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LASAIR®II

Operations Manual

PARTICLE MEASURING SYSTEMS

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Declaration of Conformity

Application of Council Directive(s):	89 / 336 /EEC, 73 / 23 /EEC	
Standard(s) to which Conformity is Declared:	**EMC**	EN 55011, EN 50082-1
	Safety	EN 61010:1993 (IEC 1010-1:1990)
Manufacturer's Name:	Particle Measuring Systems, Inc.	
Manufacturer's Address:	5475 Airport Boulevard, Boulder, CO 80301 USA	
Manufacturer's Telephone / FAX:	(303) 443-7100 / (303) 449-6870	
Distributor's Name:	Particle Measuring Systems Europe, LTD.	
Distributor's Address:	Grovewood Road, Enigma Science Park	
	Malvern Worcester WR14 1XZ	
	England	
Distributor's Telephone / FAX:	011-44-1684-581000 / 011-44-1684-560337	
Type of Equipment:	Particle Monitoring	
Model No.:	LASAIR-II	

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Signature:	Kurquidi	**Signature:**	Hall
Full Name:	Kristi Urquidi	**Full Name:**	David Hall
Position:	Vice President Operations	**Position:**	Managing Director
Place: Boulder	**Date:** June 19, 2000	**Place:** Malvern	**Date:** June 30, 2000

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Quality Statement

The Quality Policy of Particle Measuring Systems is to strive to meet or exceed the needs and expectations of our customers and to align the activities of all employees with the common focus of customer satisfaction through continuous improvement in the quality of our products and services.

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Chapter 1

Getting Started

Introduction

Thank you for purchasing the LASAIR® II aerosol particle counter from Particle Measuring Systems, Inc. Read through this operations manual for the information you need to successfully unpack, install, operate, and maintain your LASAIR II.

In this chapter, the following topics will be discussed:

- Overview
- Description
- Specifications
- Using this manual

Refer to subsequent sections for more information on these topics.

Overview

The LASAIR II is an aerosol particle counter designed for either mobile or dedicated use. It comes in four models. The difference in models lies entirely in their sizing channel thresholds. Refer to the chart below for the channel thresholds for each model.

Model Number	Channel Thresholds
310	0.3, 0.5, 0.7, 1.0, 5.0, 10.0 µm
325	0.3, 0.5, 1.0, 5.0, 10.0, 25.0 µm
510	0.5, 0.7, 1.0, 2.0, 5.0, 10.0 µm
525	0.5, 0.7, 1.0, 5.0, 10.0, 25.0 µm

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When the LASAIR II begins sampling, the internal pump creates a vacuum to pull air into the inlet. It runs in a controlled loop to maintain 1 CFM airflow through the sampler. A variance of only ± 5% in airflow is allowed in a valid sample.

Sampled air moves from the inlet through the sample chamber. A laser beam is projected through the sample chamber so that any particles in the sample will scatter the light. The scattered light energy is picked up by the collecting optics and converted to a voltage pulse with the amplitude of the voltage pulse corresponding to the size of the particle.

The incoming particle data is allocated according to size to the appropriate channel. Both differential and cumulative counts are displayed.

Once sampled, air continues to move past the sampling chamber, through the pump, and into tubing leading to a HEPA filter. The filter removes 99.97% of particles 0.3 μm or larger. Once the air has gone through the filter, it exits through the sample outlet.

Precautions

Precautions relating to the LASAIR II are listed in Appendix D.

Précautions

Les Précautions à prendre concernant le LASAIR II sont décrites dans l'appendice D.

Vorsichtsmassregeln

Vorsichtsmassregeln bezueglich des LASAIR II sind in Appendix D aufgeführt.

Voorzorgsmaatregelen

Voorzorgsmaatregelen met betrekking tot de LASAIR II bevinden zich in appenidx D.

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Precauzioni

Le precauzioni relative al LASAIR II sono elencate nell'Appendice D.

Description

The LASAIR II is a portable aerosol counter that is both lightweight and durable. Its compact size and comfortable carrying handle enhances its portability. The LASAIR II can be used for cleanroom monitoring, facility certification, troubleshooting, trending analysis or statistical process control.

Its external features include a 1/4 VGA color LCD display screen, softkey panels, sample probe, and a built-in thermal printer.

Depending on your model, the LASAIR II measures particle sizes in the range of 0.3 to 25.0 µm. It uses six channels with preset thresholds so that you can size the particle count. The LASAIR II has an optional Temperature/Relative Humidity (T/RH) sensor, and up to four analog environmental sensors can be connected using the 4-20 mA input.

LASAIR II allows you to:

- Set up your sampling, analog data and alarm parameters
- Connect environmental sensors for continual reading
- Start and stop particle sampling
- Display sampling results, counter status, and analog data
- Print sample results

The LASAIR II can be controlled and operated in a number of ways:

- As a standalone unit
- Connected to PMS facility monitoring software, Facility Net or Pharmaceutical Net
- From the web browser on your PC, when connected to the LASAIR II with an Ethernet 10Base-T compatible network

If you suspect that certain areas of your facility are a source of particles, you can easily transport the LASAIR II to those locations for sampling. You can name the location on a setup menu. When the sampling ends and prints out, each printout is labeled with the location name.

When connected to a computer or network, a menu allows you to set addresses and enable different communications protocols to suit your needs. Once your communications protocols are set up from the LASAIR II unit, you can modify and view the sampling process from a

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remote computer. You can also monitor the LASAIR II from PMS's Pharmaceutical Net or Facility Net software.

The LASAIR II stores 3,000 sample records in Random Access Memory. When the LASAIR II is connected to a computer or network, sampling records can be downloaded or deleted.

Both external features and internal components are described in the sections that follow. Refer to the following sections for more detail.

External Features

The LASAIR II is compact, portable and loaded with features. Features to be discussed are segregated by location on the LASAIR II:

- Top
- Front panel
- Back panel
- Side panel

Refer to the sections that follow for a description of the features found at each location.

Top Features

Two features are found on the top of the LASAIR II:

- Sampling inlet
- T/RH sensor port

Sampling Inlet

Air for particle count sampling is brought into the top of the LASAIR II through the sampling inlet.

An anodized aluminum sampling funnel fits over the sampling inlet. The inner diameter of the funnel has two cylindrical grooves, each fitted with an O-ring to seal and secure the funnel on the sampling inlet.

Temperature/Relative Humidity Probe Port

Directly behind the sampling inlet is a port to insert a Temperature/ Relative humidity sensor. The port is 5-pin LEMO.

Instruction for inserting and removing the T/RH probe are given in Chapter 2.

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Front Panel Features

The front panel of the LASAIR II allows you to set up parameters and view all LASAIR II activities. The front panel consists of:

- Color LCD display screen
- Control panel
- Softkey panel

The control panel and softkey panel enable you to control the LASAIR II unit. Each front panel feature is discussed in the sections below.

Color LCD Display Screen

The LASAIR II has a color liquid crystal display (LCD) display screen. The display screen is covered with an inert clear plastic cover that reduces glare and is easy to clean.

Control Panel

The control panel is located below the display screen and is comprised of keys that are used to setup and operate the LASAIR II. Control keys allow you to:

- Turn the LASAIR II on and off
- Lighten and darken the display screen
- Move the cursor in a screen field
- Increase or decrease a value in a screen field
- Start and stop the sampling sequence

Softkey Panel

The softkey panel is the column of arrows on the right side of the display. Each arrow corresponds to the icon on the screen directly to the left of that arrow. Icons represent options available from that particular screen.

To select an icon (option), press the softkey to the right of the icon. The action that is represented by the icon will be performed.

Back Panel Features

The back panel of the LASAIR II is comprised of the power connection, the sampling outlet, and five communications ports. Communications ports are listed below:

- Ethernet ("NET")
- RS-232
- HHIPA (Hand-Held Isokinetic Probe, Audible)

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- 4-20 mA input
- 4-20 mA output

The back panel features are discussed in the following sections.

Power

The LASAIR II is powered by either an optional battery or by 85-264 volt AC power. The power cord accompanying the unit will vary with location (US vs. non-US standards).

Communications Ports

The LASAIR II can be used in conjunction with a computer or facility monitoring software. It also provides you with a 4-20 mA connection, to which you can connect analog sensors for additional environmental information. The sections below discuss the different communications ports found on the rear panel.

Ethernet Port

A 10Base-T Ethernet port, marked 'NET,' is used to connect:

- Directly to a computer
- Into a network hub

Each kind of connection requires its own cabling configuration. Refer to Appendix A "Cable Requirements" on page 120 for more information.

RS-232 Port

The RS-232 port is currently used for calibration or TouchRAM communications.

4-20 mA Input Port

Up to four more analog sensors can be connected through the 4-20 mA port to provide additional environmental sensor information. Analog sensors available from PMS include: air velocity, differential pressure, and T/RH sensors.

HHIPA

HHIPA is hand-held isokinetic probe with an audible alarm. It can be enabled to "beep" or to produce an audio alarm when a particle is counted. The LASAIR II provides the HHIPA with its own port and power.

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Sample Outlet

Air is pumped through the LASAIR II for sampling. It exhausts through the sample outlet located on the back panel. Air passes through a HEPA filter before exiting the unit.

NOTE: Ensure that the sample outlet is not blocked. If it becomes blocked, maintaining a standard airflow will become difficult. If the airflow varies too much, the readings may not be valid.

Internal Components

Significant internal components include:

- Diode laser
- Tubing
- Pump
- HEPA filter

Diode Laser

The diode laser is a 50 mW infrared laser. The operating power is 35 mW for the 310 and 325 models and 20 mW for the 510 and 525 models. Operating at less than the full 50 mW extends the diode's life.

Tubing

Internal tubing is used between the sampling inlet and the pump, and the pump and the outlet. Tubing is made of 3/4 inch inside diameter polyethylene.

Pump

A regenerative blower pump is located at the base of the unit. The blower pump is a low power, DC voltage-controlled unit that is controlled to keep the flow rate at one cubic foot per minute. This pump was selected for its expected long life and low maintenance requirements.

HEPA Filter

The internal HEPA filter eliminates 99.97% of all particles with a size of 0.3 µm or greater. It is located just before the sample outlet to filter out particles before the air leaves the LASAIR II.

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LASAIR II Specifications

Size Range	0.3-25.0 µm
Channel thresholds	Model 310: 0.3, 0.5, 0.7, 1.0, 5.0, 10.0 µm Model 325: 0.3, 0.5, 1.0, 5.0, 10.0, 25.0 µm Model 510: 0.5, 0.7, 1.0, 2.0, 5.0, 10 µm Model 525: 0.5, 0.7, 1.0, 5.0, 10.0, 25.0 µm
Number of channels	6
Flow rate	1 CFM (28.3 LPM) with ± 5% accuracy
Maximum concentration, models 310, 510, 525	900,000/ft^{3}at 10% coincidence loss 425,000/ft^3 at 5% coincidence loss
Maximum concentration, model 325	750,000/ft^{3}at 10% coincidence loss 375,000/ft^3 at 5% coincidence loss
Counting efficiency	>50% ± 10% (exceeds JIS standard)
Zero count level	<1 count/5 minutes at minimum size (meets JIS standard)
Laser source	Diode laser, 780 nm
Calibration	Materials traceable to US National Institute for Standards and Technology (NIST)
Environmental sensors	Temperature/Relative Humidity sensor, plus interfaces with 4 external environmental sensors via 4-20 mA input
Data storage	3,000 sample records
Statistical standards supported	FS-209E ISO 14644 BS 5295 and simple averaging
Communication Modes	Ethernet or RS-232; optional 4-20 mA output board.
Supporting Software	*Facility Net, Pharmaceutical Net*, MS Internet Explorer®
External Surface	ESD-compatible KYDEX®
Cleaning Materials	Bleach, formaldehyde, ethyl or isopropyl alcohol, peroxide/quaternary ammonium solutions, PHENE-AMOL™ Spray disinfectant, STERI-PEROX™, HYPO-CHLOR™, DECON-QUAT 100, and DECON-CLEAN™
Sample Output	Internally filtered, HEPA standard (> 99.97% at 0.3µm)
Display	1/4 VGA color LCD screen
Languages	English, French, German, Italian, Japanese (Konji), Korean, Mandarin (classical), Spanish
Printer	Built-in thermal printer

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Reports	Sample printouts; final reports for FS-209E, ISO 14644-1, and BS-5295
Power	85-264 V, 50-60 Hz
Battery (optional)	Removable NiMH battery: 5 hrs. expected operation; 2 hrs. to recharge externally; 4 hours to recharge internally
Dimensions (H,W,D)	11.5 x 10.7 x 9.0 in./29 x 27 x 23 cm.
Weight	12.0 lbs. (5.4 kg.) without battery; 15.5 lbs. (7 kg.) with optional battery
Operating Environment	Temperature 4-35°C; humidity: 10-85%, non-condensing

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Chapter 2

Unpacking, Installation and Setup

Introduction

When your LASAIR II arrives, you will want to:

- Unpack the shipping container
- Determine the sampling location for your unit
- Connect the Temperature/Relative Humidity (T/RH) sensor
- Connect communications cables
- Set up the LASAIR II to communicate to a computer or a facility management system.

Each of these topics is discussed in greater detail below.

Unpacking

Upon arrival, inspect the outside of the shipping container for any damage. If the container appears damaged, DO NOT OPEN IT. Contact the shipper immediately.

If, however, the shipping container appears unharmed, carefully open it. Inspect the contents of the container. The LASAIR II is shipped with:

- Printer paper
- Operations manual
- Sample probe
- Sample tubing
- Zero count filter
- Power cord
- Spare fuse

Make sure that the items listed above are included in your shipment. If not, contact PMS' Customer Response Center at 1-877-475-3317 for replacement.

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Given that all of the materials are included and undamaged, store the packing materials. It is important to store these materials because warranties may not apply if return shipping containers are inadequate.

Installation

Use the following installation sections as they apply to your use of the LASAIR II.

Connecting Your Power Source

The power input is a standard EIA fused power input of 85-264VAC, 50-60 Hz. A power cord is supplied with your LASAIR II. The power cord for European shipments may require the attachment of the appropriate wall plug, according to the electrical requirements.

To connect power for the LASAIR II:

1. Plug the female end of the cord into the power inlet. The inlet is located on the left side of the back panel.
2. Plug the 3-prong end of the cord into your power source.

CAUTION: PMS recommends the use of a good quality surge protector to isolate the LASAIR II from voltage spikes. Surge protectors are inexpensive and easily obtainable from many office supply or computer equipment sources.

Installing the Battery

Your LASAIR II can be powered solely by an optional rechargable battery pack. The battery pack can be recharged while it is installed in the LASAIR II or outside the LASAIR II with an optional recharger.

To install the battery pack,

1. Remove the battery from its packaging.
2. Position the battery pack with the label up and write the date you are placing the battery into service into the space provided on the label.
3. Open the battery chamber door on the back of the LASAIR II.
4. Ensure that the battery label is facing up and the battery retainer is turned to a horizontal position.

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5. With the battery contacts entering first, slide the battery pack into the LASAIR II's battery chamber until it stops.
6. Rotate the battery retainer to a vertical position. The retainer's edge should engage into a provided channel.
7. Ensure that the battery is firmly in place by tipping the LASAIR II or by trying to pull the battery out without turning the battery retainer to a horizontal position.
8. Close the battery chamber door.

Connecting Your Sample Probe

The LASAIR II comes with a standard sample probe, which can be connected in one of the following two ways:

- directly to the sample inlet
- to the end of sample tubing

A 10-foot section of tubing is included in your shipment. The tubing is lined internally with a material that reduces electrostatic attraction and subsequent particle sticking. Cut it to the length that meets your needs. It will fit over the sample inlet.

NOTE: PMS cannot guarantee valid particle measurement with a length of tubing greater than 10 feet.

For precise positioning and proper cleanroom isolation, you may choose to mount the sample probe on a tripod or on a wall. The following accessories will help you to precisely position your LASAIR II:

- A floor tripod (Part No. MI008)
- A table tripod (Part No. 1000000979)
- A Wall Mount Adaptor for the Standard Sampling Probe (Part No. 1000000971)
- A Sampling Probe, Isokinetic, with wall/hand/tripod adapter (Part No. 90103070) from PMS.

To connect the sample probe directly to the sample inlet,

1. Remove the protective cap from the sample inlet. Place the sample probe directly over the black polyethylene sample inlet, located on the top of the unit.
2. Gently, but firmly, press downward on the sample probe until it will not move down any further.

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To connect the sample probe to tubing.

1. Remove the protective cap from the sample inlet.
2. Place one end of the tubing over the inlet.
3. Work it over the inlet until it reaches the base of the inlet.
4. Connect the adapter onto the free end of the tubing.
5. Fit the sample probe over the adapter inlet.

To secure the sample probe to a tripod.

1. Screw the bolt on the adapter into the screw hole of the tripod plate.
2. Position the tripod where you wish to sample.

Connecting the T/RH Sensor

The T/RH sensor is an optional accessory to the LASAIR II. It mounts on the top of the unit, behind the sample probe. When connecting this sensor, look for the red dot at the bottom of the sensor. You will also find a corresponding red dot at the sensor base on the unit.

CAUTION: When disconnecting the T/RH sensor, you must pull up gently on the cylindrical sleeve (near the base of the sensor) to release the clips that hold the sensor in place. DO **NOT** TWIST OR PULL UP ON THE SENSOR IN YOUR ATTEMPT TO REMOVE IT.

To connect theT/RH sensor.

1. Do ***NOT*** twist the sensor.
2. Position the sensor above the base so that the red dots are aligned.
3. Carefully push the sensor down into place. You should hear a slight click as it locks into place.

To disconnect the T/RH sensor.

1. Place your fingers on the cylindrical sleeve and pull up. The sleeve will move upward as the clip tabs release from the base.
2. Continue to pull up on the sensor from the sleeve. The sensor will disengage from the base of the unit.

