if controller option has been installed) the monitored room at the Positive Room Control/Monitor setpoint as conditions in the room change.

`Negative Room` mode monitors and controls (if controller option has been installed) the monitored room at the Negative Room Control/Monitor setpoint as conditions in the room change.

`Unoc Positive Room` mode monitors and controls (if controller option has been installed) the monitored room at the Unoccupied Positive Room Control/Monitor setpoint as conditions in the room change

`Unoc Negative Room` mode monitors and controls (if controller option has been installed) the monitored room at the Unoccupied Negative Room Control/Monitor setpoint as conditions in the room change.

`Purge` mode monitors and controls (if controller option has been installed) the monitored room at maximum negative pressure for the duration of the programmed purge time. Controller output is maintained at maximum (or minimum depending on controller action) to achieve maximum negative pressure.*

*Note: This pressure may exceed the SENTRY's measuring range.

5.3 – STANDARD OPERATION MODE (con't)

OPERATING STATUS

One of the status LED's will always be lit indicating the current monitored room condition relative to the current room operating setpoint and alarm setpoints. The following descriptions are applicable for both Positive and Negative room operating modes. Figure 5.2 is a visual representation of the following descriptions.

Normal (green) LED indicates the monitored room condition is between a low value of the midpoint between the room Control/Monitor setpoint and the Low alarm setpoint, and a high value of the midpoint between the room Control/Monitor setpoint and the High alarm setpoint. In Figure 5.2 this range would be 0.015" w.c. to 0.025"w.c.

Caution (yellow) LED indicates the monitored room condition is either between the Low alarm setpoint and the midpoint between the room Control/Monitor setpoint and the Low alarm setpoint, or between the High alarm setpoint and the midpoint between the room Control/Monitor setpoint and the High alarm setpoint.. In Figure 5.2 these ranges would be 0.011" w.c. to 0.014" w.c. and 0.026" w.c. to 0.029" w.c.

Alarm (red) LED indicates the monitored room condition is less than or equal to the Low alarm setpoint or greater than or equal to the High alarm setpoint. In Figure 5.2 these flows would be less than or equal to 0.010" w.c. and greater than or equal to 0.030" w.c.
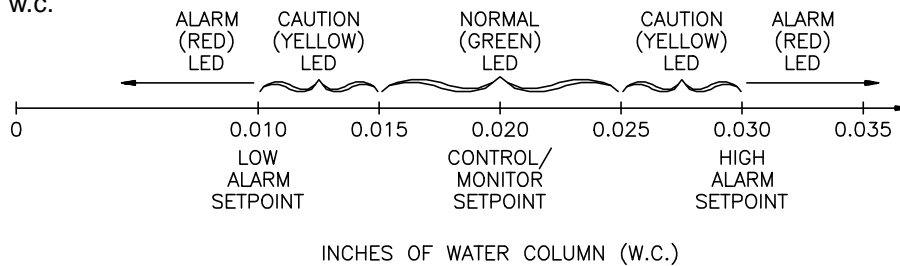

Figure 5.2

ALARMS

If an alarm condition (Low or High) persists beyond the programmed delay period, the Alarm (red) LED will be lit, local audio alarm will sound (if active), and alarm relays will activate.

Pushing [MUTE] will silence the local audio alarm. Pushing again will remove mute. Mute can also be accomplished remotely by a momentary contact closure at terminals 18 and 20 (see Section 4.4). When local audio alarm has been muted, an ฿ will be displayed in the lower right corner of the display.

Alarms will automatically reset when acceptable conditions are restored, unless alarms have been set to latching via switch 3 of DIP S3 (see Section 5.4.2). If alarm is latching and operating mode selection is Keypad or Keyswitch (see Section 5.4.2), pushing [RESET] or momentary contact closure at Terminals 18 and 20 (see Section 4.4) after alarm condition clears will reset all alarms.

If alarm is latching and operating mode selection is Remote, reset can only be accomplished by momentary contact closure at terminals 18 and 20.

Successive pushing and holding [ALARM POINTS] will alternately display High and Low alarm setpoints (Low only for Unoccupied and Purge modes).

When changing room mode (via any method), alarm activation will be delayed for 30 seconds to allow controller to bring room condition to setpoint value. This 30 seconds is independent of any programmed alarm delay (see Section 5.5). Caution (yellow) LED may be lit immediately upon room mode change.

5.3 – STANDARD OPERATION MODE (con't)

CONTROLLER (only available if controller option is installed).

If controller has been configured for automatic operation (see Section 5.5), output will continuously modulate its output to maintain monitored room condition at room Control setpoint.

DIAGNOSTIC TEST

The SENTRY will perform a self-diagnostic test routine that the user can use to verify that the display, status LED's, and local audio alarm are working properly. To initiate the test, push and hold $\boxed{\begin{array}{c}\text{TEST}\\\text{SELECT}\end{array}}$ until DIAGNOSTIC TEST IN PROGRESS begins to scroll across the screen. The display will then indicate;

```
DIAGNOSTIC TEST
LEDs Cycling Now
```
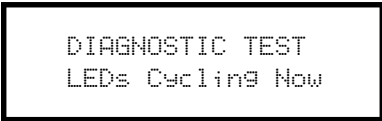
User should verify that the status LED's are alternately flashing for about 5 seconds. The display will then indicate;

```
DIAGNOSTIC TEST
Audio Alarm Now
```

User should verify that the local audio alarm sounds for about 5 seconds. All status LEDs will be lit during this audio test. At the end of this test the SENTRY will return to standard operation and the display will indicate as it did prior to the test. If any problems were observed during the test, refer to Section 8 - Troubleshooting.

5.4 – CONFIGURATION SET-UP

The SENTRY configuration set-up is accomplished via two DIP switches S2 and S3, each with 8 switches.

DIP switch S2 is located on the circuit board in the Transmitter I/O Enclosure (see Figure 5.3) and is used to set the SENTRY for the desired pressurization (flow) range [±0.005" w.c. (±250 FPM); ±0.015" w.c. (±450 FPM); ±0.035" w.c. (±650 FPM); ±0.100" w.c. (±1150 FPM)].

   Note: A (-) in front of the FPM value indicates flow direction.