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Connecting to a Computer or Facility Management System

For information about connecting the LASAIR II to a computer or a facility management system, please see "Connecting to a Remote Computer or Network" on page 119.

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Chapter 3

Controls and Displays

Introduction

The LASAIR II has many powerful features to facilitate particle counting and monitoring.

This chapter discusses the following topics:

- Layout of control panel buttons and screens
- Menu options
- Display screens

Refer to the subsequent sections for information about these subjects.

Layout

By using the control panel buttons and softkeys on the front panel, you can perform all of the tasks necessary to set up and operate the LASAIR II. Refer to "Front Panel Features" on page 5 in Chapter 1 for a review of the control panel buttons and softkeys.

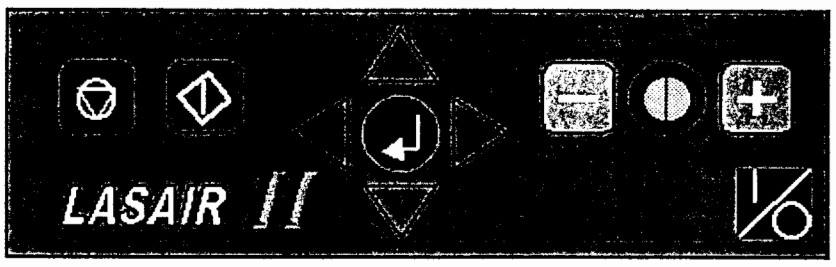
In this section, we will discuss:

- Control panel buttons
- General layout of screens
- Guidelines for moving to different screens

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Control Panel Buttons

The control panel buttons are located below the screen display. The panel houses a number of buttons for the setup and operation of the LASAIR II.



To turn the LASAIR II on and off, press the On/Off key.

To darken or lighten the screen, press the Minus or Plus key until the screen darkens or lightens to the desired contrast.

To start sampling, press the Start key. The Start Key works from any screen. Pressing it will return you directly to the Main Display Screen.

To stop sampling, press the Stop key.

To initiate edit mode (on a setup screen,) press the Enter key.

From within Edit Mode:

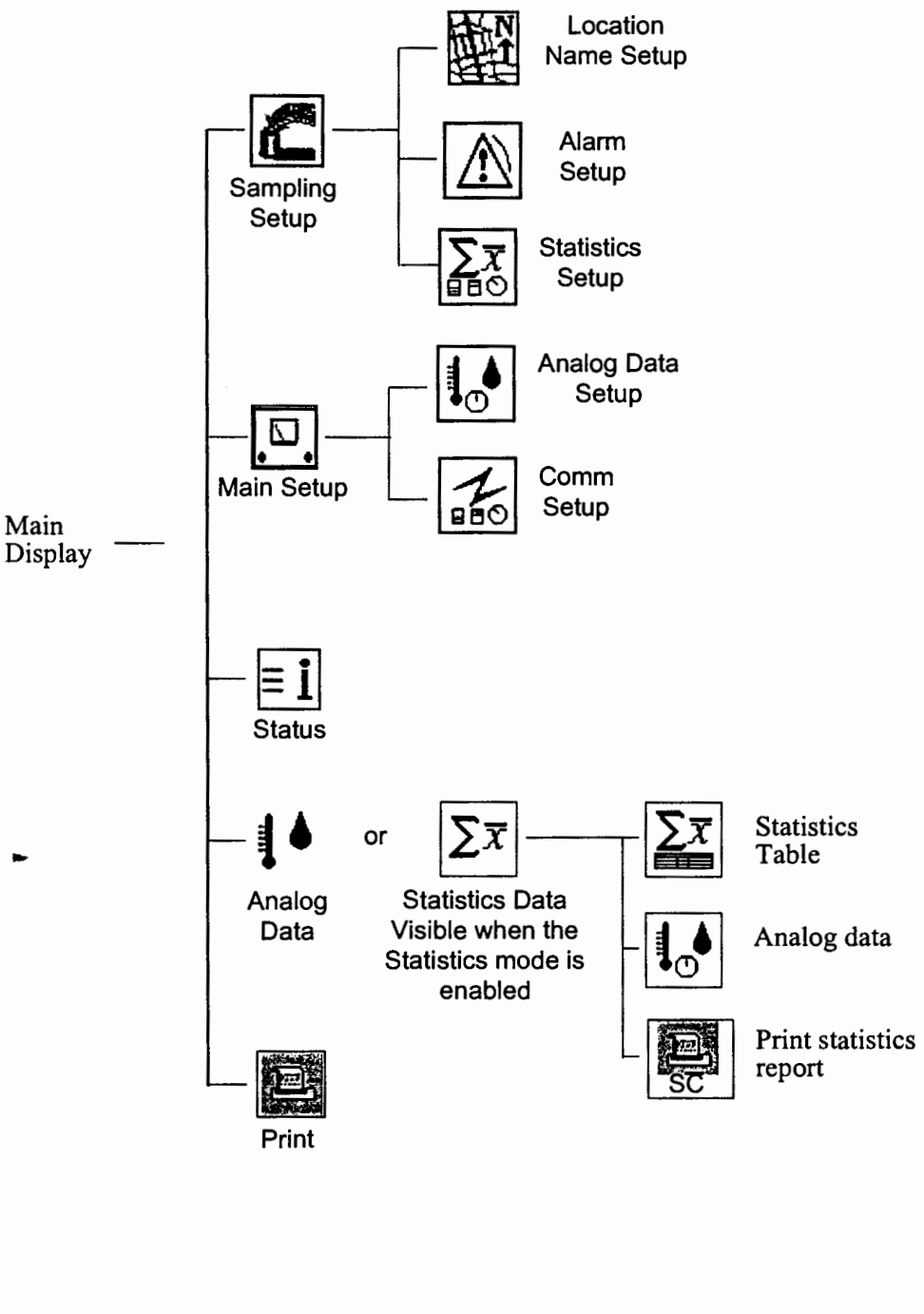
- *To move the cursor*, press the Left or Right arrow key.
- *To increase or decrease a value* , press the Up or Down arrow key.
- *To enter a setup selection into the system*, press the Enter key.

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Hierarchy of Screens

The LASAIR II uses a hierarchy of setup screens and displays. By becoming familiar with the hierarchy, you can navigate to the menus and displays with greater ease. We encourage you to take some time to access the different screens so that you can build a picture of the layout in your mind.

The hierarchy of screens is shown in the following graphic. Notice the different icons that represent each screen and/or function.



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When the LASAIR II is turned on, the Main Display Screen appears. From the Main Display Screen, you can see your sampling data and access all the other screens.

To the right of the screen, notice a column of icons. Each setup screen, display screen or function is represented by an icon. Each icon is associated with a softkey to the right of the icon. When you press the softkey associated with an icon, the screen for that icon is displayed.

General Guidelines for Screen Navigation

No matter what screen you are viewing, the following general rules will help you navigate:

- If you want to go to another screen, identify the icon and press its softkey.
- To move back out of a screen, press the top softkey beside the Back Screen icon. 
- If a screen can be edited, you will see a pencil icon in the upper left part of the screen.
- A screen that can be edited opens in the Display Mode. The screen must be set to Edit Mode before you can change an input field.
- To change an input field, enter Edit Mode by pressing the blue Enter button.  You will notice that the edit icons for that menu will appear by the softkeys.
- Use the Return Arrow softkey  to exit Edit Mode. The Return Arrow is always the top icon in the column.

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Display Screens

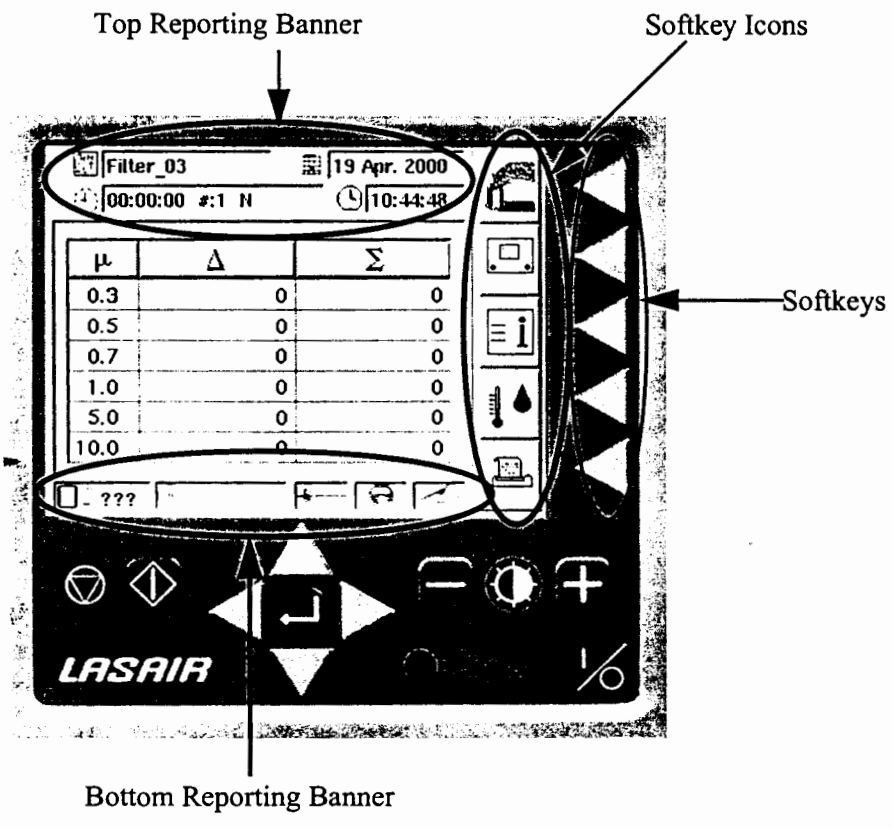
The LASAIR II has the following display screens:

- The **Main Display Screen** shows sampling data, as well as some key status and alarm information.
- The **Status Screen** gives information on the battery, laser, data storage capacity, and more.
- The **Analog Data Display Screen** shows the data collected from the analog probes during the last sampling.

NOTE: If the LASAIR II may be accessed over your Ethernet network, always leave the instrument's display at either the Main Display Screen or the Analog Display Screen so remote users can access the LASAIR II.

Main Display Screen

The main display screen appears when the LASAIR II is turned on. If you are viewing any other screen and press the Up Arrow softkey, you will eventually arrive at the Main display.



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Display Layout

The Main Display Screen is divided into four areas:

- A top reporting banner that displays the location, date, run-time status, and time.
- A sampling data area with a table of the particle size channels and related particle counts.
- A bottom reporting banner with status information on the battery, pump, laser, password, and communications.
- A column of softkey icons to the right of the central area.

The display is real-time; it shows changing particle counts as a sample is run. While sampling, real-time values of the following parameters are displayed:

- Sampling time or delay time
- Flow rate

Many areas of the screen change during operation to reflect real-time status. These changes are discussed in the sections that follow.

Sampling Data Area

When the LASAIR II is first turned on, no particle counts are shown. Once you start sampling, the particle counts are displayed. When the sampling has completed, the final counts for that sample are shown on the main display screen. These results will remain until the next sampling is performed. At that time, the columns will reset to zero in preparation for the next set of data.

Top Reporting Banner

When the Start button is pressed, the Initial Delay countdown will begin. An hourglass will appear to the left of the pre-sampling countdown time.

When the Initial Delay time reaches 0, sampling begins. The sample time counts down to zero from the sample time you have set. A clock symbol is displayed to the left of the sample time.

If your sample is by volume, a beaker will appear in the upper left part of the Main Display Screen and the sample countdown will be by the volume remaining.

When the sample is completed, a check mark (✓) will appear to the left of the clock or the beaker, which is to the left of the sampling time (or

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volume). If the sample run was invalid, the check mark will have a red "X" over it.

Bottom Reporting Banner

In the bottom banner, the battery status is displayed as a percentage of a full charge. When the battery is discharging (that is, the unit is not plugged in to an electrical outlet), the number will be negative. If the battery is charging, the number will be positive. This information is realtime.

CAUTION: If the LASAIR II stops operating because of low battery power, recharge the battery immediately. If the battery is allowed to sit uncharged, it will lose additional charge due to the normal chemistry of Nickel-metal-hydride batteries. Once it loses all charge it cannot be recharged again in the LASAIR II or the optional BC II battery charger.

When sampling, the Pump symbol comes out of its grey, inactive state. An airflow rate will appear next to the Pump symbol. If the airflow alters more than ± 5% from one cubic foot per minute during sampling, a red "X" will appear over the pump symbol. The red "X" indicates an invalid sample run.

The Laser symbol is also activated when sampling. It should turn red to show that it is on and functioning properly. If the laser is drawing too much or too little power, a red "X" will appear over the Laser symbol to indicate an invalid sample.

The padlock icon is the symbol for a user password. When no password has been set, the padlock is greyed out. If a password has been entered, the padlock icon takes on the color blue. If the password has been entered but not enabled, the padlock icon is open. If the password has been enabled, the padlock icon is closed and highlighted.

The *lightning bolt* is the symbol for a communications connection. If your LASAIR II unit is connected to Facility Net or Pharmaceutical Net and the addresses have been properly set, the *lightning bolt* will not be greyed out.

Status Screen

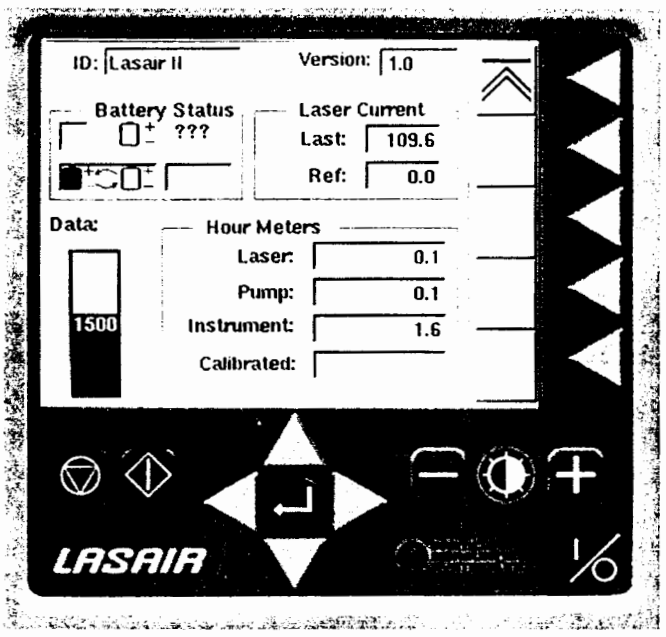
The Status Screen gives you information on the following items:

- Battery status
- Data Storage
- Laser Current
- Hour Meters for laser, pump, and instrument

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- Date of last calibration

To display the Status Screen, press the third softkey icon ≡i on the Main Display Screen.



Field	Usage
ID	Entered in the Main Setup, the ID name is a way of tracking the unit. This information is also placed in the data record.
Version	The software version currently loaded.

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Battery Status

When the unit is not plugged in, the Power Plug icon on the status screen will appear grayed out.

The battery status is updated from the battery charger board every five seconds. When the battery is discharging, the battery icon will be red and a minus (-) sign near the battery icon will be shown. When charging, the battery icon will turn blue and a plus (+) sign will be shown.

The percentage value shows the amount of battery charge remaining.

If no battery is installed, the battery icon will be grayed out, and the screen will show "---".

If something is wrong with the communications to the battery charger, the percentage will show "???".

NOTE: When a depleted (5% charge) battery is installed into the LASAIR II, the battery status may display "???" for about 5 minutes.

The recycle icon shows how many charge/discharge cycles the battery pack has been through.

Laser Current

Laser Current has 2 fields:
Last shows the most recent value
Ref. (reference) shows the value when the laser was new.

NOTE: The two fields are used to indicate how much current the laser draws as a reflection of wear. When the Last field value is approximately 150% of the Reference field value, call Instrument Service and Support at Particle Measuring Systems: 1-800-557-6363.

A red "X" over the laser icon on the Main Display Screen means that the laser is not functioning properly.

Data

The Data field shows the number of sample data sets in storage. The LASAIR II can store 3,000 sets of sample data. The field also graphically indicates how full the data storage area is. In other words, the blue fill represents how much storage has been used, while the white area represents available capacity.

When the data storage is filled to capacity, each new set of sample data entered overwrites the oldest set of sample data.

Data files can be downloaded and/or erased from the LASAIR II with the Web Server function. See Chapter 5, "Using the LASAIR®II With A Computer, Facility Net, or Pharmaceutical Net" on page 63.

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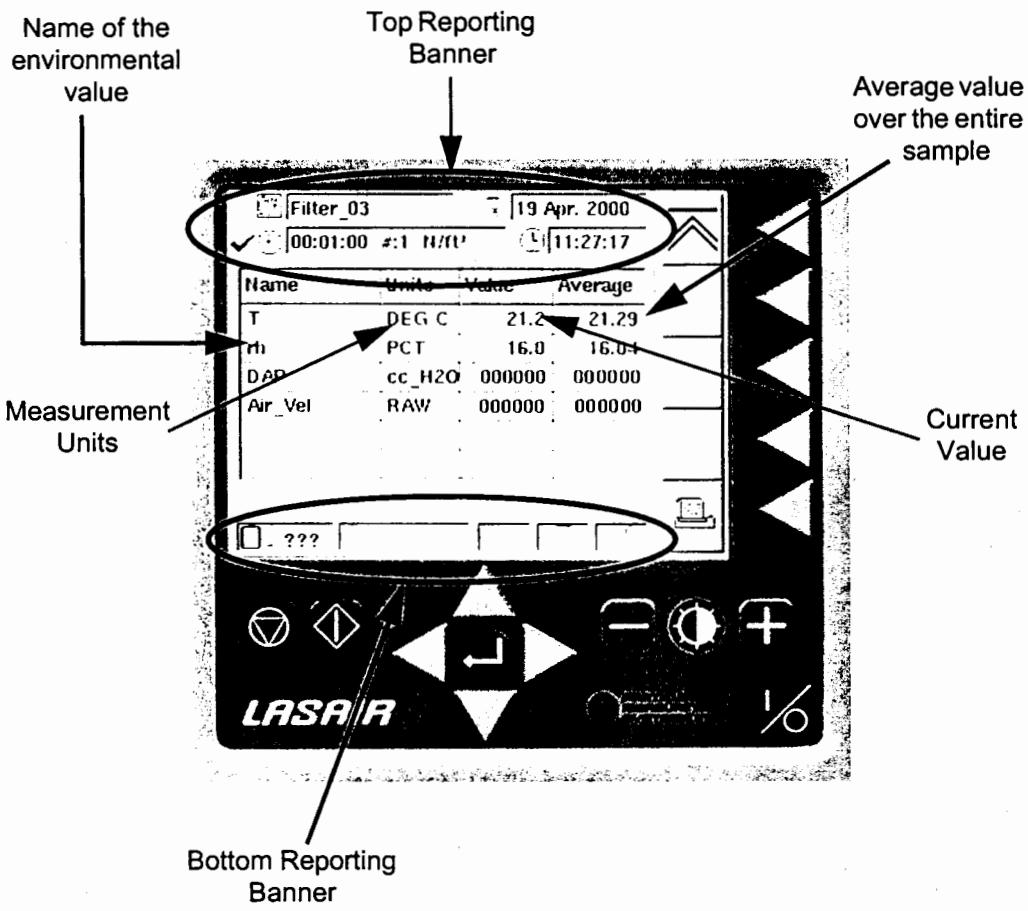
Hour Meters	The amount of time the laser, the pump, and the instrument has been used. Values are in hours.
Calibration	The date of the most recent calibration appears in this field.

Analog Data Display Screen

The Analog Data Display Screen is laid out very much like the Main Display Screen. It has the same top and bottom banners of information. Instead of showing particle count information in the data area, it shows data from the analog devices connected to the unit. For example, for the Temperature/Relative Humidity Sensor, it would show temperature and relative humidity values.

To view the Analog Data Display Screen, press the Analog Data display icon (fourth icon) softkey . A sample Analog Data display screen is shown on the following page:

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Analog Data Display Layout

The Analog Data Display Screen is divided into four areas:

- A top reporting banner with the location, date, run-time status, and time.
- A data area with a list of enabled analog sensors and corresponding readings.
- A bottom reporting banner with status information on the battery, pump, laser, password and communications.
- A column of softkey icons to the right of the data area.

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Analog Data Area

When the LASAIR II is first turned on, no analog data is shown. Once you start sampling, the analog values are displayed. When the sample is complete, these results will remain on display until the next sample is started. At that time, the columns will reset to zero in preparation for the next set of analog data.

Top and Bottom Banners

These display areas are identical to those in the Main Display Screen, discussed earlier in this chapter.

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Setting Up the Display Screens

The display screens show a great deal of data. Parameters for the data reported on these screens are set on several setup menus.

The table below is a reference that lists display items and the setup menu to use for alterations. Any item that has more information on another display is also listed.

Field Setup Quick Reference Guide

Field	Screen	From Main Display Screen, press...
Location Name	Sampling Setup	1st (top) softkey
Sampling Time/ Vol.	Sampling Setup	1st softkey
Delay Times	Sampling Setup	1st softkey
Sampling Units	Sampling Setup	1st softkey
Raw vs. Normalized Data	Sampling Setup	1st softkey
Auto-Print	Sampling Setup	1st softkey
Alarms	Alarm Setup	1st softkey; then press 3rd softkey (Alarm)
Date and Time	Main Setup	2nd softkey
Password	Main Setup	2nd softkey
Analog Name	Analog Data Setup	2nd softkey, then press 2nd softkey (Analog Data)
Analog Units	Analog Data Setup	2nd softkey, then press 2nd softkey (Analog Data)
Communications	Comm Setup	2nd softkey; then press 3nd softkey (Comm)
Battery	Status	3rd softkey
Pump	Status	3rd softkey
Laser	Status	3rd softkey

See Chapter 4, "Setup and Operation" on page 31 for more information.

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Chapter 4

Setup and Operation

Introduction

This chapter describes the Setup and Operation of the LASAIR® II. You define the operational details of your LASAIR II in the setup screens.

The LASAIR II uses Setup Screens for the following functions:

- **Sampling Setup Screen:** Assign parameters that directly relate to sampling
- **Location Name Setup Screen:** Specify the names of sampling sites
- **Alarm Setup Screen:** Specify the particle count or analog data that will trigger an audible or visual alarm or both
- **Main Setup Screen:** Enter a date and time, as well as use the Password function
- **Analog Display Setup Screen:** Enable and name your analog devices connected to the LASAIR II
- **Communications Setup Screen:** Enter the addresses for connections to a computer or to facility monitoring software

Each setup screen is covered in its own section below. Information will include:

- How to open the setup screen
- Setup screen graphics
- Field usage

NOTE: If you have configured the LASAIR II to be accessed on your Ethernet network, always leave the instrument's display on either the Main Display Screen or the Analog Display Screen. Otherwise, the remote PC will be unable to access the LASAIR II.

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Edit Mode

To make any modifications to the current settings in a setup screen, you must go into Editing Mode.

To initiate Editing Mode, press the Enter button. The editing function icons will appear in a column on the right of the screen.

Editing icons are listed below:

Edit Navigation Functions

Icon	Function
	The Return Arrow is always the top (or first) icon. This command icon will take you out of Editing Mode without leaving the screen.
	The Forward Tab is used to move from one screen location to another.
	The Back Tab is used to move back to the previous location in a screen.

Field Editing Functions

Icon	Function
	The Delete softkey deletes the alphanumeric character to the left of the cursor and moves the cursor one space to the left.
	Depending on the kind of field you are editing, the Insert softkey adds a zero or a space to the right of the blinking edit cursor.

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Location Name Editing Functions

Icon	Function
	The Edit Location softkey allows you to edit the highlighted location name. (Used in Location Setup Screen only.)
	The Add Location softkey allows you to add a new location name. (Used in Location Setup Screen only.)
	The Delete Location softkey removes the highlighted location name. (Used in Location Setup Screen only.)

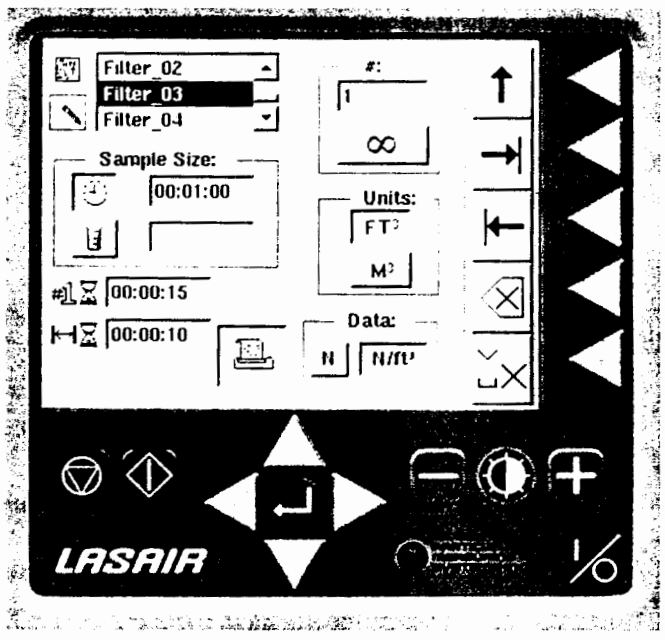
Using Edit Mode - - General Procedure

1. Press the Enter key to access Edit Mode.
2. Use the Tab Keys to move the cursor to the parameter to be changed.
3. Press Enter to access the parameter.
4. Use the Arrow and/or Enter keys to change the parameter.
5. Press Enter as necessary to record the desired setting.
6. Use the Enter, Tab keys, or Return Arrow to leave the Edit Mode.
7. Verify that the desired setting was implemented.

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Sampling Setup Screen

To open the Sampling Setup Screen, press the top (or first) softkey on the display screen.



Field	Field Usage
Location	The Location field allows you to include the location name in your display screens, sample data, and printouts.
Sample Time/Size	Sampling is performed for either a designated time or a designated volume. When you select one method and enter a value, the LASAIR II also calculates the corresponding value for the other method. Volumes are rounded to the nearest one second time interval. Volumes in cubic feet per minute are displayed to two decimal places, and volumes in cubic millimeters are displayed to four decimal places.
Initial Delay Time	Sets the amount of time the pump will run before the LASAIR II begins to sample.

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Intersample Delay Time — Sets the amount of time between samples.

NOTE: The pump will continue to run during the intersample delay, but no data will be collected.

No. of Samples — Sets the number of times you sample in a sequence. Select the infinity symbol for continuous sampling.

Units — Sets the units in which sample volume will be displayed, cubic feet or cubic meters.

Data — Sets whether particle count data will be displayed in Normalized (N/ft^3 or N/m^3) or Non-normalized ("raw counts") data (N).

AutoPrint — Allows you to enable automatic printing at the end of each sample. When On, the Printer icon is blue. When Off, the icon is grey.

NOTE: The delay time between samples **plus** the sample time must be at least 15 seconds to allow enough time for the printer to finish the last job.

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Start Sampling by Time-of-day

The Start Sampling by Time-of-day functions allows you to set your LASAIR II to automatically start sampling at a time of your choosing.

When start by time-of-day is enabled, the LASAIR II disables the user-set purge delay and sets the purge time internally to allow the sampling to begin at the set time. For example: if you set the LASAIR II to begin sampling at 2 A.M., LASAIR II will calculate and set a purge time so that sampling will begin at exactly the time you have specified.

If the sampling time is greater than 60 seconds later than the current time, LASAIR II will automatically shut down the laser and fan to reduce wear.

The auto-print function remains under user control.

To enable the start by time-of-day time feature,

1. Select the time-of-day icon on the *Sampling Setup Screen* and then press enter. The purge delay setting is now disabled.
2. Push the green *Start* button. The *Enter Start Time* dialog box will open, prompting you to set the sampling start time.
3. Select the start time and then click on *OK*.

   The LASAIR II dynamically sets the purge delay so that sampling will begin at the specified time.

NOTE: The start by time-of-day feature is not available within the web browser.

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Location Name Setup Screen

If you are moving the unit to different locations for sampling, the LASAIR II lets you name those locations in the Location Name Setup Screen. Once you have the locations named, you can select a location name to label your sampling data.

Initially, the LASAIR II will have no location names in the list box on the left side of the screen. You can add location names, one at a time, or you can use the option to add locations numbered 1-100. You can also use the web browser option to download a file of location names from your PC into the LASAIR II. See Chapter 5, "Using the LASAIR®II With A Computer, Facility Net, or Pharmaceutical Net" on page 63.

Location setup options are as follows:

- Edit location name
- Add location name
- Delete location name
- Erase all location names
- Add locations numbered 1-100

Each setup option is represented by an icon and corresponding softkeys.

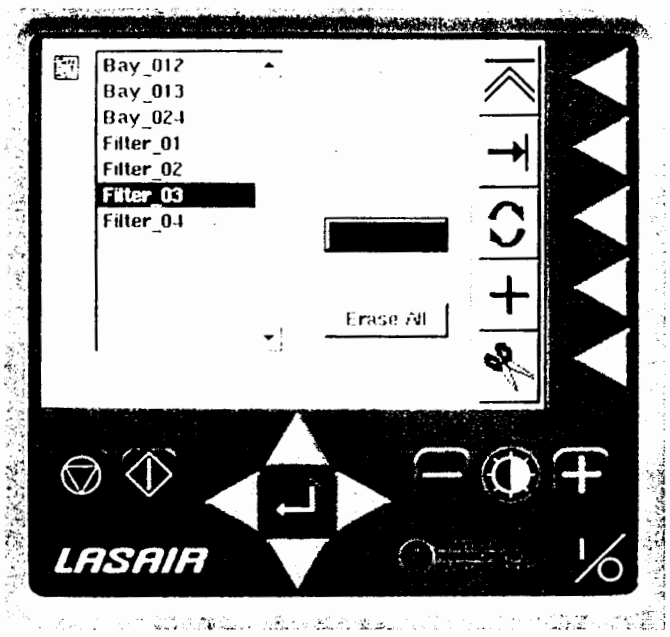
Refer to the list of icons in the "Editing Mode Functions" section, discussed previously.

To access the Location Name Setup Screen,

1. Press the first softkey  on the Main Display Screen. The Main Setup Screen will be displayed.

2. Press the Location softkey.  The Location Name Setup Screen will be displayed:

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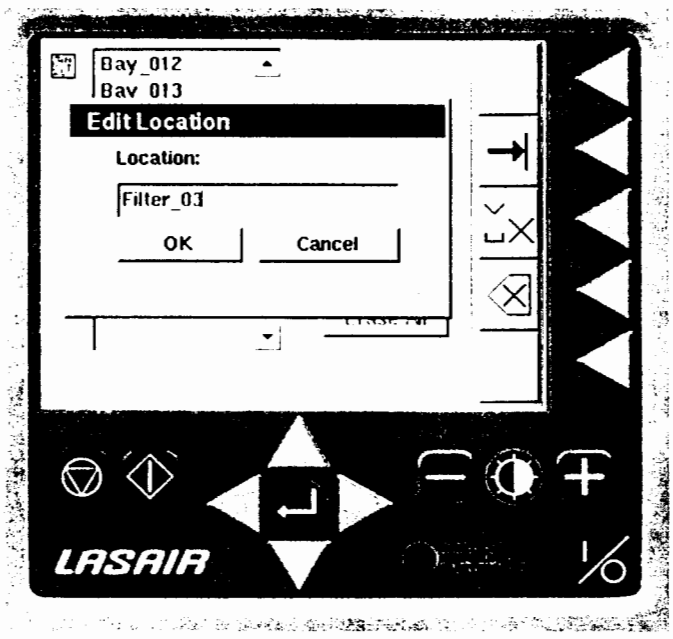


Field	Field Usage
Location List	Contains the names and/or numbers of locations that have been entered.
001....N	Generates a list of locations numbered from 1 to 100. This option works only if no other names have been entered.
Erase All	Allows you to delete all entered locations in the list at once.
Location Softkeys	Brings up setup menus to edit, add, or delete locations.

To Edit a location name,

1. Highlight the location name to be edited.
2. Press the Edit Location softkey. ↻ The Edit Location screen will be displayed:

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NOTE: If you edit a location name, any stored sample records from that location will use the new name in the data output. To indicate a change, LASAIR II will also place a "?" by the new location name. To ensure data validity, you should consider one of the following actions:

a) Add new names instead of editing old names.
b) Erase the stored data before changing any location names.

3. Using the editing softkeys and directional arrow buttons on the control panel, edit the name. Pressing the Right or Left Arrows will move the cursor, while pressing the Up or Down Arrows will change the alphanumeric value.

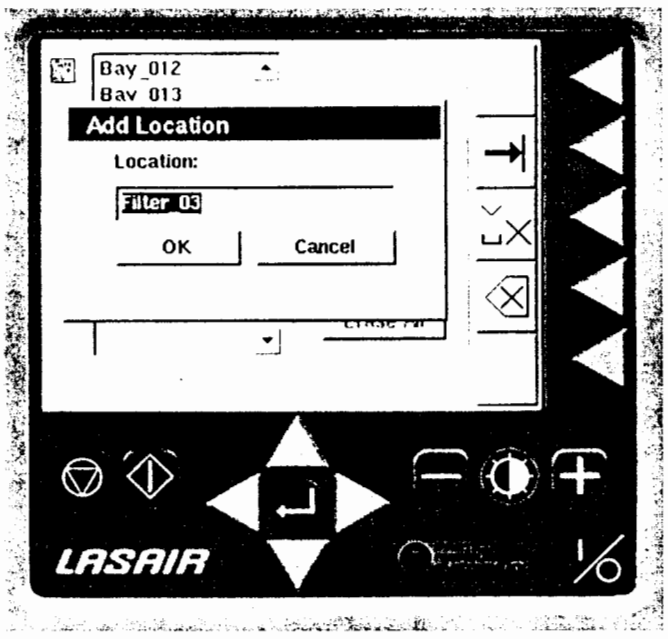
4. After you have completed editing, press the Enter button on the control panel to highlight the OK button.

5. Press the Enter button again to save your edited location name.

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To Add a location name,

1. Press the Add Location softkey. + The Add Location Screen will be displayed:



2. If a location is highlighted in the list, you will see the name/number in the Location field. Using the editing softkeys and directional arrow buttons on the control panel, edit or replace the location name.
3. After you have completed editing, press the Enter button on the control panel to highlight the OK button.
4. Press the Enter button again to save your new location name.

To delete a location name,

1. Highlight the location name that you wish to delete, using the Up and Down Arrow buttons on the control panel.
2. Press the Delete Location softkey. The highlighted location name will be deleted from the list.

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Alarm Setup Screen

The Alarm Setup Screen allows you to set an alarm for maximum particle count, as well as minimum or maximum analog values. After you set an alarm, the LASAIR II display flashes red and yellow when the defined limit has been exceeded. You can also set an audio alarm.

Silencing Alarms

If the alarm is activated, the Main Display Screen (and Analog Data Display Screen) will blink red and yellow. If the audio alarm has been set, the unit will beep.

To silence an alarm, press the Enter button, or one of the arrow buttons on the control panel, until all alarms are off. The triggering value will remain in red on the Main Display Screen if it is a particle alarm (or on the Analog Data Display Screen, if it is an analog value).

To remove the red and yellow flashing, after the pump stops, press the Enter button once more (after pressing it to silence the alarm). You can also silence alarms and stop the red and yellow blinking by repeating the sampling, without exceeding an alarm limit, or by turning the unit OFF and then ON.

Accessing Alarms

To access the Alarm Setup Screen,

1. Press the first softkey on the main display screen. The Main Setup Screen will be displayed.

2. Press the Alarm softkey. The Alarm Setup Screen will open:

Field	Usage
Alarms Enable/ Disable	Allows you to turn **all** alarms ON or OFF.
Audio Enable/Disable	Determines whether audio alarms will accompany the visual alarms.