DIP switch S3 is located on the circuit board in the Keypad Assembly (see Figure 5.4) and is used to set operational parameters (see Section 5.4.2 for specifics). The positions of all switches of S2 and S3 as they were set at the Factory are recorded on the Factory Set-Up Information Sheet included at the end of this manual. Review this sheet before proceeding.
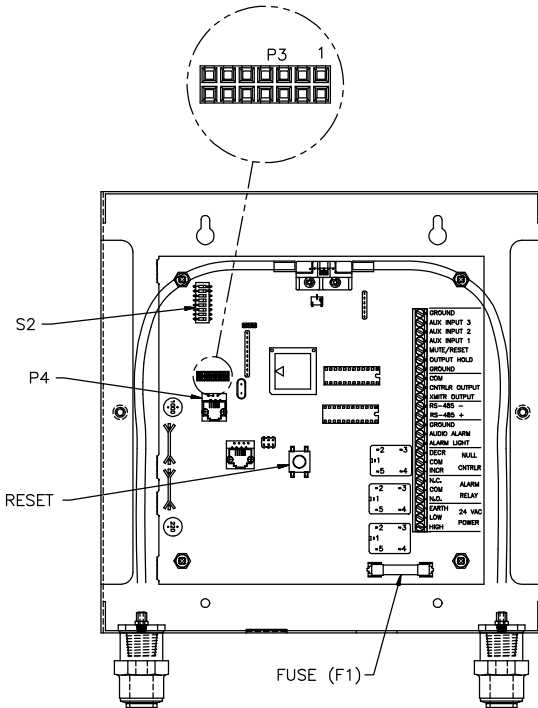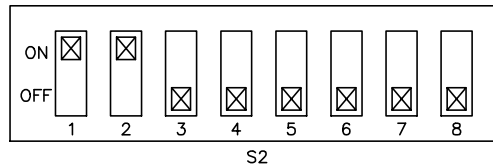

Figure 5.3
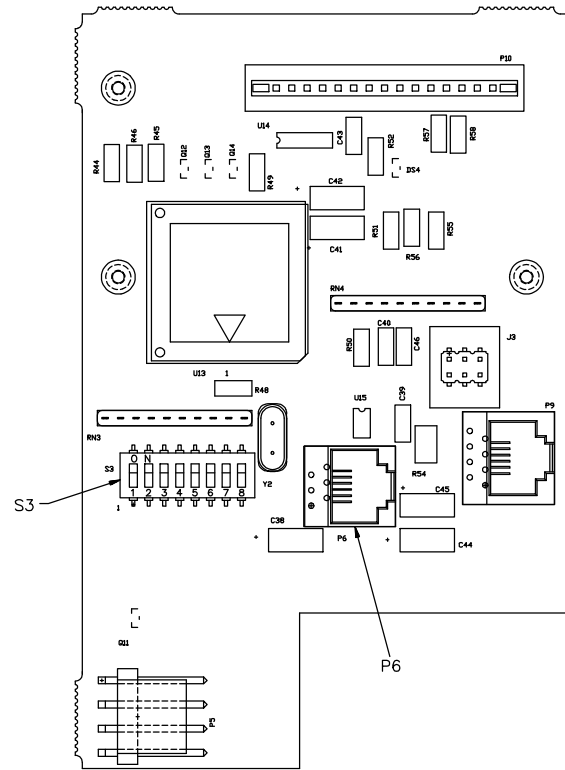
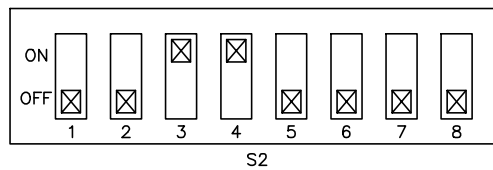Figure 5.4

5.4 – CONFIGURATION SET-UP (con't)

5.4.1   Flow Range

To gain access to DIP switch S2, remove the two screws holding on the cover of the Transmitter I/O Enclosure. See Figure 5.3 to locate S2 on the circuit board.   Figure 5.5 depicts the positions of the eight individual switches on DIP S2 for the four available pressurization (flow) ranges.
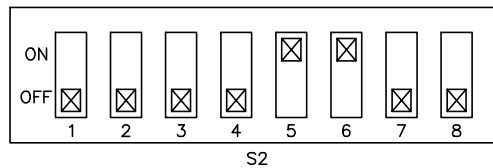
-0.0050" to +0.0050" w.c. (-250 to +250 FPM)

-0.0150" to +0.0150" w.c. (-450 to +450 FPM)

-0.0350" to +0.0350" w.c. (-650 to +650 FPM)

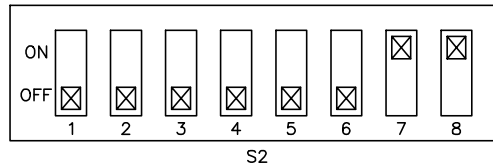-0.1000" to +0.1000" w.c. (-1150 to +1150 FPM)

Figure 5.5

5.4 – CONFIGURATION SET-UP (con't)

5.4.2   Operational Parameters

To gain access to DIP switch S3, remove the two screws holding the Keypad Assembly to the wall mount bracket. See Figure 5.4 to locate S3 on the circuit board.

The following details the functions of the eight switches on S3.

SWITCH 1: Factory set and should not be changed.

SWITCH 2: Factory set and should not be changed.