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Particle Alarms — This section contains the fields pertaining to particle alarms. You can set an alarm limit for each particle channel. You can enable/disable the limit in each channel. The enabled alarm will activate if the particle count exceeds the set limit. You can also select whether the alarm limit is a differential or total count value. A value of zero disables the channel.

Analog Alarms — The analog alarms section allows you to set a high and/or low limit for each enabled analog environmental sensor (Analog data information is set up in the Analog Data setup screen). Each limit can be enabled or disabled.

To Edit the Alarm Setup, press the Enter button.

Use the tab and back tab keys to move from the Particle Alarm Setup Screen and the Analog Alarm Setup Screen and to move to the major areas within each setup screen.

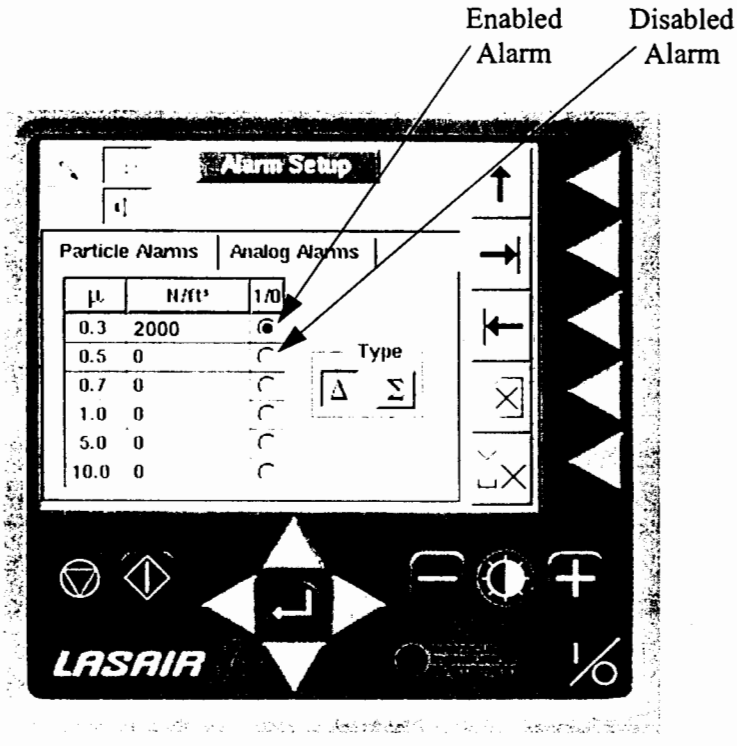
Use the Arrow keys to move within an alarm matrix. Use the Enter key to initiate and to confirm changes.

To move back and forth from Particle Alarms and Analog Alarms, press the "Tab softkey" when you are out of edit mode.

Setting Particle Alarms

You can set as many as six particle alarms - one for each particle size channel. Each alarm value has a corresponding "radio button" to enable or disable the alarm. By pressing Enter, you put a "bullet" in the 1/0 field to enable the alarm. Remember that you can turn off all the alarms by turning off the Alarm icons at the top-left of the screen.

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To set an alarm for one or more particle channels,

1. With the Alarm Setup Screen for analog data displayed, press the Enter key to enable the Edit Mode.
2. Tab to the Type field and select either Differential Counts or Total Counts.

NOTE: The right tab key moves the cursor from the Alarm Enable Button, to the Audible Alarm Button, to the Type Count Button, to the Particle Alarms Table. Pressing the right tab key again will change the display to the Analog Alarms Screen.

3. Tab to the Count field (N, N/ft^3, or N/M^3).

NOTE: N, N/M^3 or N/ft^3 is selected in the Sample Setup Screen.

4. Press Enter to activate the Count Field of your choice.
5. Use the arrow keys to move within the alarm table or to change alphanumeric values.

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6. Use the Enter key to initiate and confirm the change.

Pressing Enter also moves you into the Enable field, where the 1/0 field will be highlighted.

7. Press Enter again to insert a "bullet" in the 1/0 radio button. Your alarm setting is now enabled.

Automatic Changes in Particle Alarms

Particle alarm settings will be automatically adjusted for changes made in the sample settings so that the proportions will remain constant. For example:

- If data is in the Raw mode, then changing the Time/Volume setting will also change the alarms. For example, suppose that the Alarm is set to 10 particles and Time is set to 00:01:00. If you change the time setting to 00:02:00, the alarm setting will automatically be changed to 20 particles.
- If data is changed from Raw to Normalized, the value of the new alarm will be automatically changed to equal (Old Alarm/volume) * (1 ft^3/min).
- If data is changed from Normalized to Raw, the opposite happens. That is, New Alarm = (Old Alarm * Volume) * (1 ft^3/min).
- If data is in Normalized mode and units change from ft^3 to m^3 or from m^3 to ft^3, the alarm is also automatically adjusted.

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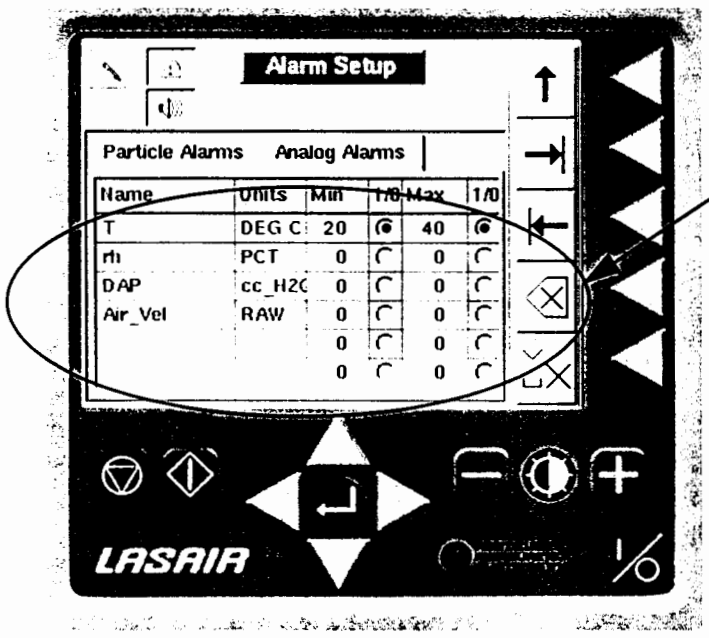
Setting Analog Alarms

To set an alarm for an analog parameter, you must have already enabled that parameter in the Analog Data Setup Screen.

You can set a Minimum value, a Maximum value, or both for each analog variable in your list. You must also enable those alarms by entering a bullet in the 1/0 field next to the Min/Max field.

To set minimum and/or maximum values for an analog probe,

1. Bring the Analog Alarm Setup Screen into view:

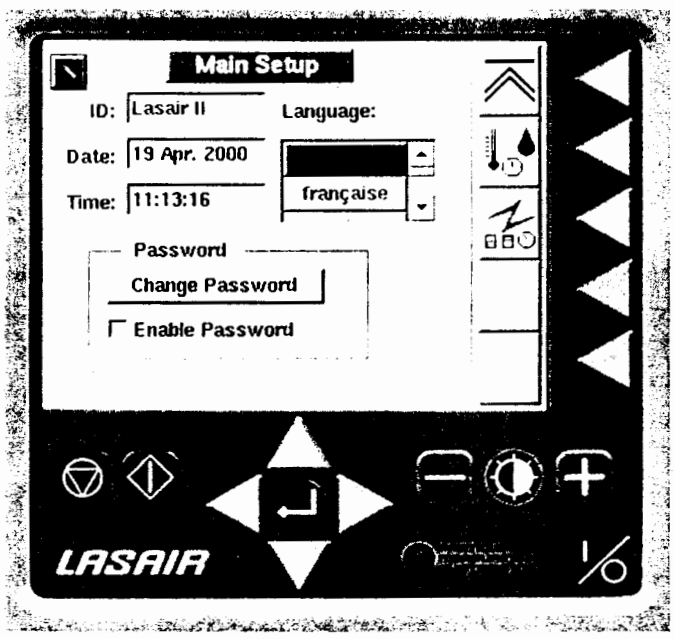


2. Press Enter to activate Edit Mode.
3. Tab to the first Min value field in the list. Use the directional arrow buttons on the control panel to move around the list of variables.
4. Press Enter to initiate the ability to change an alarm limit in a Min or Max field.
5. Press Enter to record that value and to move to the 1/0 radio button.
6. Press Enter again to insert a bullet in the 1/0 radio button. This alarm is now enabled at the alarm limit you have selected.

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Main Setup Screen

To open the Main Setup Screen, press the second softkey ⊡ from the top on the main display screen. The Main Setup screen will open:



Field	Usage
ID	Allows you to enter an identification name or number for the LASAIR II. You can enter up to 16 alphanumeric characters.
Date	Lets you set the date in the format of *dd:month:yyyy*.
Time	Allows you to set the time in the format of *hh:mm:ss*. Time is in military time only. That is, one o'clock in the afternoon is 13:00:00. Hours range from 00:00:00 to 23:59:59.

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Password — The password group box enables you to add or change a password, as well as enable/disable the password function. If a password is set and enabled, the user must always enter the password when selecting the Main Setup Screen.

NOTE: Once a password has been set, it is always enabled for the web browser connection.

Language — English, French, Spainish, German, Italian.

Data Erase button  — Pressing this button will erase all data samples on the box. A pop-up screen will query the user to confirm the erase. A data recovery feature allows the user to restore erased data. See the data recover button below.

Data Restore button  — This button is displayed after data has been erased from the box. It allows recovery of data which is erased by mistake. The data recovery function will work even after the box has been powered off and back on. However, once a new sample has been taken, old data cannot be recovered.

To edit the Main Setup Screen,

1. Press the Enter button to move into the Edit mode.
2. Use the forward and backward tab keys to move to the desired location.
3. Change any fields that are necessary.

Refer to the section, "Edit Mode" on page 32, for more information about changing values and selecting options in the fields.

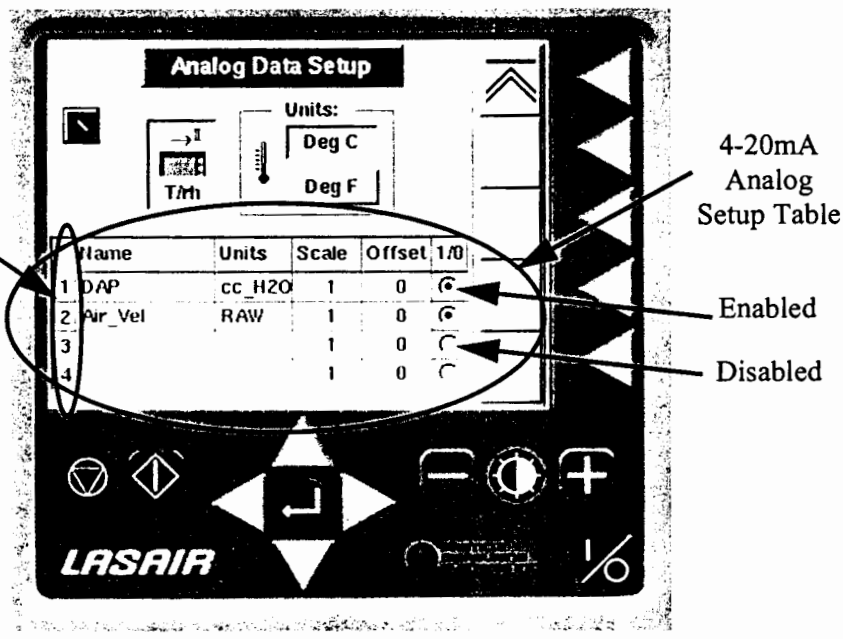
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Analog Data Setup Screen

To display the Analog Data Setup Screen,

1. Press the second softkey on the Main Display Screen . The Main Setup Screen will be displayed.

2. Press the second softkey on the Main Setup Screen . The Analog Data Setup Screen will open:



Field	Field Usage
T/rh	Enables or disables the optional Temperature/Relative Humidity (T/RH) sensor mounted at the top of the LASAIR II.
Units	This group box relates to the T/RH field, and determines whether the temperature readings will be displayed in Centigrade or Fahrenheit.
Name	Allows you to enter up to 16 alphanumeric characters for the name of any additional analog sensor.

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Units Allows you to enter up to 10 alphanumeric characters to describe the measurement units.

Scale Allows you to enter a scaling factor for the data from the corresponding probe.

Offset Allows you to enter an offset factor for the data from the corresponding probe.

A scale of 1 and an offset of 4 will produce an output in raw milliamperes (μA).

Enable/ Disable Determines whether the individual sensor is enabled or disabled. If the sensor is enabled, ◉ its measurements will be displayed on the Analog Display Screen, included in the printouts and the data record or output, and can be used to trigger alarms.

To Enable or Disable a channel,

1. Enter the data table and move to the 1/0 cell for the Analog Channel you want to enable.
2. Press the Enter key to activate the field. The back ground around the select icon will turn white.
3. Press the Enter key again to enable ◉ (or disable ○) and to move the position focus to the first cell in the row.

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Password and Remote Access Security

LASAIR II has a password protection feature that enables you to set a password for a LASAIR II, and then enable or disable the password feature. A Password can be set and enabled or disabled from the instrument only. The password that is set at the instrument is specific to the instrument and is the same password that users must enter when accessing the LASAIR II from a web browser, Facility net, or Pharmaceutical Net.

Once a password has been set, a user trying to remotely access a LASAIR II must always enter the password even if the password function has been disabled at the instrument.

Remote access from a web browser access or from a facility management program such as Facility Net or Pharmaceutical Net can be disabled at the instrument's *Comm Setup Screen*.

If a password has been set and the password function is enabled, access to the password and the remote access controls require the user to enter a password.

To set a password,

1. From the Main Display Screen press the Main Setup Icon softkey to open the Main Setup Screen. 
2. Press the Enter button to enable the Edit Mode.
3. Press the Tab softkey until you reach the Change Password button.
4. Press the Enter key. The Enter New Password dialog box will open.
5. Use the Up or Down arrow buttons and the softkeys to enter a password. The password may be 16 alphanumeric characters including the underscore and the blank characters.
6. Use the Tab softkey to move to the OK button and then press the Enter button to accept the password. The Verify New Password dialog box will open.
7. Re-enter the password, tab to the OK button and press the Enter button to accept the password. The Password Changed dialog box will open.
8. Press the Enter button to complete the action for that password.
9. If you are ready to enable password protection, navigate to the Enable Password check box and then press the Enter button to insert a check mark.

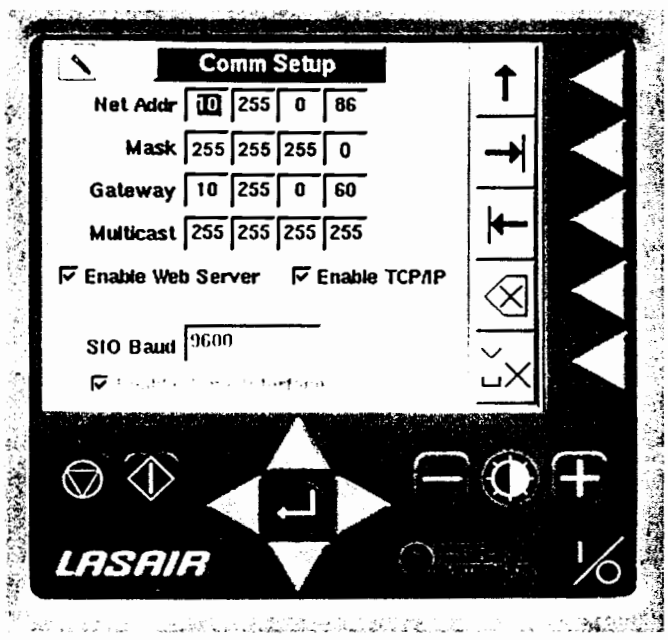
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Communications Setup Screen

To open the Comm Setup Screen,

1. On the main display screen, press the Main Setup softkey . The Main Setup Screen will be displayed.
2. Press the Comm Setup softkey  to open the Comm Setup Screen:



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Network Parameters

Field	Field Usage
Net Address	Sets the IP address of this unique LASAIR II in a decimal notation form of aaa.bbb.ccc.ddd. Each 3-numeric series represents a value from 0-255, separated by period characters (.). This address is unique to the hardware it serves. A valid IP address would look like: "010.255.000.099". The non-significant zeros can be dropped so that the same address appears as 10.225.0.99.
Mask	Sets the net mask address using a decimal notation form of aaa.bbb.ccc.ddd. Each 3-numeric series represents a value from 0-255, separated by period characters ".". The mask separates the network address from the host address. Usually, the mask will be similar to "255.255.255.0". Your network administrator will tell you if you need to enter this field.
Gateway	The gateway address is used when communicating across a different network. This field sets the gateway address in a decimal notation form of aaa.bbb.ccc.ddd. Each 3-numeric series represents a value from 0-255, separated by period characters ".". An example of a valid gateway address is: "10.255.0.60".
Multicast	The multicast address must be assigned if you are using the Pharmaceutical Net or Facility Net software. This field sets the multicast address in a decimal notation form of aaa.bbb.ccc.ddd. Each 3-numeric series represents a value from 0-255, separated by period characters (.). An example of a valid multicast address is: 224.100.100.1.
Enable Web Server	The default setting for this field is Enabled; note the check mark in the box. It allows a user to connect to the LASAIR II from a computer. Disabling this function prevents remote control and viewing of sampling.
Enable TCP/IP	The default setting for this field is Enable; note the check mark in the box. It allows a user to connect to Facility/ Pharmaceutical Net. Disabling this function prevents the use of these applications.
TCP/IP Remote Mode	The default setting is "disabled". Checking this box enables Facility Net to download data stored in the LASAIR II rather than sampling data collected on-line. See "Facility Net Remote Mode Operation" on page 64 for additional details. "Enable TCP/IP" must also be checked to enable this function.