SWITCH 3: Used to select between latching or non-latching alarm type. Figure 5.6 depicts the positions of switch 3 for the two different alarm selections. A non-latching alarm will clear when alarm condition no longer exists.
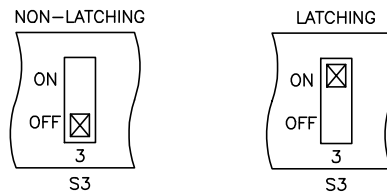

Figure 5.6

SWITCH 4: Used to select whether local audio alarm is active or inactive. Figure 5.7 depicts the positions of switch 4 for the two local audio alarm selections.
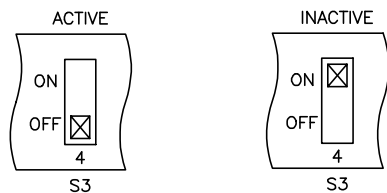

Figure 5.7

SWITCH 5: Used to select whether the monitored room pressurization is displayed in Inches of w.c. or in FPM.. Figure 5.8 depicts the positions of switch 5 for the two different display selections.
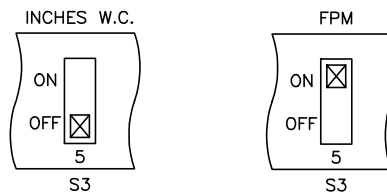

Figure 5.8

5.4 – CONFIGURATION SET-UP (con't)

5.4.2   Operational Parameters (con't)

SWITCH 6 and 7: Used to select the method of room mode selection. Three methods are available; Keypad, Keyswitch (only if option has been installed) or Remote. Figure 5.9 depicts the positions of switch 6 and 7 for the three different room mode selection methods.
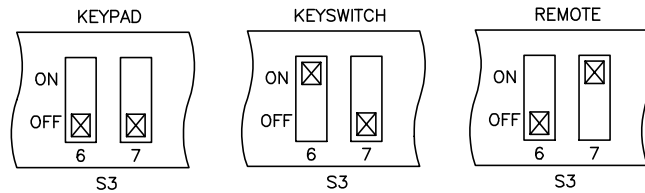

Figure 5.9

SWITCH 8: Used to select whether the passwords are active or inactive. Figure 5.10 depicts the positions of switch 8 for the two different password selections.
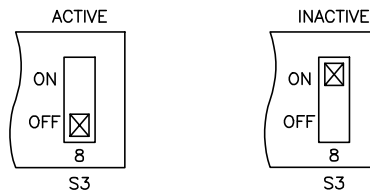

Figure 5.10

5.5 – PARAMETER SET-UP

The SENTRY parameter set-up is accomplished via the six buttons on the Keypad Assembly. The following descriptions list all parameters, which may or may not be available on your unit. Review the Factory Information Set-Up Sheet for those parameters available on your unit.

PARAMETER MENU DISPLAY   DESCRIPTION

```
┌─────────────────────────────┐
│                             │
│        Room Mode            │
│                             │
└─────────────────────────────┘
```

Selects the Room Operating Mode: Positive Room, Negative Room, Unoccupied Positive Room, Unoccupied Negative Room, or Purge. This menu item is not available if method of Room Mode selection is either Keyswitch or Remote.

```
┌─────────────────────────────┐
│      Control SetPt          │
│      Positive Room          │
│                             │
└─────────────────────────────┘
```

Sets the Positive Room setpoint.
Adjustable between 0 and (see Table 5.1)

Note: If controller option is not installed, display will read:

```
┌─────────────────────────────┐
│      Monitor SetPt          │
│      Positive Room          │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│     Low Alarm SetPt         │
│      Positive Room          │
│                             │
└─────────────────────────────┘
```

Sets the Positive Room Low Alarm setpoint
Adjustable between 0 and the Control/Monitor setpoint.

```
┌─────────────────────────────┐
│     High Alarm SetPt        │
│      Positive Room          │
│                             │
└─────────────────────────────┘
```

Sets the Positive Room High Alarm setpoint.
Adjustable between the Control/Monitor setpoint and (see Table 5.1)

```
┌─────────────────────────────┐
│      Control SetPt          │
│      Negative Room          │
│                             │
└─────────────────────────────┘
```

Sets the Negative Room setpoint. Adjustable between 0 and (see Table 5.1).

Note: If controller option is not installed, display will read:

```
┌─────────────────────────────┐
│      Monitor SetPt          │
│      Negative Room          │
│                             │
└─────────────────────────────┘
```

5.5 – PARAMETER SET-UP (con't)

PARAMETER MENU DISPLAY   DESCRIPTION

```
┌─────────────────────────┐
│                         │
│    Low Alarm SetPt      │
│     Negative Room       │
│                         │
└─────────────────────────┘
```
Sets the Negative Room Low Alarm setpoint.
Adjustable between 0 and Control/Monitor setpoint.

```
┌─────────────────────────┐
│                         │
│   High Alarm SetPt      │
│     Negative Room       │
│                         │
└─────────────────────────┘
```
Sets the Negative Room High Alarm setpoint.
Adjustable between Control/Monitor setpoint and (see Table 5.1).

```
┌─────────────────────────┐
│                         │
│    Control SetPt        │
│    Unoc Positive Rm     │
│                         │
└─────────────────────────┘
```
Sets the Unoccupied Positive Room Setpoint.
Adjustable between 0 and (see Table 5.1).

Note: If controller option is not installed, display will read:

```
┌─────────────────────────┐
│                         │
│    Monitor SetPt        │
│    Unoc Positive Rm     │
│                         │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│                         │
│    Control SetPt        │
│    Unoc Negative Rm     │
│                         │
└─────────────────────────┘
```
Sets the Unoccupied Negative Room Setpoint.
Adjustable between 0 and (see Table 5.1).

Note: If controller option is not installed, display will read:

```
┌─────────────────────────┐
│                         │
│    Monitor SetPt        │
│    Unoc Negative Rm     │
│                         │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│                         │
│     Purge Time          │
│                         │
│                         │
└─────────────────────────┘
```
Sets the duration of the Purge Mode.
Adjustable between 0.1 and 8.0 hours, in 0.1 hour increments.

5.5 – PARAMETER SET-UP (con't)

PARAMETER MENU DISPLAY   DESCRIPTION

```
┌─────────────────────────┐
│      Low Alarm          │     Turns all (Negative, Positive, Unoccupied, and Purge) Low alarms on or off.
│    Enable/Disable       │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│     High Alarm          │     Turns both (Negative and Positive) High alarms on or off.
│   Enable/Disable        │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│     Alarm Delay         │     Sets the time between an alarm condition existing and alarm activation.
│                         │     Adjustable between 0 and 600 seconds in 1 second increments. Applicable to
│                         │     all alarms.
└─────────────────────────┘
```

```
┌─────────────────────────┐
│   Cal Xmitter Zero      │     Allows for zero calibration.  See Sections 6.1.3 and 6.2.3.
│                         │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│   Cal Xmitter Span      │     Allows for span calibration.  See Sections 6.1.4 and 6.2.4.
│                         │
└─────────────────────────┘
```

```
┌─────────────────────────┐  *
│   Prop. Band Gain       │     Sets the controller Proportional Band Gain between 0.10 and 10.00 in 0.01 increments.
│                         │
└─────────────────────────┘
```

```
┌─────────────────────────┐  *
│      Integral           │     Sets Integral Time Constant between 0.0 and 60.0 seconds in 0.1 second increments.
│    Time Constant        │
└─────────────────────────┘
```

* Only available when controller option has been installed.

5.5 – PARAMETER SET-UP (con't)

PARAMETER MENU DISPLAY   DESCRIPTION

```
Invers Derivativ
  Time Constant
```
*
Sets Inverse Derivative Time Constant between 0.0 and 60.0 seconds in
0.1 second increments.

```
Cntrlr Out Min.
```
*
Sets the minimum controller output between 4.00 and 20.00 mA in 0.01 mA
increments.

```
Cntrlr Out Max.
```
*
Sets the maximum controller output between 4.00 and 20.00 mA in 0.01 mA
increments.

```
Controler Output
  Auto/Manual
```
*
Allows for the switching of controller output between automatic (setpoint)
and manual (keypad setting).

```
Controler Output
  Manual Value
```
*
Sets the manual controller output value between 4.00 and 20.00mA in 0.01 mA
increments.

```
Output Action
Direct/Reverse
```
*
Sets the controller output action between direct and reverse. The action selected
applies to the room mode (Positive or Negative) selected in the menu or currently
selected via Keyswitch or Remote. The action will automatically switch when
room operating mode is changed (i.e. Positive to Negative). Example: If reverse
action was selected while room operating mode is Positive (or Unoccupied
Positive), the action will switch to direct when room operating mode is changed
to Negative (or Unoccupied Negative).

```
Set Operator
  Password
```
Allows setting of custom four alpha-character Operator password.

```
Set Technician
  Password
```
Allows setting of custom four alpha-character Technician Password.

* Only available when controller option has been installed.

5.5 – PARAMETER SET-UP (con't)

PARAMETER MENU DISPLAY   DESCRIPTION

```
  Display Max D.P.
```

Displays the maximum differential pressure that can be sensed in the current range set in Section 5.3.1. This pressure corresponds to a transmitter output of 20.00mA.

or

```
  Display Max Flow
```

Displays the maximum flow that can be sensed in the current range set in Section 5.3.1. This flow corresponds to a transmitter output of 20.00mA.

```
   Exit Menu
   Push SELECT
```

Returns the SENTRY to standard operation.

5.5 – PARAMETER SET-UP (con't)

PARAMETER	OPERATING RANGE			
	0 to ±0.00500" w.c.[1] (0 to ±250 FPM)	0 to ±0.0150" w.c.[2] (0 to ±450 FPM)	0 to ±0.035" w.c.[3] (0 to ±650 FPM)	0 to ±0.100" w.c.[4] (0 to ±1150 FPM)
Positive Room Control/Monitor Setpoint	0 to 0.00500" w.c. (0 to 250 FPM)	0 to 0.0150" w.c. (0 to 450 FPM)	0 to 0.035" w.c. (0 to 650 FPM)	0 to 0.100" w.c. (0 to 1150 FPM)
Positive Room Low Alarm Setpoint	0 to Control/ Monitor Setpoint	0 to Control/ Monitor Setpoint	0 to Control/ Monitor Setpoint	0 to Control/ Monitor Setpoint
Positive Room High Alarm Setpoint	Control/Monitor Setpoint to 0.00600" w.c. (280 FPM)	Control/Monitor Setpoint to 0.0180" w.c. (500 FPM)	Control/Monitor Setpoint to 0.042" w.c. (725 FPM)	Control/Monitor Setpoint to 0.120" w.c. (1250 FPM)
Negative Room Control/Monitor Setpoint	0 to -0.00500" w.c. (0 to -250 FPM)	0 to -0.0150" w.c. (0 to -450 FPM)	0 to -0.035" w.c. (0 to -650 FPM)	0 to -0.100" w.c. (0 to -1150 FPM)
Negative Room Low Alarm Setpoint	0 to Control/Monitor Setpoint	0 to Control/Monitor Setpoint	0 to Control/Monitor Setpoint	0 to Control/ Monitor Setpoint
Negative Room High Alarm Setpoint	Control/Monitor Setpoint to -0.00600" w.c. (-280 FPM)	Control/Monitor Setpoint to -0.0180" w.c. (-500 FPM)	Control/Monitor Setpoint to -0.042" w.c. (-725 FPM)	Control/Monitor Setpoint to -0.120" w.c. (1250 FPM)
Unoccupied Positive Room Control/Monitor Setpoint	0 to 0.00500" w.c. (0 to 250 FPM)	0 to 0.0150" w.c. (0 to 450 FPM)	0 to 0.035" w.c. (0 to 650 FPM)	0 to 0.100" w.c. (0 to 1150 FPM)
Unoccupied Positive Room Low Alarm Setpoint	0.00000" w.c. (0 FPM) Not Adjustable	0.0000" w.c. (0 FPM) Not Adjustable	0.000" w.c. (0 FPM) Not Adjustable	0.000" w.c. (0 FPM) Not Adjustable
Unoccupied Negative Room Control/Monitor Setpoint	0 to -0.00500" w.c. (0 to -250 FPM)	0 to -0.0150" w.c. (0 to -450 FPM)	0 to -0.035" w.c. (0 to -650 FPM)	0 to -0.100" w.c. (0 to -1150 FPM)
Unoccupied Negative Room Low Alarm Setpoint	-0.00000" w.c. (-0 FPM) Not Adjustable	-0.0000" w.c. (-0 FPM) Not Adjustable	-0.000" w.c. (-0 FPM) Not Adjustable	-0.000" w.c. (-0 FPM) Not Adjustable
Purge Low Alarm Setpoint	0.00000" w.c. (0 FPM)	0.0000" w.c. (0 FPM)	0.000" w.c. (0 FPM)	0.000" w.c. (0 FPM)

Table 5.1

[1] Adjustable in 0.00025" w.c. (10 FPM) increments
[2] Adjustable in 0.0005" w.c. (25 FPM) increments
[3] Adjustable in 0.0010" w.c. (25 FPM) increments
[4] Adjustable in 0.005" w.c. (50 FPM) increments

5.5 – PARAMETER SET-UP (con't)

To enter into the parameter set-up menu and verify or change parameters follow the steps outlined below.