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Serial Parameters

Field	Field Usage
Serial Mode	"LASAIR II" is the default setting. Select "TouchRAM Read" or "TouchRAM Write" to use TouchRAM.
SIO Baud	The serial I/O port baud rate is set at 9600.

NOTE: Before you edit this screen we recommend that you record and save the initial values as received from the factory.

TouchRAM

TouchRAM buttons are small metal buttons which can be programmed with sampling information and a location name. The LASAIR II can read data from the button by means of a wand-style button reader that attaches to the serial port on the top of the LASAIR II's case.

An example of how TouchRAM buttons may be used is to permanently attach them to walls at sample point locations. When using your LASAIR II at that location, you can easily read the sample location information and sample parameters into your LASAIR II.

TouchRAM Formats

There are two formats of TouchRAM buttons:

- a MiniLaz compatible format
- a LASAIR II compatible format

The LASAIR II automatically reads either format, but it writes in the LASAIR II format only. Buttons written in the LASAIR II format will be ignored by a MiniLaz instrument.

An optional PC program can write buttons in a modified MiniLaz format that supports additional alarms on the LASAIR II.

Configuring the LASAIR II to Read/Write TouchRAM Buttons

The LASAIR II must be configured to read or read and write TouchRAM buttons.

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To configure your LASAIR II for TouchRAM read/write, navigate to the communications setup screen and check the appropriate box.

Writing TouchRAM Buttons

The button writing utility is found on the LASAIR II's *Location Setup Screen.*

To write to a TouchRAM button.

1. Navigate to the Location Setup Screen.
2. Select a location.
3. Install the TouchRAM wand.
4. Enable the Write button.

A message will direct you to press the wand to the button. the programming operation takes a few seconds. A confirmation dialog box will appear on he screen if programming was successful. If programming was unsuccessful an error message will appear.

Reading TouchRAM Buttons

To read a button, position the wand over the button at any time. If the LASAIR II is running, it will stop sampling. A message will appear on the screen indicating the name of the new location to load. Either accept or reject the location.

LASAIR II Button Format

The LASAIR II button format offers the following advantages over a MiniLaz button format:

- Location names may be 16 characters rather than 7
- The purge delay time is recorded
- The time-of-day start option is recorded
- The *Sample by Volume/Sample by Time* setting is recorded.
- Alarm buzzer on/off is recorded.
- Differential particle alarms may be used.

NOTE: When a LASAIR II format button is scanned by a MiniLaz, it is ignored.

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Compatibility With MiniLaz Buttons

The LASAIR II is compatible with MiniLaz TouchRAM buttons, but there are some differences. In general buttons written by the MiniLaz or PC program can be used on the LASAIR II, and those written with the PC program can be used on the MiniLaz.

Buttons Written on MiniLaz

These buttons have the following characteristics:

- support the first 5 channels of particle alarms, but do not support particle alarms on the LASAIR II's largest channel
- particle alarms in metric units are written incorrectly by the MiniLaz. LASAIR II alarms will be set 35.3 time higher than expected
- supports temperature and rh alarms, but not user analog channels

Buttons Written with a PC

These buttons are similar to those written by the MiniLaz, but the following MiniLaz communications options can be set:

- MiniLaz Comm Type
- MiniLaz Comm Baud
- MiniLaz PMS Addr

The other communications options are fixed:

- MiniLaz Option Printer
- MiniLaz Option Baud 9600
- MiniLaz Display Time-out Time out disabled

Particle Alarms

NOTE: When reading a button with your LASAIR II, ensure that the button was written with the same model of LASAIR II. The LASAIR II is available in different models which have different with particle size channels. See "LASAIR II Specifications" on page 8. The particle alarms are written and read in the buttons for each channel. A LASAIR II 310 which reads alarm settings based on a LASAIR II 510 will set the alarms on a channel by channel basis. That is, the first channel alarm on the 510 (0.5 μm) is read as the first channel alarm on the 310 (0.3 μm).

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Operation

Once you have successfully unpacked and installed the LASAIR II, and set up the unit for sampling, operations is a simple matter. Use the following steps to operate the LASAIR II:

Collecting Sample Data

1. Place the LASAIR II unit in the area where you wish to sample.

CAUTION: Use of a cellular, land-based portable, or mobile phone within 2 Meters of the LASAIR II can cause Radio Frequency interference. Similarly, use of a phone base station within 6 Meters of the LASAIR II can cause interference. Such interference can lead to inaccurate readings. This type of problem is more likely if the phone uses the 1.8-1.9 GHz frequency. The LASAIR II meets all CE requirements related to Radio Frequency Interference.

2. Plug in the unit. If the LASAIR II is already plugged in, but the display is blank, press the ON/OFF button in the lower right of the control panel. You will hear a beep during the startup process.

3. When the display is visible, press the green Start button on the control panel. You will hear the pump begin to circulate air through the unit. On the display screen, you will see the unit go through the Initial Delay countdown and then begin sampling.

When the sampling is completed, the pump turns itself off. Sample results are displayed on the display screens. If you have set sampling to run continuously, the unit will continue to run until you stop the pump or turn the unit off.

To turn sampling OFF, press the red Stop button on the left side of the control panel. You may stop sampling before the sampling sequence reaches completion. The sample data will be marked as invalid.

Printer Output

This section describes the messages and data that appear on the LASAIR II's printed output. The descriptions are listed by line number, from top to bottom as the lines appear on the printed output. Note, however, that the lines are not numbered on the printer output.

The following text is an example of A print output from the LASAIR II thermal printer. A description of each line and the possible variations in each line follows this example.

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```
Final Sample Normalized
LASAIR II
006 Invalid
2000/04/13 12:40:48#1
||  μ  ||     Δ     ||     Σ     ||
||  0.3|| 6459381||  7470894||
||  0.5||  713777||  1011512||
||  0.7||  133677||   297735||
||  1.0||  117950||   164058||
||  5.0||   30024||    46108||
||10.0||   16084||    16084||
    Avg   ||   Min    ||  Max
T                          DEG C
     25.1 ||  24.94   ||  25.23
rh                         PCT
     15.4 ||  15.33   ||  15.43
Alarm: Pump
Alarm: Laser
```

Line No	Text or Data	Description
1a	Final Sample Normalized	A sample will either be final or partial depending on the state of the sample cycle when the printer is run.
1b	Partial Sample Normalized	
2	LASAIR II	This gives the name/ID of the particle counter that produced the data.
3a	006 Valid	*006* identifies the name of the location where the sample was drawn. *Valid* indicates that the LASAIR II has not detected any conditions that would cause the sample to be invalid.
3b	006 Invalid	*Invalid* indicates that the LASAIR II has detected a condition that has invalidated the sample. Also see lines 17 and 18.
4	2000/04/13 12:40:48#1	A date stamp (yr/month/day) followed by a time stamp (hr:min:sec), and the number of the sample.

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5	|| µ || Δ || Σ ||	Column headers: || Particle size in microns || number of particles detected of that size || The sum of all particles counted of that size and larger.||
6	|| 0.3|| 6459381|| 7470894||	The .3 micron channel: || Total counts of .3 microns || Total of all counts of .3 microns and larger
7	|| 0.5|| 713777|| 1011512||	The .5 micron channel: || Total counts of .5 microns || Total of all counts of .5 microns and larger
8	|| 0.7|| 133677|| 297735||	The .7 micron channel || Total counts of .7 microns || Total of all counts of .7 microns and larger
9	|| 1.0|| 117950|| 164058||	The 1 micron channel || Total counts of 1 microns || Total of all counts of 1 microns and larger
10	|| 5.0|| 30024|| 46108||	The 5 micron channel || Total counts of 5 microns || Total of all counts of 5 microns and larger
11	||10.0|| 16084|| 16084||	The 10 micron channel, total counts of 10 microns, total of all counts of 10 microns and larger
12	Avg || Min || Max	Column headers for Environmental Data. Average, Minimum, and Maximum are taken over the Sample period.
13	T DEG C	T: temperature DEG C: degrees centigrade
14	25.1 || 24.94 || 25.23	Average, minimum, and maximum temperature in degrees centigrade. See lines 11 and 12.
15	rh PCT	rh: relative humidity PCT: percent
16	15.4 || 15.33 || 15.43	Average, minimum, and maximum relative humidity in percent. (See lines 12 and 14.)
17	Alarm: Pump	This line prints when the LASAIR II senses that the flow rate is outside the boundary of 1 CFM ±5%. (Also see line 3b.)
18	Alarm: Laser	This line prints when the LASAIR II senses that the laser power is out of the specified range. (Also see line 3b.)

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Silencing Alarms

If the alarm is activated, the Main Display Screen (and Analog Data Display Screen) will blink red and yellow. If the audio alarm has been set, the unit will beep.

To silence an alarm, press the Enter button or one of the arrow buttons on the control panel until all alarms are off. The offending value will remain in red on the Main Display Screen if it is a particle count value (or on the Analog Data Display Screen, if it is an analog value).

To stop the red and yellow flashing, after the pump stops, press the Enter button once more after pressing it to silence the alarm. You can also silence alarms and stop the red and yellow blinking by repeating the sampling, without exceeding an alarm limit, or by turning the unit OFF and then ON.

Copying and Deleting Data

The LASAIR II saves 3,000 sample data records internally. Once the record file is full, any new record will displace the oldest record in the file. A LASAIR II set to process a sample once a minute will fill the record file in about 48 hours.

If you want to save the sample data, monitor the status of your LASAIR II's data file and copy the sample data before the data file is completely full. Remember, once the data file is full, you will lose the oldest data when new sample data is collected.

To monitor the status of the sample data file from the LASAIR II,

1. Press the Information Icon softkey to open the Information Screen.
2. Observe the condition of the Data: "thermometer indicator". The indicator will display the number of records stored and as a relative degree to which the thermometer is filled. The white space in the bar is a relative indication of the amount of space remaining in the data file.

Saving the Sample Data File

You may want to copy the sample data file to another file so it can be saved for long-term retention or for data analysis. This can be done by three methods.

The data can be copied by accessing the LASAIR II from a web browser/Ethernet connection and using the LASAIR II data save

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feature. See Chapter 5, "Using the LASAIR®II With A Computer, Facility Net, or Pharmaceutical Net" on page 63.

Data can also be saved continuously by connecting your LASAIR II to a facility management system such as Facility Net or Pharmaceutical Net and collecting your samples while so connected. When using such a system, the data is saved continuously on a PC, and the local data storage can be ignored.

By operating your LASAIR II separate from Facility Net or Pharmaceutical Net and periodically connecting your LASAIR II to Facility Net for a data dump. See "Facility Net Remote Mode Operation" on page 64.

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Chapter 5

Using the LASAIR®II With A Computer, Facility Net, or Pharmaceutical Net

Introduction

Chapter 4, "Setup and Operations", explained how to setup and operate your LASAIR II directly by manipulating the softkeys and control panel. This chapter explains how to access and control your LASAIR II from a separate computer or from a Facility Management System (FMS) such as Facility Net or Pharmaceutical Net.

Using LASAIR II With Facility Net or Pharmaceutical Net

You can use your LASAIR II with Facility Net (or Pharmaceutical Net) in one of the two following ways:

Part of an FMS Operation

- You can connect to your LASAIR II and control it through a FMS such as Particle Measuring Systems' *Facility Net* or *Pharmaceutical Net*. Using a FMS enables you to manage many LASAIR IIs as a part of your facility's environmental monitoring process.

Contact your Particle Management Systems representative for guidance on connecting LASAIR II to your FMS.

NOTE: Before connecting the LASAIR II with your system, ask your PMS representative to verify that Facility Net (or Pharmaceutical Net), has received all of the relevant upgrades.

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Facility Net Remote Mode Operation

You can also use your LASAIR II "off-line" from Facility Net and transfer the collected data to Facility Net later. That is, you can enter locations in your LASAIR II, collect data at those locations while disconnected from Facility Net, and then download the collected data directly to Facility Net where it can be archived or analyzed.

NOTE: Before beginning to use this feature, ensure that your version of Facility Net has the required versions of the .dll and .hlp files listed below. If your dll or hlp files are not correct, contact your local Particle Measuring Systems representative or distributor.

Preparing Your LASAIR II for use in Remote Mode

Complete the following steps to ensure that your LASAIR II is ready for use in the Remote Mode.

To prepare your LASAIR II for use in remote mode.

1. Ensure that its identifier, on the Main Display Screen, is unique to all other LASAIR II's that will be used with your Facility Net system.

NOTE: If you attach a LASAIR II that has a duplicate identification to your Facility Net system, the driver will ask if you want to switch the existing configuration over to the new IP address. The LASAIR II identification is placed in the *DCSName* in Facility Net so it will be present in the *Instrument Configuration Dialog Box*.

---

2. Ensure that all location names are unique between different LASAIR IIs.
3. Ensure that the LASAIR II's Ethernet address is unique to all other LASAIR IIs that may be connected simultaneously to Facility Net.

Downloading Data from A LASAIR II to Facility Net

The following steps will download data from a LASAIR II to your Facility Net system

To download data collected off-line to a Facility Net system.

1. Ensure that the following files in your copy of Facility Net are of the correct versions:
   - pdrvlpen.dll: version 2.9.23 or later

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- pms_util.dll: version 2.9.22 or later
- pdrvlpen.hlp: dated Feb 20, 2001 or later

2. Before connecting your LASAIR II to Facility Net, navigate to the *Communications Setup Screen* under the *Main Setup Screen*.
3. Navigate to the "TCP/IP Remote Mode" checkbox, and place a check in the check box.

NOTE: If this check box is not enabled before connection to Facility Net, the LASAIR II will be configured within Facility Net as a regular on-line sensor.

---

4. If you want to automatically delete the data in the LASAIR II after it has been copied to Facility Net, select Auto-delete in Facility Net.

NOTE: If you prefer to manually delete the data from the LASAIR II, use the manual delete button in Facility Net's Runtime dialog box. Use of this button is controlled by normal security features. Or, use the delete button on the LASAIR II's *Main Setup Screen*.

---

5. Connect your LASAIR II to your Facility Net system.
6. In Facility Net, enter an "All" particle sample point and an associated "Text" sample point. The "All" analog entries are optional. The driver will auto-configure these locations and download data from the LASAIR II to Facility Net. When download is complete, Facility Net communications with LASAIR II will be automatically disabled.

Using LASAIR II With a PC

You can use your web browser software to control your LASAIR II from a separate computer through one of two kinds of connection:

- A direct cable connection to a PC.
- A connection over an Ethernet network to a PC

Using a computer to access and control your LASAIR II has the following advantages:

- You can access and control your LASAIR II from a remote location.
- You can use a keyboard and mouse for data entry and editing.
- You can display more data on a larger screen.

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- You can copy data from the LASAIR II directly to your computer's hard drive, spread sheet software, or database software.

NOTE: The instructions in this chapter assume that you are familiar with using either Microsoft Internet Explorer or Netscape Communicator browser software.

Connecting to a Dedicated or Networked PC

To connect the LASAIR II to a dedicated or networked PC, please see the Appendix and perform all required actions for each of the following areas:

- Meeting PC hardware and software requirements
- Connecting the unit through Ethernet to the PC or the network
- Setting Network addresses
- Assigning an address to the PC's TCP/IP connection
- Determining the address of the LASAIR II

Direct and Indirect Control

The differences between controlling your LASAIR II directly and controlling it indirectly (remotely) are the following:

Direct control always takes precedence over indirect control. This means that you will be unable to take control from someone who is directly controlling the LASAIR II.

- Even if you have already established indirect control, you can lose control to someone who begins controlling the LASAIR II directly.
- When you are unable to gain control of the LASAIR II sampler, the error message "Unable to gain control of the instrument at this time." will appear on the PC display.

The issue of more than one person accessing the same LASAIR II should be managed through passwords and other administrative controls.

NOTE: You cannot set, enable, or disable passwords from a remote computer.

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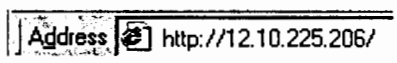
Establishing Communications Through a Web Browser

You will use the same steps to connect with a LASAIR II whether you are connecting over an Ethernet network or directly from a PC with a crossover cable.

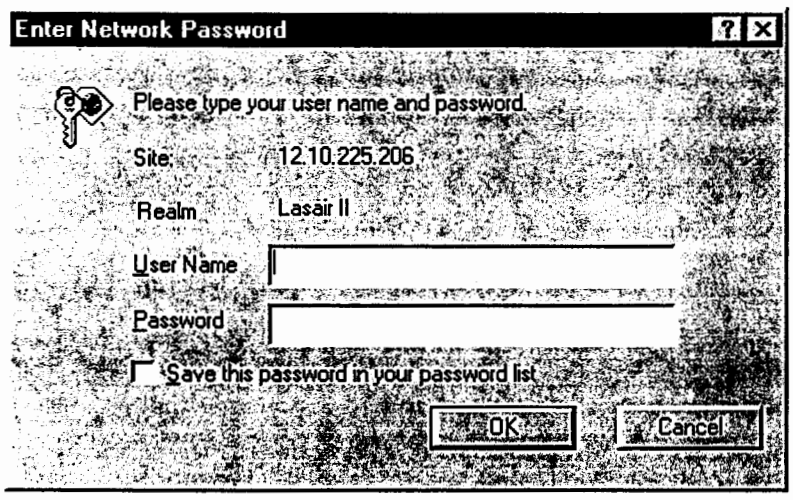
NOTE: If someone else has control of the LASAIR II either directly or from a FMS or PC, you will be unable to gain control of the LASAIR II. Leaving the LASAIR II edit screens active can also interfere with a remote connection. The LASAIR II should always be left with the Main Display Screen open.

To establish communication between your computer and the LASAIR II,

1. Start your LASAIR II and your computer.
2. Open your browser software.
3. Click on the IP address field to select the entire address.
4. Type the LASAIR II's IP address into the into the IP address field. You do not need to type "http://" or the non-significant zeros in the IP address. The address will appear something like the following example:



5. Press the Enter key on the keyboard or click on Go. The Enter Network Password dialog box will open.



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6. The User Name field is **NOT** used for LASAIR II access. Ignore it and move the cursor into the Password field.
7. If password control is enabled and passwords have been assigned, type your Password and then click the OK button. Otherwise, click OK. The main LASAIR II display will open.

NOTE: If a password has been assigned, it is always enabled in the web browser even if it is disabled on the Front Panel.

Control With a Web Browser

You will now be able to perform the following functions from your PC:

- Display the particle and analog data from the LASAIR II
- Configure the setup screens for sampling
- Start or stop sampling
- Download, save, or delete sample data
- Detect alarms
- Print reports
- Upload software revisions into flash memory

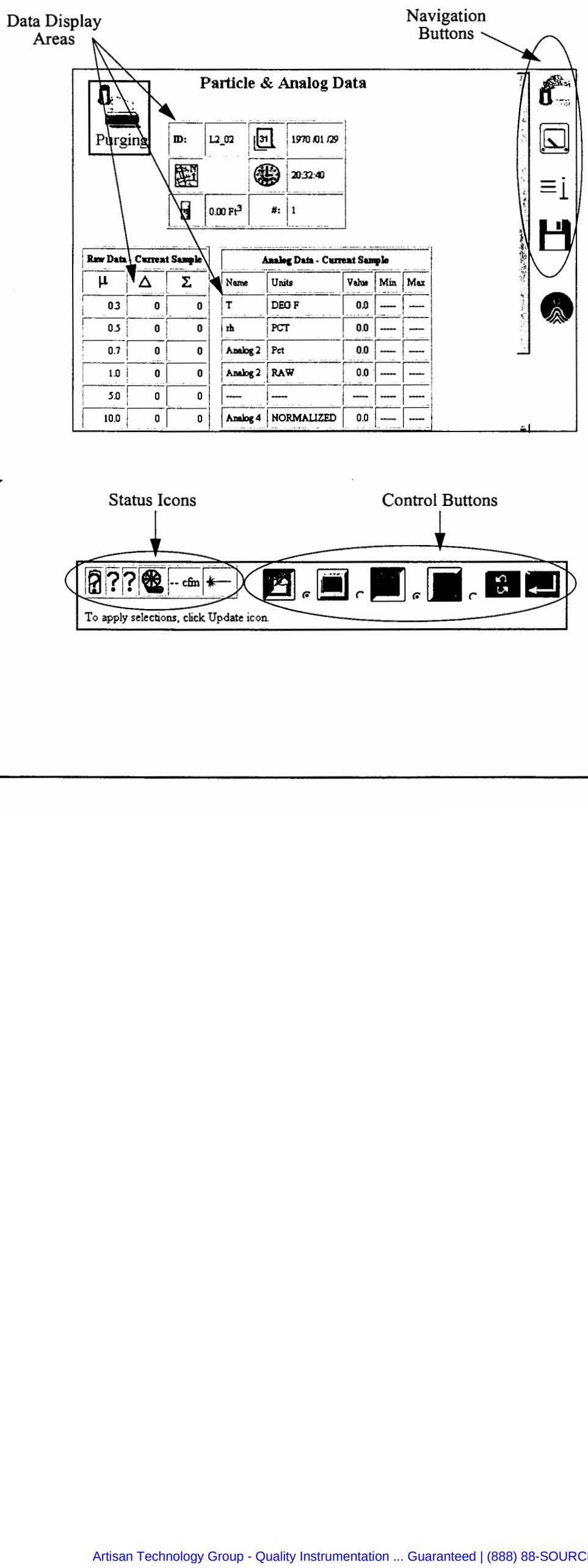
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Displaying Data on a PC

The Particle and Analog Data window is comprised of four parts:

- The Data Display area
- The Status Icons
- The Control Buttons
- The Navigation Buttons

The Particle and Analog Data window is the LASAIR II's "home page". From here you can navigate to the Setup Windows, start or stop a sampling run, display the current or previous data for display, and refresh the display.



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Particle and Analog Data Window Display Area

The Display Area is where you will find information such as the LASAIR ID, sampling location name, and the results of the current or previous sampling.

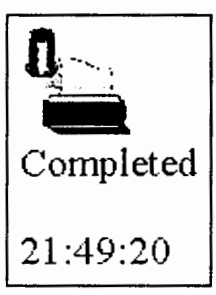
Unlike the data displayed on the LASAIR II instrument, the data displayed on the web browser is **not** real-time. The web browser captures data at one point in time, but it does not automatically update the data as it changes.

To update the data display, click the Refresh button on the window or on the browser menu bar to update the data display. Be sure to click the refresh button after a sampling sequence has completed to see the final results.

Note that the following status icons appear in the upper left corner of the display screen to tell you what is happening in the sampling process.







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Particle and Analog Data Window Display Status Icons

These status icons and control buttons are on the bottom of the main display window. Use the scroll bar as needed to see this part of the window.

The status icons have the same function and appearance as the status icons found on the bottom of the LASAIR II'S Main Display Screen.

Particle and Analog Data Window Control Icons and Buttons

The Control Icons and buttons control the following functions:



Display current data: Either this icon or the next icon is selected. Selecting one deselects the other. Select it by clicking in its empty radio button and then clicking the Enter Icon.



Display the last completed sample data. Either this icon or the previous icon is selected. Selecting one deselects the other. Select it by clicking in its empty radio button and then clicking the Enter Icon.



Stop a sampling run. Either this icon or the next icon is selected. Selecting one deselects the other. Select it by clicking in its empty radio button and then clicking the Enter Icon.



Start a sampling run: Either this icon or the previous icon is selected. Selecting one deselects the other. Select it by clicking in its empty radio button and then clicking the Enter Icon.



Refresh Control Button: Click this button to refresh the display.



Enter Control Button: Click this button to activate any choices you have made among the first four icons on this list. If the Start Icon has been chosen, and sampling parameters have been defined, a sampling run will begin when you click on this button.

Two steps are required to Activate the Previous Sample Button, Current Sample Button, Stop Sampling Button, or Start Sampling Button:

To activate the control buttons,

1. Click on the radio button to the right of the button to insert a dot.
2. Click the Enter button to activate the buttons you have selected.

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Saving Sample Data File

You may want to copy the sample data file to another file so it can be saved for long-term retention or for data analysis. The data can be copied by accessing the LASAIR II from a web browser/Ethernet connection and using the LASAIR II data save feature.

To save sample data to another file,

1. From the Particle and Analog Data page, click the Download Data Icon. It looks like a computer diskette. This will open the sample data file. The data will have the following appearance:



```
"Sample Date","Sample Time","Sensor Name",
1970/01/01,04:17:48,"","LasairII-310",0000
1970/01/01,22:20:10,"","LasairII-310",0000
1970/01/04,02:24:37,"","LasairII-310",0000
```

The data starts with a header line. Each line after the header line is one sample record. The entire file is created in a Comma Separated Value (CSV) format with the date stored in a year/month/day format. For details about this format, see "Comma Separated Value (CSV) Format" on page 135.

2. Click on *File* > *Save* As in the browser's menu bar and complete the dialog box to name the new data file you will create and to define where the file will be located. For example, you might name the file "data" and save the data as a text file to import into Excel.
3. Click *Save*.
4. Go to the file location and name to verify that the save was completed.

Deleting Sample Data Records

Once you have saved your data records outside the LASAIR II, you should delete those records from the LASAIR II to avoid duplication of data.

You may also want to delete invalid records from the LASAIR II.

To delete the entire buffer of sample data from the LASAIR II,

1. From the Particle and Analog Data page, click the Main Setup Icon. This will open the Main Setup Page.



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2. Click anywhere on the Stored Data Deletion Icon.



LASAIR II will require confirmation that you really want to delete all of your stored data records.

NOTE: A message that reads: "*Unable to gain control of the instrument at this time. No values were updated.*" means that someone else has direct control of the LASAIR II or that the LASAIR II has been left with a screen other than the Main Display or Analog Display open. No records were deleted.

---

3. Click the delete button to complete the record deletion. If you go to the Status page (use the Status Icon) you will see that the "Used: " line of the storage indicator will read zero.



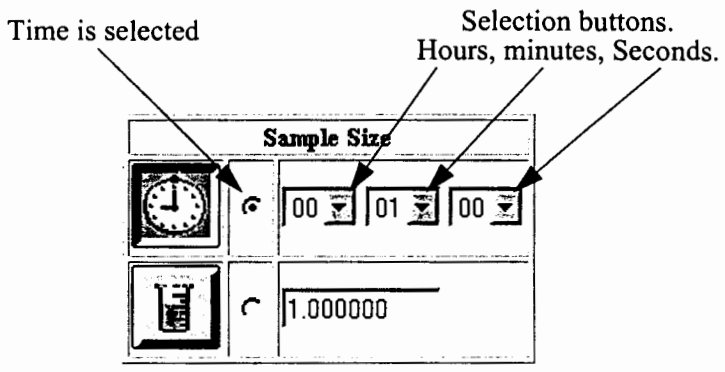
Setup Windows

Web browser Setup Windows are different from the setup screens on the LASAIR II in a few important ways.

- **Radio buttons:** the options on setup windows are chosen by activating the radio button associated with the choice. Click in an empty radio button to choose the option associated with it.
- **Parameter Values:** The parameter values are changed by using a pull-down menu or by clicking an increment button.
- **Setting the Sampling Size parameters:** If the Sampling Size type you want to use is not selected (volume or time), click in the empty radio button associated with the type (Time or Volume) you want to use. A large dot will appear in the radio button you choose, and the other radio button will be cleared.

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- **Setting the time or volume:** Use the increment button or click in the data area and type.



The Undo Button resets all values to their previous settings, if you click it before clicking the Enter Button.

The Enter button accepts your settings for use in the next sampling run. You must click the Enter Button if you want your settings to be used.

Location Name Setup Window

The following two functions can be performed only from the web browser.

Copying Location Names from a File to LASAIR II

You may find it easier to create your location names on a text editor and then transfer the list into your LASAIR II in one action.

To copy location names from a file to LASAIR II,

1. Use any text editor to create a list of location names with one name on a line. The first line must be a number that indicates the number of location names in the file. Each location name can be a maximum of 16 alphanumeric characters from the following set:

   0-9

   a-z lower case

   A-Z upper case

   The underscore character: _

   A blank

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A single LASAIR II will accept a maximum number of 200 location names.

2. Save the file as "Text Only". The file will have the appearance of the following example:

   3

   Lab A Point1

   Lab A Point2

   Assembly

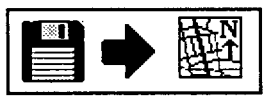
3. Click the Sampling Setup Icon to open the Sampling Setup Window.



4. Click the Location Name Setup Icon to open the Location Name Setup Window.



5. Click on the "Transfer locations to LASAIR II from a file" icon.

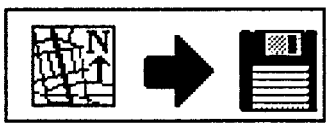


6. Follow the instructions on the window to specify the file you want to transfer to the LASAIR II.

Copying Location Names from LASAIR II to a file

To copy Location Names from LASAIR II to a file.

1. Click the Sampling Setup Icon to open the Sampling Setup Window.
2. Click the Location Name Setup Icon to open the Location Name Setup Window.
3. Click on the "Transfer locations from LASAIR II to a File" icon.



4. On the command bar, click File > Save As..., and specify the location and file name of the file to hold the data.

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Chapter 6

Statistics Mode

Introduction

This chapter describes setup and operation of the LASAIR® II for use with certification statistics. When used for that purpose, it is said to be in the *Statistics Mode*. If you want to use the LASAIR II for routine sampling, see chapter 4, "Setup and Operation."

Depending on your choice of certification standard and other variables, the LASAIR II will determine the minimum requirements to certify a cleanroom.

LASAIR II supports the following standards:

- FS-209E
- ISO 14644-1
- BS 5295

In addition, the LASAIR II has an *Average* mode that enables you to create and collect simple averaging data from one or more locations.

The variables that you may set vary with the international standard (or Average mode) that you select. If a standard does not allow you to change a variable, that variable will disabled in the setup screen.

NOTE: Although the LASAIR II will make the process of cleanroom evaluation and certification much simpler, it is not a substitute for expert knowledge of the standard's requirements.

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Features

The LASAIR provides the following features while in statistics mode:

- Valid parameter ranges are automatically calculated
- The room name is saved as part of the data set. This is useful for performing certifications of several areas at one time and downloading Comma Separated Value (CSV) data at a later time for off-line calculations.
- A *Sample Acknowledge* mode allows the user to verify each sample before accepting it as valid data. Rejecting the sample results will prevent its use in the statistical calculations.
- The *auto-increment* mode provides a means of automatically identifying sequential sample locations without creating and selecting location names.

NOTE: The statistics mode is not supported in the web browser.

Screens

The LASAIR II uses the following screens for its certification (statistical) functions:

- **Statistics Setup Screen**: this screen is where you select the type of statistics you wish to collect, set the appropriate parameters for the statistical method, and enable or disable the LASAIR II statistical mode.
- **Statistics Data Screen:** where you can see the data generated from the current location as it is being generated.
- **Statistics Location Summary Screen:** where you can see a summary of the data that has been collected from one or more locations.
- **Sampling Setup Screen**: Use this screen to select the correct location name or number.

See the following sections for details about each screen.

The following screens have functional changes when the statistics mode is enabled:

- Sample Setup Screen
  - ➢ Sample size is locked when the statistics mode is enabled. Also, samples are all by volume, not time.
  - ➢ The user can only display normalized counts, not raw counts.

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➢ Units cannot be changed while statistics is enabled.

➢ Continuous sampling cannot be selected.

➢ The # *Samples* range is restricted depending on the standard you choose. If *Sample Acknowledge* is on, only one sample may be taken at a time.

➢ When numeric locations are used, the location list is replaced by an integer box.

- Main Display Screen

  ➢ The differential counts column is replaced with a *concentration limit target* column or, if the *average* mode is selected, a *mean value* column.

  ➢ The standard and class is printed above the data table.

  ➢ The analog data menu icon is replaced by a statistics menu icon. Analog data is still available even though the menu is changed.

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Cleanliness Standards

This section lists the cleanliness standards supported by LASAIR II and describes what you may need to know about how LASAIR II integrates the requirements of the standards into its operations.

The standards tables are reproductions of the targets for each of the international standards supported by the LASAIR II. The areas of the tables that are shaded represent invalid settings. For example, the FS-209E standard, does not allow you to measure a class 1000 cleanroom using a 0.3μ particle size.

FS-209E Standard

The document, FED-STD-209E (11 September 1992), was used when designing the FS-209 module, and only the classes specified in the document's tables have been implemented.

If the number of locations is less than five, the number of samples required at each location is increased, so that a minimum of five samples is taken. This may result in six or more samples being taken so that the LASAIR II will accept the result.

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FS-209E Target Table

Class		0.1μ		0.2μ		0.3μ		0.5μ		5.0μ	
SI	English	m^3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^3
M1		350		75.7		30.9		10.0			
M1.5	1	1,240	35.0	265	7.50	106	3.00	35.3	1.00		
M2		3,500		757		309		100			
M2.5	10	12,400	350	2,650	75.0	1,060	30.0	353	10.0		
M3		35,000		7,570		3,090		1,000			
M3.5	100			26,500	750	10,600	300	3,530	100		
M4				75,700		30,900		10,000			
M4.5	1,000							35,300	1,000	247	7.00
M5								100,000		618	
M5.5	10,000							353,000	10,000	2,470	70.0
M6								1,000,000		6,180	
M6.5	100,000							3,350,000	100,000	24,700	700
M7								10,000,000		61,800	

Use the following sources for more information about the FS-209E standard:

- Institute of Environmental Sciences and Technology
  940 East Northwest Highway
  Mount Prospect
  Illinois, 60056
  USA
- Tel: 0101 708 255 1561
- Fax: 0101 708 255 1699
- e-mail: Publicationsales@iest.org or iest@iest.org