Note: While in the parameter set-up menu, transmitter output, controller (if option is installed) output, and alarms (except status LEDs) will continue to function as normal.

1. Push [TEST SELECT] and if password is active (see Section 5.4.2), display will indicate:

```
┌─────────────────────────────┐
│                             │
│      Enter Password         │
│       Push SELECT           │
│                             │
└─────────────────────────────┘
```

If password is bypassed (see Section 5.4.2), display will indicate;

```
┌─────────────────────────────┐
│                             │
│      Parameter Menu         │
│       Push SELECT           │
│                             │
└─────────────────────────────┘
```

Skip steps 2 through 7 and proceed with step 8.

2. Push [TEST SELECT] and display will indicate:

```
┌─────────────────────────────┐   *
│                             │
│      Enter OPerator         │
│         Password            │
│                             │
└─────────────────────────────┘
```

Use [MUTE ▲] or [RESET ▼] to scroll to:

```
┌─────────────────────────────┐
│                             │
│     Enter Technician        │
│         Password            │
│                             │
└─────────────────────────────┘
```

                        or

```
┌─────────────────────────────┐   **
│                             │
│      Exit Password          │
│       Push SELECT           │
│                             │
└─────────────────────────────┘
```

   *This option is only available if the method of room mode selection is Keypad (see Section 5.4.2).

**Using this selection will exit parameter set-up menu and return to standard operation.

5.5 – PARAMETER SET-UP (con't)

3. When desired Password type is displayed, push [TEST SELECT] and display will indicate:

```
┌─────────────────────────────────┐
│                                 │
│         Password                │
│            █                    │
│                                 │
└─────────────────────────────────┘
```

4. Push [TEST SELECT] and an A will appear as shown below:

```
┌─────────────────────────────────┐
│                                 │
│         Password                │
│            A                    │
│                                 │
└─────────────────────────────────┘
```
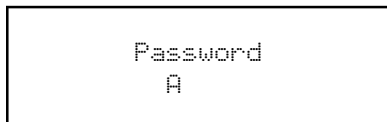
5. Use [MUTE ▲] or [RESET ▼] to scroll up or down through the alphabet.

6. When correct letter is displayed, push [TEST SELECT] and letter will be entered* and cursor █ will move one space to the right.

    *When entering the letter, the 'Normal'-green LED will flash once as an indication that the letter has been stored in the microprocessor's memory.

7. Repeat steps 4 through 6 for the remaining three letters of the password. When [TEST SELECT] is pushed for entering the fourth letter, and if the password was correct, the display should indicate:

```
┌─────────────────────────────────┐
│      Parameter Menu             │
│        Push SELECT              │
│                                 │
└─────────────────────────────────┘
```
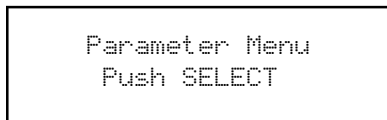
If the password was incorrect, the display will indicate:

```
┌─────────────────────────────────┐
│      Wrong Password             │
│         Try Again               │
│                                 │
└─────────────────────────────────┘
```
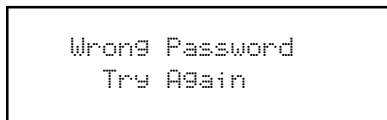
for 5 seconds, then return to standard operation. Repeat steps 1 through 7 using the correct password.

Note: All SENTRY's are shipped from the factory with both passwords set to AAAA. If the password has been changed and cannot be recalled, it can be bypassed via switch 8 of DIP S3 (see Section 5.4.2).

5.5 – PARAMETER SET-UP (con't)

8. Push [TEST SELECT] and display will indicate:

```
┌─────────────────────────────┐
│                             │      *
│        Room Mode            │
│                             │
│                             │
└─────────────────────────────┘
```
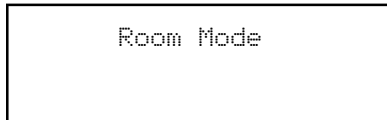
* This menu item will be available only if method of room mode selection is Keypad (see Section 5.4.2).

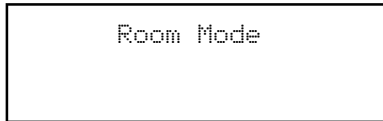9. Push [TEST SELECT] and the display will indicate the current room operating mode.

```
┌─────────────────────────────┐
│        Room Mode            │      (Example)
│      Positive Room          │
│                             │
│                             │
└─────────────────────────────┘
```
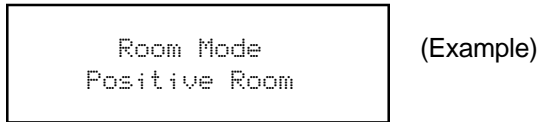
10. Use [MUTE ▲] or [RESET ▼] to scroll through the available options. Once the desired room mode is displayed, push [TEST SELECT]
    and the mode will be entered* and display will return to:

```
┌─────────────────────────────┐
│        Room Mode            │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

*When entering the room mode (even if it has not changed), the 'Normal'-green LED will flash once indicating that
the room mode has been stored in the microprocessor's memory.

Note: If user desires not to change room mode, but has forgotten the original selection, push [ALARM POINTS] and the
original selection will be retained in the microprocessor's memory and the display will return to:

```
        ┌─────────────────────────────┐
        │                             │
        │        Room Mode            │
        │                             │
        │                             │
        └─────────────────────────────┘
```

This feature can be used while displaying the value or state of any menu item.

11. If the Technician Password was used to enter parameter set-up menu, use [MUTE ▲] or [RESET ▼] to scroll through
    the available parameter set-up menu items. Any available menu item can be viewed and changed in a similar
    fashion as detailed in steps 8 through 10 above.

    Otherwise exit the set-up menu by following step 12. This would be the only option available if the Operator
    Password was used to enter the parameter set-up menu.

12. To exit parameter set-up menu scroll menu until display reads;