- Web Site: www.iest.org

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ISO 14644-1 Standard

The document, ISO/FDIS 14644-1 (10 November 1998), was used when designing the ISO 14644-1 module, and only the classes specified in the document's tables have been implemented. LASAIR II does not support intermediate class sizes or intermediate particle sizes.

In ISO 14644, if only one location is used, three sample points are required.

ISO 14644-1 Target Table

Class	0.1µ	0.2µ	0.3µ	0.5µ	1.0µ	5.0µ
ISO 1	10	2				
ISO 2	100	24	10	4		
ISO 3	1000	237	102	35	8	
ISO 4	10000	2370	1020	352	83	
ISO 5	100000	23700	10200	3520	832	29
ISO 6	1000000	237000	102000	35200	8320	293
ISO 7				352000	83200	2930
ISO 8				3520000	832000	29300
ISO 9				35200000	8320000	293000

Use the following sources for more information about the ISO 14644-1 standard:

- International Standards Organization
  Web Site: www.iso.ch
- Institute of Environmental Sciences and Technology
  940 East Northwest Highway
  Mount Prospect
  Illinois, 60056
  USA
- Tel: 0101 708 255 1561
- Fax: 0101 708 255 1699
- e-mail: Publicationsales@iest.org or iest@iest.org
- Web Site: www.iest.org

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BS-5295 Standard

The document, BS 5295 (1989), was used when designing the BS 5295 module, and only the classes specified in the document's tables have been implemented. LASAIR II does not support intermediate class sizes or intermediate particle sizes.

The BS 5295 standard specifies a particle counter with a sample flow rate of 0.4 Liters per second ± 5% (24 Liters per minute). The LASAIR II has a flow rate of about 0.471 liters per second. It is common practice to use 1 CFM for BS-5295 calculations. The standard also requires samples of 27 Liters. In BS-5295 mode, the min/max sample volume is 27.4 Liters (.0274 m^3).

In BS-5295 mode, the statistics summary screen and statistics location summary only show data for the smallest particle channel. Data for all relevant channels is shown on the printed report.

Also, only the minimum number of sample locations may be used. That is, you may not increase the minimum number of locations.

BS-5295 Target Table

Class	0.3µ	0.5µ	5.0µ	10.0µ	25.0µ	Area	Samples
C	100	35	0			10	20
D	1000	350	0			10	10
E	10000	3500	0			10	5
F		3500	0			25	5
G	100000	35000	200	0		25	5
H		35000	200	0		25	1
J		350000	2000	450	0	25	1
K		3500000	20000	4500	500	50	1
L			200000	45000	5000	50	1
M				450000	50000	50	1

Use the following sources for more information about the BS-5296 standard:

- B S I Standards
  389 Chiswick High Road
  London W44 AL
- Tel: 0181 996 9000
- Fax: 0180 996 7400
- e-mail: info@bsi.org.uk

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Alarms

When the statistics mode is enabled, global alarms are automatically disabled. You can manually enable the alarms while in statistics mode. When you disable the statistics mode, global alarms will not be automatically enabled. You must manually enable global alarms, if you want that function.

Communications

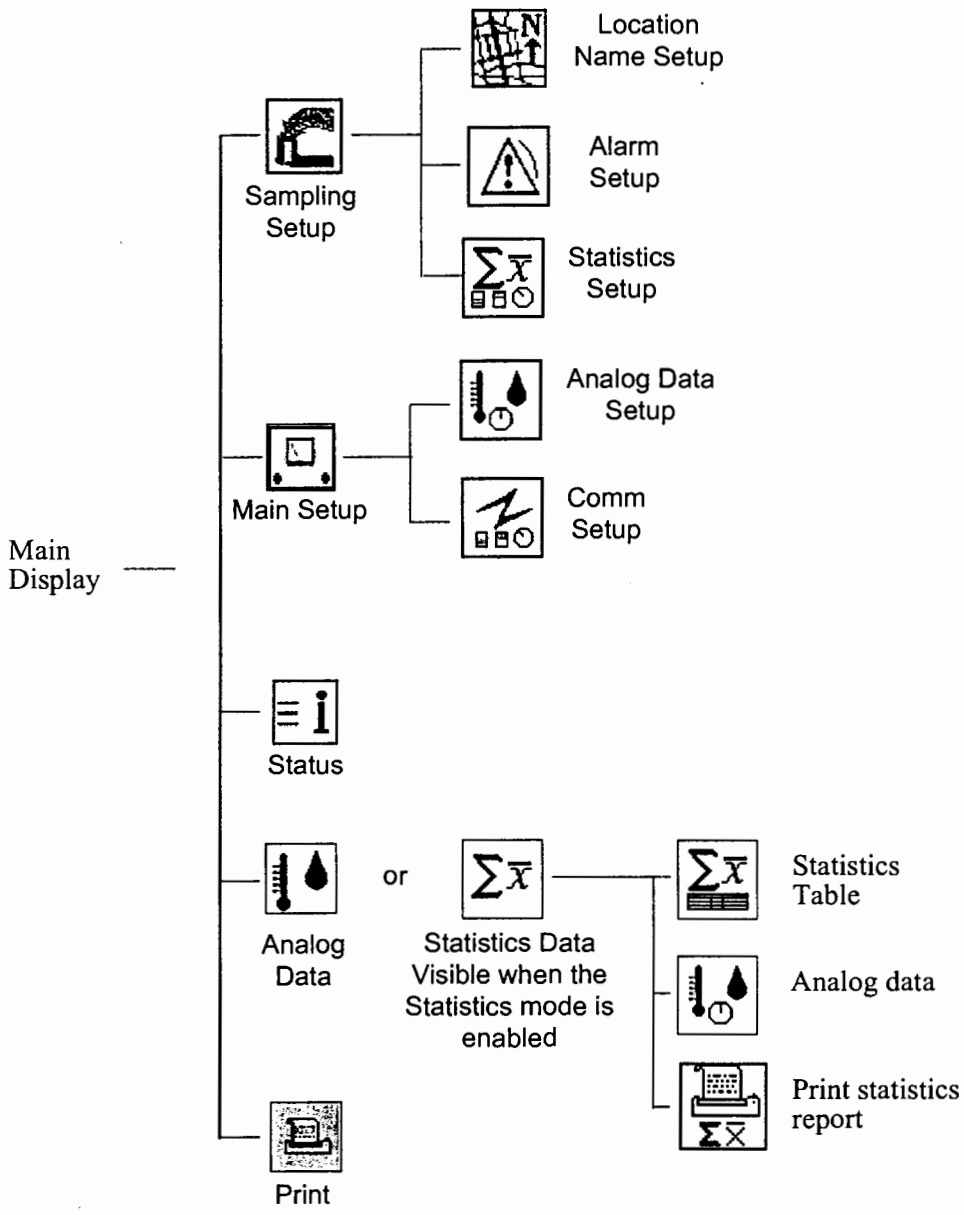
When the statistics mode is enabled, TCP/IP is disabled.

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Hierarchy of Screens

The LASAIR II uses a hierarchy of setup screens and displays. By becoming familiar with the hierarchy, you can navigate to the menus and displays with greater ease. We encourage you to take some time to access the different screens so that you can build a picture of the layout in your mind.

Notice the different icons that represent each screen and/or function.



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Statistics Setup Screen

The *Statistics Setup* screen is where you will make your settings for the standard you will be using and the area you will be sampling.

NOTE: If you have not set the LASAIR II's identification, date, time, and password, go to "Main Setup Screen" on page 46, complete the settings, and then return to this chapter.

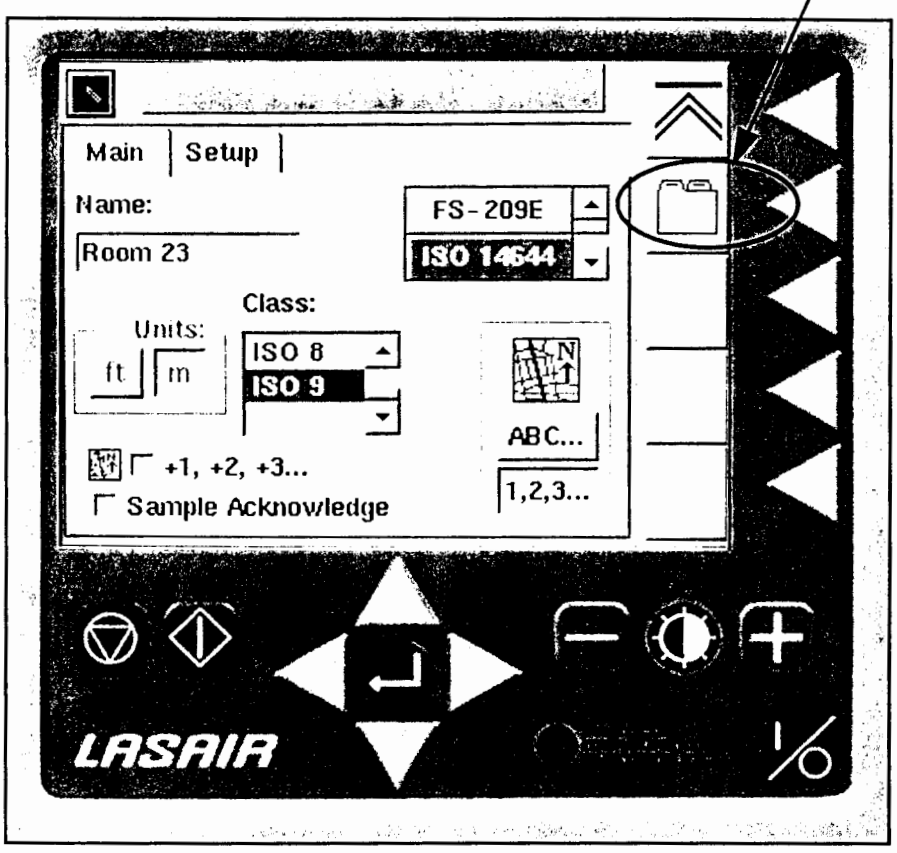
To open the statistics Setup Screen,

1. From the Main Display screen, press the Sampling Setup icon softkey . The Sampling Setup screen will open:

2. Press the *Statistics Setup* icon  softkey to open the *Statistics Setup-Main* screen.

NOTE: There are two parts to the *Statistics Setup* Screen, the *Main* dialog box and the *Setup* dialog box. When you reach the last editable part of the *Statistics Setup-Main* screen, pressing the tab softkey again will automatically open the *Statistics Setup-Setup* screen.

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Statistics Setup-Main

Field	Field Usage
Name:	Enter the name of the area that will be certified. Example: *Cleanroom B*. This name is included in the printed report and is saved for CSV file output.
FS-209E ISO 14644	This is a selection list that enables you to select one of three standards or the *Average* function.
Units:	The units selector determines the unit of measure and is preset depending on the international standard you choose. If you choose the *FS-209*E or *Average* function, you will be allowed to select feet or meters. The ISO-14644-1 and BS-5295 standards force the use of meters.

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Class	The class selector enables you to chose the appropriate cleanroom class.
Auto Increment check box	Put a check mark in the auto numbering check box to cause the LASAIR II to automatically change the location when sampling at one location is complete. This option can be changed while the statistics mode is enabled.
Sample Acknowledge check box	Put a check mark in the Sample Acknowledge checkbox to cause the LASAIR II to prompt you for an acknowledgement after each sample. This option can be changed while the statistics mode is enabled.
Location Name Selection	Clicking on ABC... or 1,2,3... will select either location names or location numbers. This option cannot be changed once statistics has been enabled.

About Location Names or Numbers

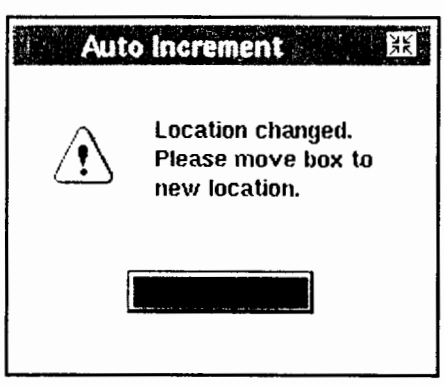
During the statistical certification process, you will move the unit to different locations for sampling. The LASAIR II allows you to choose one of the two following options for identifying those locations.

- auto-incrementing names/numbers
- manual user selection of the location name (or number)

Your choice of numbering method will determine the settings you must make in the *Statistics Setup-Setup* screen.

Auto-incrementing Location Numbers/Names

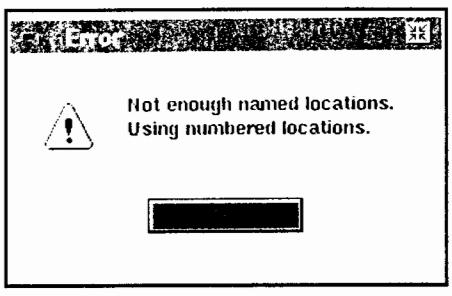
This method requires checking the auto-increment check box.



When using *Auto Increment* with auto-generated numbers, you should maintain a log that matches the location number with a physical description of the location.

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NOTE: If you are auto-incrementing location names, you must create enough locations names so that each sample location will have its own unique name. If there are an insufficient number of location names, LASAIR II will display the following error message and default to *Auto-incrementing of LASAIR II-generated location numbers.* See "Location Name Setup Screen" on page 37.

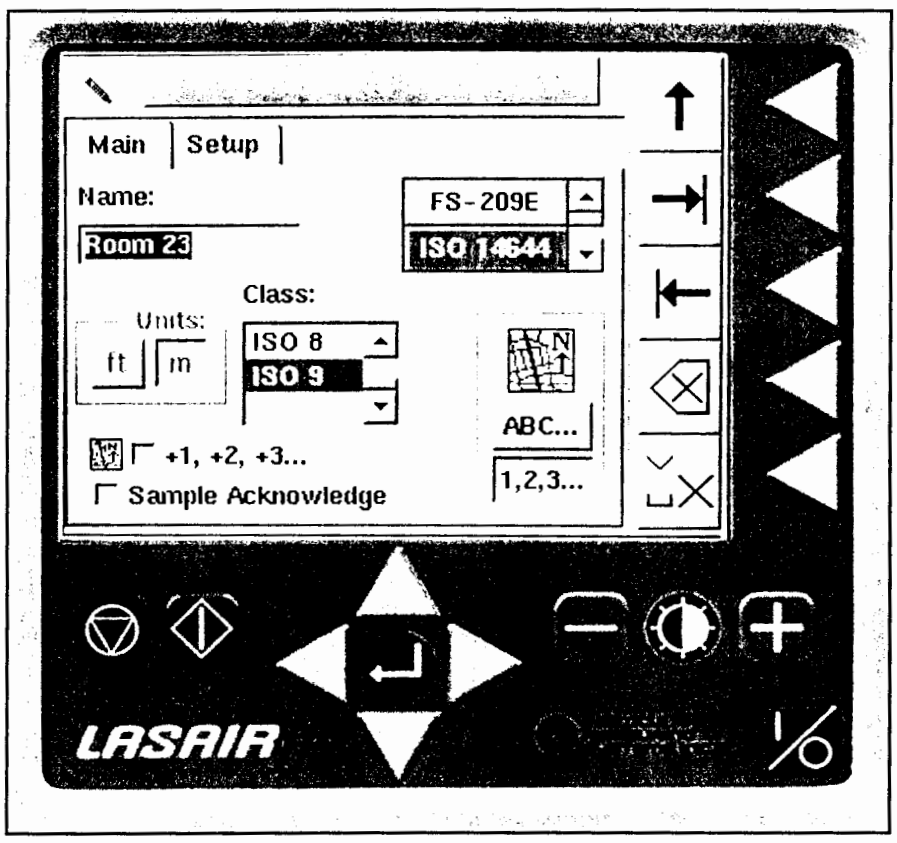


NOTE: You must ensure that the actual sampling location matches the location name. LASAIR II will increment the location names in the order that they are stored in the location name list *starting* with the location name you have highlighted in the *Sampling Setup Screen*. For example, if you have 10 location names and you have selected the seventh name in the list to start on, LASAIR II will proceed through the names in the following order: 7, 8, 9, 10, 1, 2, 3, 4, 5, 6.

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To edit the Statistics Setup-Main display,

1. Press the *Enter* button to enable the Edit mode.



2. Use the forward and backward tab keys to move to the desired location.

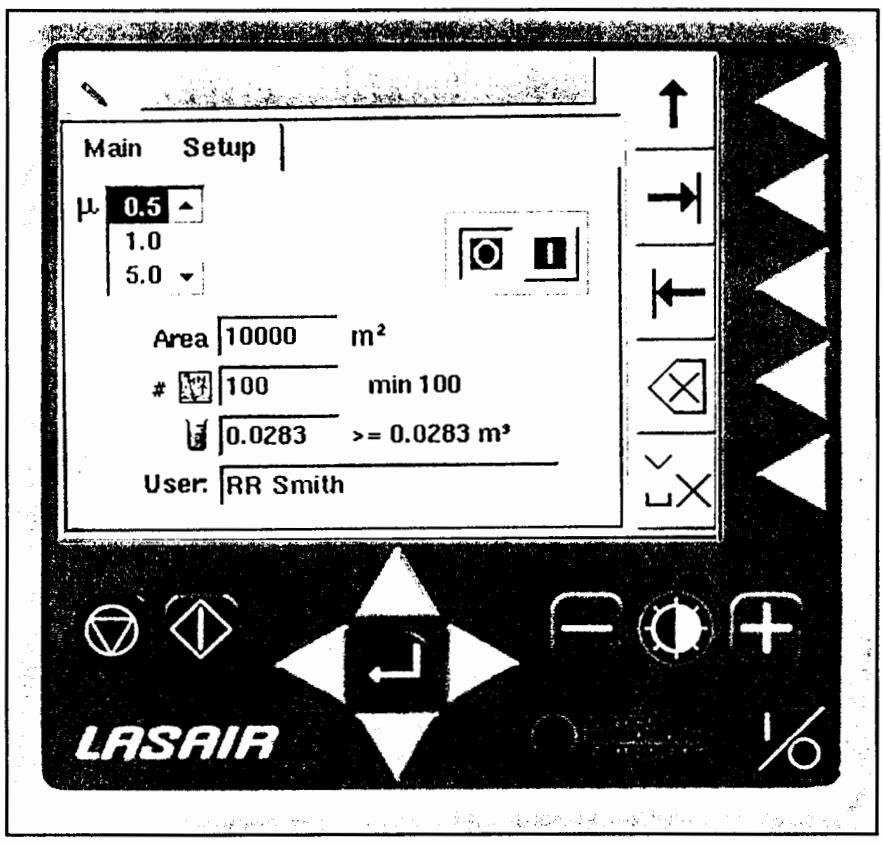
NOTE: Until you are familiar with the editable fields, it is much easier to use the forward tab softkey only.

NOTE: Refer to "Control Panel Buttons" on page 18 and "Edit Mode" on page 32, for more information about changing values and selecting options in the fields.

3. Continue to press the *Tab Forward* softkey until the *Statistics Setup-Setup* screen opens. This screen will open in the edit mode if you access it with the *Tab Forward* or *Tab Back* softkeys.

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Statistics Setup Screen



Field	Field Usage
μ	Select the particle size for the FS-209 and ISO-14644-1 standards or the averaging function. This field is not selectable when the BS-5295 standard is used.
Flow	Select the type of flow in the cleanroom you are certifying, uni-directional or multi-directional. This setting may influence the number of locations that must be sampled. **NOTE:** This setting is available in the FS-209 standard.
Area	Input the size of the cleanroom you are certifying.
# 	The minimum number of locations is calculated and displayed by LASAIR II. You may accept the minimum number of locations or increase this number if the international standard allows you to do so.

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Volume 	The minimum volume that the LASAIR II will sample at each location. Sample volume cannot be changed while the statistics mode is enabled. The sample volume seen in the *Sampling Setup* screen is not used for setting the volume for the statistics mode.
User:	The name of the person who will be collecting the data. This is printed in the report.
Statistics Mode disable-enable 	Select **O** to disable the statistics mode. Select **I** to enable the statistics mode. Once the statistics mode is enabled, it will be maintained throughout power cycles until it is disabled in the *Statistics Setup* screen. Also, once the statistics mode is enabled, most parameters are locked out. The following parameters can be changed while the statistics mode is enabled: • The auto-increment option and the acknowledge sample option can be toggled on and off. • In all standards (including averaging) other than BS-5295, the number of sample points can be increased over the minimum and a smaller sample particle size can be chosen (if available).

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Statistics Mode Operation

Once you have set up the LASAIR II for sampling, operations is a simple matter. Use the following steps to operate the LASAIR II.

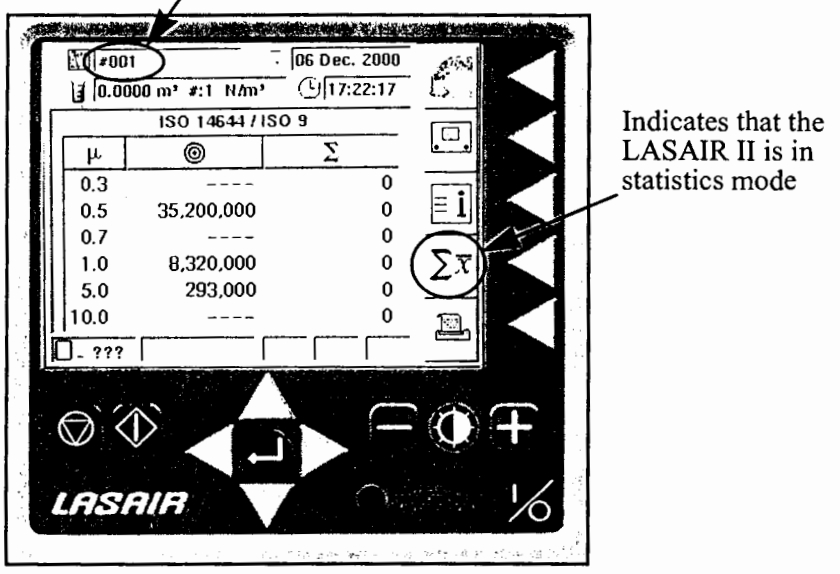