```
┌─────────────────────────────┐
│        Exit Menu            │
│      Push SELECT            │
│                             │
│                             │
└─────────────────────────────┘
```
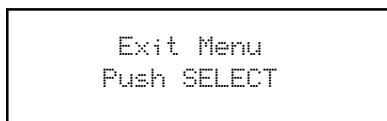
Push [TEST SELECT] and the SENTRY will return to standard operation.

5.6 – CONTROLLER TUNING

This section will detail the various controller tuning features that can be used to tune the SENTRY's controller to system dynamics.

5.6.1   Proportional Band Gain: Control mode in which controller output is proportional to Proportional Gain times the input error. Proportional Gain is a dimensionless number between 0.00 and 10.00, adjustable in 0.01 increments. Factory default setting of this variable is 1.00. Increasing this value will speed up the controller's response to change.

Integral Time Constant: Control mode in which controller output is proportional to the Integral Time Constant of input error, and as long as error exists in reference to time, controller output will increase or decrease as necessary to bring error to zero. Integral Time Constant is expressed in seconds. Range is 0.0 to 60.0 seconds, adjustable in 0.1 second increments. Factory default setting of this variable is 10.0 seconds. Decreasing this value will speed up the controller's response to change.

Inverse Derivative Time Constant: Control mode in which the controller's Proportional mode output response is delayed by the Inverse Derivative Time Constant. This special feature is very useful in controlling a fast process, such as flow. Inverse Derivative Time Constant is expressed in seconds. Range is 0.0 to 60.0 seconds, adjustable in 0.1 second increments. Factory default setting of this variable is 10.0 seconds. Decreasing this value will speed up the controller's response to change.

Note: Generally, a controller cycling several times before settling at setpoint indicates an under-damped system. Slowing of the controller's speed of response is recommended. A controller taking excessive time to reach its setpoint without overshooting, indicates an over-damped system. Speed up the controller's response in this case. An optimally tuned (critically damped) system will generally have one overshoot and one undershoot prior to settling at setpoint.

---

6 – CALIBRATION

This section outlines the steps necessary to calibrate zero and span of the SENTRY. Section 6.1 is to be used for units that display in inches of w.c. Sections 6.2 is to be used for units that display FPM.

These steps must be performed with the SENTRY mounted in its normal operating location.

6.1 – CALIBRATION (Pressure)

6.1.1   Required Equipment: Manometer capable of reading to the nearest 0.001" w.c.
                                    Two Capacity Chambers
                                    Appropriate Tubing

6.1.2   Preparation:

1.   Set room operating mode to either Positive Room or Negative Room. Select the mode most commonly used. Do not select Unoccupied or Purge Modes.

2.   Locate a capacity chamber in a calm location in the monitored room. If Positive Room mode was selected in Step 1, connect this chamber to the high input of manometer via appropriate tubing. If Negative Room mode was selected, connect to low input of manometer.

3.   Locate the other capacity chamber in a calm location in the reference area. Connect this chamber to the remaining input of manometer via appropriate tubing.

4.   Open any doors or passageways between the monitored room and the reference area and allow the pressure in both areas to equilibrate.

6.1.3   Zero Calibration:

After performing this section, Section 6.1.4 must be performed to ensure proper calibration.

1.   Manometer should be reading 0.000" w.c. If not, place tape over each of the Flow/Pressure Sensing Ports, making sure to completely cover opening.

2.   Enter the parameter set-up menu and scroll to:
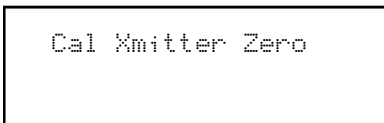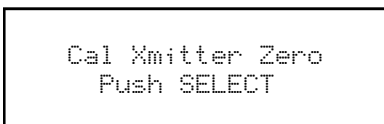
```
Cal Xmitter Zero
```

3.   Push [TEST SELECT] and the display will indicate:

```
Cal Xmitter Zero
  Push SELECT
```

4.   Push [TEST SELECT] , the display will indicate:

```
Cal Xmitter Zero
Wait 10 Seconds
```
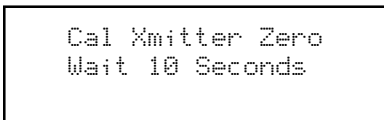
and the 'Normal'-green LED will flash once per second for 10 seconds.

6.1 – CALIBRATION (Pressure)

6.1.3   Zero Calibration (con't)

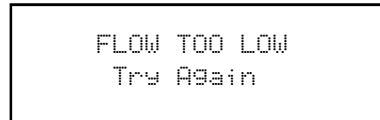5.   After the 10 seconds the display will return to;

```
Cal Xmitter Zero
```
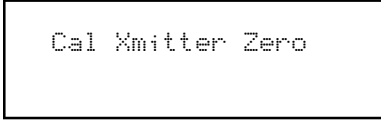
Zero calibration occurs automatically.
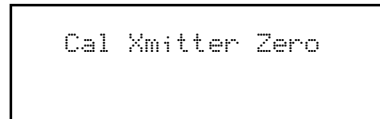
Note: If a pressure differential equal to or greater than ±25% of the selected range was sensed by the
SENTRY during the zero calibration, the display will indicate:

```
   FLOW TOO HIGH             or          FLOW TOO LOW
     Try Again                             Try Again
```

Push [TEST SELECT] and display will return to:
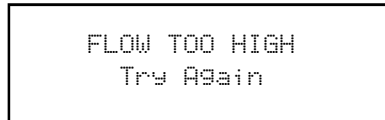
```
Cal Xmitter Zero
```

Verify Step 1 was performed, and repeat Steps 3 through 5. Refer to Section 8 – Troubleshooting if
necessary.

6.1.4   Span Calibration

This section must be done only after section 6.1.3 has been completed.

1.   With manometer still set-up as in Section 6.1.2, close all doors and passageways.

2.   Remove any tape from Flow Sensing Ports if installed in Section 6.1.3.

3.   Allow sufficient time to bring monitored room to Control/Monitor setpoint.

4.   Scroll parameter set-up menu to:

```
Cal Xmitter Span
```

5.   Push [TEST SELECT] and display will indicate:

```
Cal Xmitter Span
   Push SELECT
```
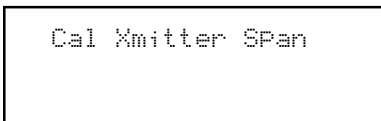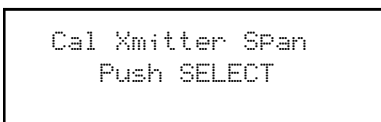
6.1 – CALIBRATION (Pressure)

6. Push [TEST/SELECT], the display will indicate:

```
Cal Xmitter SPan
Wait 10 Seconds
```

and the 'Normal'-green LED will flash once per second for 10 seconds.

7. After 10 seconds the display will indicate:

```
Set SPan Value
XXX IN. WC
```

Span calibration occurs automatically.

Note: If the pressure sensed by the SENTRY is less than 25% or greater than 125% of the selected span, the display will indicate:

```
FLOW TOO LOW          or          FLOW TOO HIGH
Try Again                          Try Again
```

Push [TEST/SELECT] and display will return to:

```
Cal Xmitter SPan
```

Correct pressure (flow) and repeat steps 5 through 7. Refer to Section 8 – Troubleshooting if necessary.

8. Displayed value should match that of the manometer. If not, use [MUTE ▲] and [RESET ▼] to increase or decrease as necessary.

9. When desired value is displayed, push [TEST/SELECT] and the display will return to:

```
Cal Xmitter SPan
```

The 'Normal'-green LED will flash once to signify that the value has been stored in memory.

10. Scroll parameter set-up menu to:

```
Exit Menu
Push SELECT
```

11. Push [TEST/SELECT] and the SENTRY will return to standard operation.

12. Remove all test equipment.

6.2 – CALIBRATION (Flow)

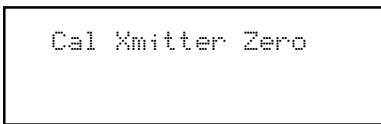6.2.1   Required Equipment: Flow Anemometer

6.2.2   Preparation:
1.   Set room operating mode to either Positive Room or Negative Room. Select the mode most commonly used. Do not select Unoccupied or Purge Modes.
2.   Open all doors and passageways between the monitored room and the reference area.
3.   Place tape over each of the Flow/Pressure Sensing Ports, ensuring to completely cover opening.
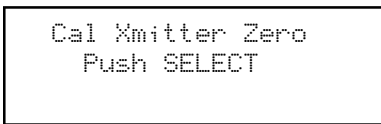
6.2.3   Zero Calibration:

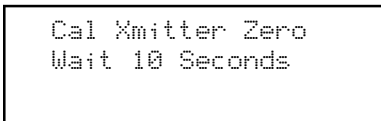After performing this Section, Section 6.2.4 must be performed to ensure proper calibration.

1.   Enter the parameter set-up menu and scroll to:

```
Cal Xmitter Zero
```

2.   Push TEST/SELECT and display will indicate:

```
Cal Xmitter Zero
   Push SELECT
```

3.   Push [TEST/SELECT], the display will indicate:

```
Cal Xmitter Zero
Wait 10 Seconds
```
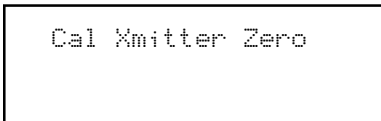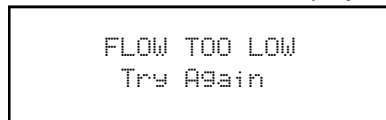
and the 'Normal'-green LED will flash once per second for 10 seconds.

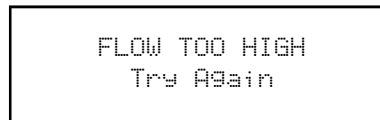4.   After 10 seconds the display will return to:

```
Cal Xmitter Zero
```

Zero calibration occurs automatically.

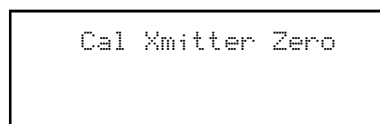Note: If a flow equal to or greater than ±50% of the selected flow range was sensed by the SENTRY during the zero calibration, the display will indicate:

```
FLOW TOO LOW          or          FLOW TOO HIGH
  Try Again                         Try Again
```

Push [TEST/SELECT] and display will return to:
```
Cal Xmitter Zero
```

Verify Section 6.2.2 was performed, and repeat steps 2 through 4. Refer to Section 8 – Troubleshooting if necessary.

6.2 – CALIBRATION (Flow) con't

6.2.4   Span Calibration. This section must be done only after section 6.3.3 has been completed.

   1.   Close all doors and passageways.

   2.   Remove tape from Flow/Pressure Sensing Ports installed in Section 6.2.2.

   3.   Allow sufficient time for the monitored room to build up pressure.

   4.   Open the main door into the monitored room 1 inch (measured between the door and the jamb). Use
        wedges to secure the door in this position.

   5.   Use the flow anemometer to traverse the flow between the monitored room to the reference area through
        the gap. Take multiple readings and calculate the average.

   6.   Scroll parameter set-up menu to:

   ```
   Cal Xmitter Span
   ```

   7.   Push [TEST SELECT] and display will indicate:

   ```
   Cal Xmitter Span
      Push SELECT
   ```

   8.   Push [TEST SELECT], the display will indicate:

   ```
   Cal Xmitter Span
   Wait 10 Seconds
   ```

   and the 'Normal'-green LED will flash once per second for 10 seconds.

   9.   After 10 seconds the display will indicate:

   ```
   Set Span Value

         XXX FPM
   ```

   Span calibration occurs automatically.

   Note: If the flow sensed by the SENTRY is less than 50% or greater than 111% of the selected flow range,
          the display will indicate:

   ```
   FLOW TOO LOW          or          FLOW TOO HIGH
      Try Again                         Try Again
   ```

   Push [TEST SELECT] and display will return to:

   ```
   Cal Xmitter Span
   ```

   Correct flow and repeat steps 7 through 9. Refer to Section 8 – Troubleshooting if necessary.

6.2 – CALIBRATION (Flow) con't

10. Displayed value should match the average flow calculated in step 5. If not, use [MUTE ▲] and [RESET ▼] to increase or decrease displayed value as necessary.

11. When desired value is displayed, push [TEST SELECT] and the display will return to:

```
Cal Xmitter Span
```

The 'Normal'-green LED will flash once to signify that the value has been stored in memory.

12. Scroll parameter set-up menu to:

```
        Exit Menu
      Push SELECT
```

13. Push [TEST SELECT] and the SENTRY will return to standard operation.

14. Remove all test equipment.

7 – MAINTENANCE

The SENTRY is a solid state device having no mechanical parts requiring special periodic maintenance. The following steps are not requirements, but guidelines for establishing a maintenance program for your specific installation.

Operating experience should be used to set frequency of specific types of maintenance.

7.1 – CLEANLINESS

– Inspect Transmitter I/O Enclosure and Keypad Assembly for build up of dirt or debris.
– Verify no condensation (or other sources of liquids) are present inside the Transmitter I/O Enclosure, Keypad Assembly, or any of the 1/2" OD tubing.
– Inspect and clean filters in each Flow/Pressure Sensing Port.

7.2 – MECHANICAL

– Verify mounting hardware are secure on the Transmitter I/O Enclosure. Keypad Assembly, and Flow/Pressure Sensing Ports.
– Verify the 1/2" OD tubing is properly connected to both Flow/Pressure Sensing Ports and the Transmitter I/O Enclosure.

7.3 – ELECTRICAL

– Inspect wiring at terminal strip in the Transmitter I/O Enclosure for proper connection and absence of corrosion.
– Verify interconnect cable is securely connected at both the Transmitter I/O Enclosure and Keypad Assembly.

7.4 – CALIBRATION

– SENTRY should have calibration verified annually as a minimum.

8 – TROUBLESHOOTING

Personnel should be familiar with the operation of the SENTRY (see Section 5) before performing any troubleshooting.

Problem	*Solution*
Keypad Assembly has no display.	– Check interconnect cable is properly connected (refer to Section 4.3.3.9). – Check fuse (F1) in Transmitter I/O Enclosure.
Transmitter output and display do not respond to changes in room conditions.	– Verify a remote Output Hold signal is not present. – Verify filters in each Flow/Pressure Sensing Port are clean and unobstructed. – Check 1/2 O.D. tubing from each Flow/Pressure Sensing Port is properly connected to Transmitter I/O Enclosure.

During System Zero Calibration
– Display Indicates Flow Too Low or Flow Too High
	– Verify correct installation (Refer to Figure 4.1)
	– Repeat Calibration (Pressure) Steps 6.1.2 through 6.1.3 or Calibration (Flow) Steps 6.2.2 through 6.2.3. If problem persists, perform the following steps:
	  1. Place tape over the Flow/Pressure Sensing Ports making sure to completely cover opening.
	  2. With a DMM set for voltage, measure Pin1 of P3 on the Transmitter Board using terminal 17 of terminal strip as common.
	  3. Adjust R11 on Transmitter for a reading of 1.25 VDC on DMM.
	  4. Remove tape and test equipment and repeat calibration.
	– Replace Transmitter Board.

During System Span Calibration – Display Indicates Flow Too Low or Flow Too High	– Verify correct installation (Refer to Figure 4.1). – Verify correct configuration (Refer to Section 5.4.1). – Repeat Section 6 - Calibration.

– System will not respond to Keypad Input. Display Locked Up.	– Verify green LED DS1 on Transmitter I/O Board is flashing. If not, replace Transmitter I/O Board.
	– Verify green LED DS4 on Keypad CPU board is flashing. If not:
	  1. Verify integrity of interconnect cable.
	  2. Verify Transmitter I/O Board and Keypad CPU Board shunt positions (refer to Factory Set-Up Information Sheet).
	  3. Replace Keypad CPU Board.
	  4. Replace Transmitter I/OBoard.

	If after following the Troubleshooting steps the SENTRY continues to operate improperly, contact the Service Department for further assistance (see Section 9).

9 – CUSTOMER SERVICE

9.1 – CUSTOMER SERVICE/TECHNICAL SUPPORT

Air Monitor Corporation provides in-house technical support for our products:

Monday through Friday
7 am to 5 pm (pst)
Phone: 707-544-2706 or 1-800-AIRFLOW
Fax: 707-526-2825

Additionally, on-site technical assistance is available. Before contacting the Customer Service Department, please ensure any applicable troubleshooting steps outlined in Section 8 have been performed.

9.2 – REPAIRS/RETURNS

If after contacting the Customer Service Department it is determined that equipment will require return to Air Monitor Corporation for further repair, a Return Authorization number will be issued by the Customer Service Department. A Confirmation of Return Authorization with shipping instructions will be sent via facsimile.

Equipment to be returned to Air Monitor should be returned in its original shipping container if possible. If this is not possible, ensure equipment is packaged sufficiently to protect it during shipment.

CAUTION
All damage occurring during transit is the Customer's responsibility.

List the Return Authorization (R/A) number on the packing list and clearly mark this number on the outside of each shipping container.

Costs associated with return of equipment to Air Monitor are the customer's responsibility regardless whether the repair/return is under warranty.

9.3 – WARRANTY REPAIRS/RETURNS

Once the Customer Service Department determines that the equipment repair is under warranty, the item will be repaired and returned to the customer at no charge.

9.4 – NON-WARRANTY REPAIRS/RETURNS

Customer will be invoiced for all parts and labor required for the repair of equipment. Return shipping charges will also be added to invoice.

9.5 – FIELD SERVICE

Requests for field service should be made to the Customer Service Department, who will coordinate sending a technician to customer's site.

Phone: 707-544-2706 or 1-800-AIRFLOW
Fax: 707-526-2825

Upon completion of work, technician completes a Field Service Report and gives a copy to the customer. Field service is charged on a daily basis and all travel expenses are also added to customer's invoice.

APPENDIX A

FACTORY SET-UP SHEETS

ARE PROVIDED SEPARATELY