Collecting Sample Data

1. After setting the variables for the statistics function and enabling the statistics mode, take the LASAIR II to the first sampling location.

CAUTION: Use of a cellular, land-based portable, or mobile phone within 2 Meters of the LASAIR II can cause Radio Frequency interference. Similarly, use of a phone base station within 6 Meters of the LASAIR II can cause interference. Such interference can lead to inaccurate readings. This type of problem is more likely if the phone uses the 1.8-1.9 GHz frequency. The LASAIR II meets all CE requirements related to Radio Frequency Interference.

2. If you are using wall power, plug in the unit.
3. If the LASAIR II is already plugged in, but the display is blank, press the ON/OFF button in the lower right of the control panel. You will hear a beep during the startup process.
4. When the *Main Display* is visible, ensure that the LASAIR II is in statistics mode. The statistics mode icon  will be visible on the main display.

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5. Press the green Start button on the control panel. You will hear the pump begin to circulate air through the unit. After a purge, the unit will begin sampling. The sampling process and the results of sampling can be observed on the *Main Display*. When the sample is complete, the pump will stop.

When Sample Acknowledge is Activated

If you have selected *Sample Acknowledge*, the following message will be displayed:

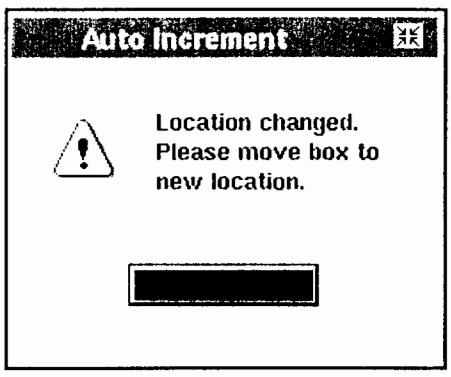
Press the *Enter* button to accept the sample or use the right arrow button to move to "No" and then press the Enter key to reject the sample.

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Rejected samples are labelled as invalid and they are not used in calculations.

When Using Auto-incrementing of LASAIR II Location Names

When the first sample is complete, the following dialog box will display.



To continue sampling,

1. Record a description of where the first sample occurred. Example: "#001-Ballroom 1, column 12a."
2. Move the LASAIR II to the next location.
3. Acknowledge the dialog box by pressing the *Enter* button.

NOTE: On the *Main Display*, observe that LASAIR II has incremented the location to the next number in sequence. Example: from "#001" to "#002."

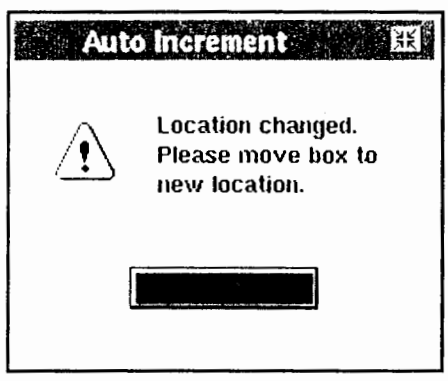
---

4. Start the next sample by pressing the *Start* button.
5. Repeat steps 1-4 until the LASAIR II notifies you that all samples are complete.

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When Using Auto-selection of User-created location Names

When the sample is complete, the following dialog box will display:



To continue sampling,

1. Move the LASAIR II to the next location.
2. Acknowledge the dialog box by pressing the *Enter* button.

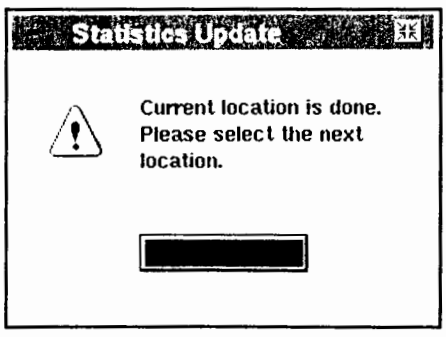
NOTE: On the *Main Display*, observe that LASAIR II has changed the location name to the next name in sequence. Example: from "Room 1 Col B12" to "Room 1 Col B15."

---

3. Start the next sample by pressing the *Start* button.
4. Repeat steps 1-3 until the LASAIR II notifies you that all samples are complete.

When Not Using the Auto-increment Mode

If you have not enabled auto-increment, the following dialog box will be displayed when sampling is completed at a location:



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To select the next location name and continue sampling.

1. Press the *Enter* button to close the *Statistics Update* dialog box.
2. Open the *Sampling Setup* screen.
3. Press the *Enter* button to activate the edit mode. The location selection box will be active when the screen changes to the edit mode.
4. Use the up and down arrow buttons to highlight the location name you want to use for the next sample.
5. Accept the location name and navigate to the *Main Display*.
6. Move the LASAIR II to the location that matches the location name you have selected.

NOTE: You could have moved the LASAIR II to the next location at any point before pressing the *Start* button.

7. Ensure that the proper location appears on the display and then press the *Start* button to collect the next sample
8. Move the LASAIR II to the next sampling location and continue sampling until all locations are sampled or terminate sampling if you must.

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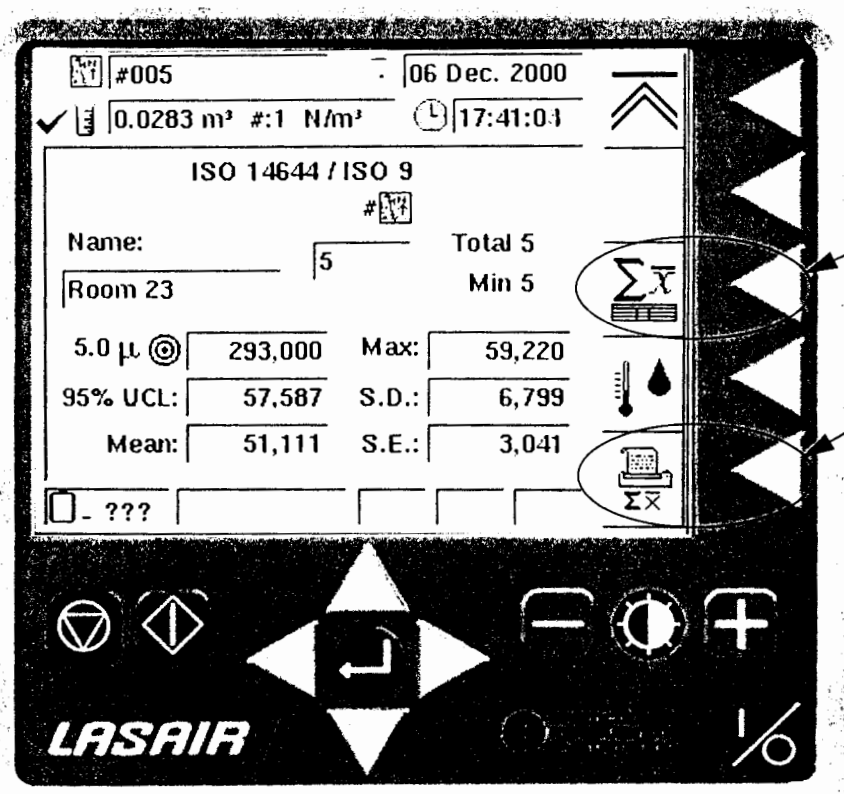
Observing Results Stored in the LASAIR II

Sample results are displayed in the *Statistics Summary* screen and the *Statistics Table* after each sample is completed.

Statistics Summary Screen

The *Statistics Summary* screen displays settings, progress, and the cumulative result of completed samples.

Statistics Summary Screen



Press this softkey to open the Statistics Sample Location Table screen

Press this softkey to print a LASAIR II report.

The following data is displayed on the Statistics Summary screen.

ISO 14644/ISO 9	the name of the user-selected standard and class
Name:	the user-assigned name of the room that is being sampled

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Sample locations completed, Total number of locations and Minimum number of locations	Example: 5 locations have been completed. The total number of locations was five and the minimum number of locations is 5. The minimum number of locations is calculated by LASAIR II. If the BS-5295 standard is *not* being used, the user may set the total number of locations to a number greater than the minimum.
5.0 µ ◎	the target maximum particle concentration set by LASAIR II. Applicable to FS-209 and ISO-14644-1 only
95% UCL:	95% Upper Confidence Limit—applicable to FS-209 and ISO-14644-1
Mean:	the mean particle concentration for all sampled locations. This number will display in the color Red if it is greater than the target maximum particle concentration.
Max:	the maximum concentration of all sampled locations
S.D:	Standard Deviation
S.E.:	Standard Error.

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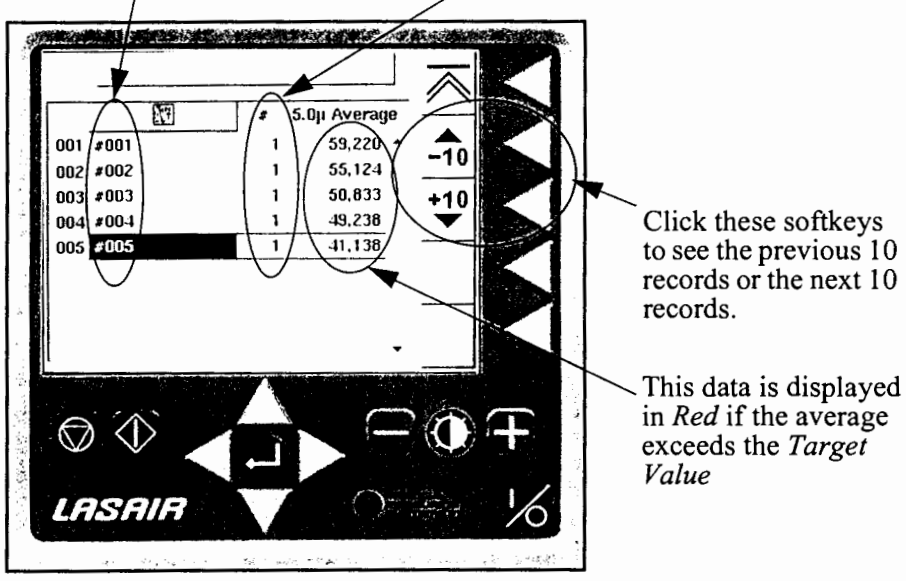
Location Summary Screen

The *Location Summary* screen displays location status:

To open the Statistics Table,

1. From the Main Display, press the Statistics Data icon  softkey to open the *Statistics Data* screen.

2. Press the Statistics Table icon  softkey to open the *Statistics Table* screen.

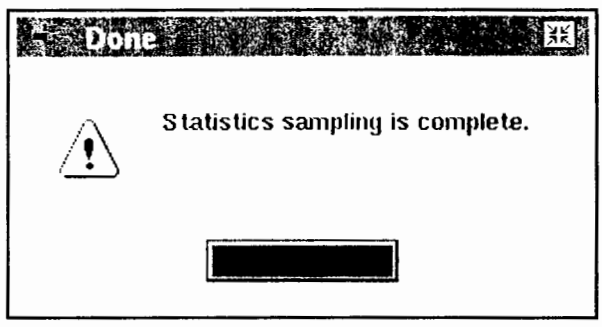


For BS-5295, only the smallest channel is shown

When All Samples Are Complete

When all samples are complete, LASAIR II will display the following dialog box:

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Press the Enter button to acknowledge the dialog box.

NOTE: When all samples are complete, it is good practice to immediately download the data stored in the LASAIR II to a file in your PC or laptop computer. See "Using the LASAIR®II With A Computer, Facility Net, or Pharmaceutical Net" on page 63.

Interrupting a Sample

To turn sampling OFF, press the red Stop Button on the left side of the control panel. You may stop sampling before the sampling sequence reaches completion. The sample data will be marked *invalid* if the sample volume is less than the minimum required for the measurement.

Disabling the Statistics Mode

You may need to disable the statics mode in the following circumstances:

- when you need to change the parameters of the *Statistics Setup*
- when you realize that the area being sampled for certification is hopelessly out of specification
- when you are done sampling

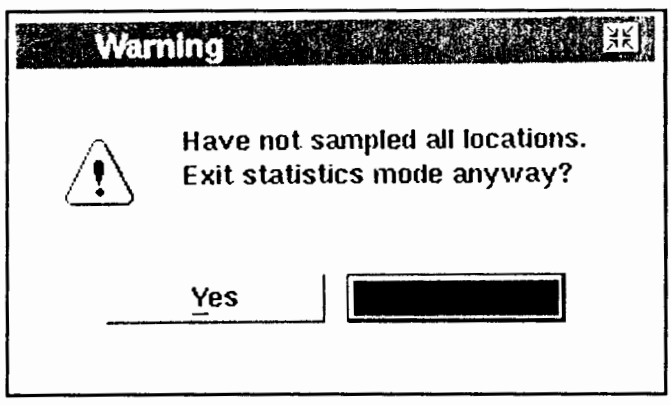
CAUTION: Before disabling the statistics mode, ensure that you have printed a report if it is required. Once the statistics mode is disabled, the report cannot be printed. The CSV data can still be downloaded by means of the web browser interface allowing statistical information to be generated by an experienced user.

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To disable the statistics mode,

1. Navigate to the *Statistics Setup-Setup* screen.
2. Enable the edit mode by pressing the *Enter* button and then use the *Right Tab* softkey to navigate to the Disable-Enable selection box.
3. Press the *Left Button* to highlight the *Off* icon and then press the *Enter* button.

If you have not completed all the required samples, LASAIR II will display the following dialog box:



Use the left arrow key to navigate to the *Yes* button and then press the *Enter* button.

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Printing a Statistics Report

The LASAIR II can print a report with details of the sampling results.

To print a sampling report, press the *Statistics Print* icon softkey.



The following text is an example of a print output from the LASAIR II thermal printer. A description of each line and the possible variations in each line follows this example. The descriptions are listed by line number, from top to bottom as the lines appear on the printed output. Note, however, that the lines are not numbered on the printer output.

1 FS-209E / 100,000 / 0.5µ
2 2000/11/16 14:08:24
3 LASAIR II-310
4 S/N: sn0001
5 Cal Date: 2000/11/03
6 Room: ABC4
7 Area: 1000 ft^2
8 Flow: NonUnidirectional (NOTE: This applies to the FS-209 only)
9 # Locations: 2
10 Min Sample: 0.10 cf
11 **Status: PASS**
12 By: Matt Michaelis

13	Target	0.5µ	100,000
14	95% U.C.L.	0.5µ	17,559
15	Mean	0.5µ	16,340
16	S.D.	0.5µ	273
17	S.E.	0.5µ	193

18	**Location**	**#**	µ	**Σ(N/cf)**
19	#001	1	0.5µ	399,015
20	#002	1	0.5µ	386,559

Invalid 2000/11/16 14:07:06
Alarm: Pump

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Line No	Text or Data	Description
1a	`FS-209E`	The international standard selected by the user
1b	`100,000`	The cleanroom class selected by the user
1c	`0.5m`	The particle size that is being sampled for
2a	`2000/11/16`	The date the first statistics sample was taken (yyyy/mm/dd)
2b	`14:08:24`	The time the first statistics sample was taken
3	`LASAIR II-310`	The LASAIR II's model number
4	`S/N: sn0001`	The LASAIR II's serial number
5	`Cal Date: 2000/11/03`	The LASAIR II's last calibration date.
6	`Room: ABC4`	The user-assigned room name.
7	`Area: 500 ft²` `(or m2)`	The area of the cleanroom being sampled for certification.
8	`Flow:` `NONUnidirectional` `(or Unidirectional)`	*For FS-209 only*. The user-selected type of airflow in the cleanroom being tested for certification.
9	`# Locations: 2`	The number of locations that must (or will) be sampled.
10	`Min Sample: cf` `(or cm)`	The minimum air volume that must be sampled
11	`Status: PASS`	The result of the sampling process, either PASS, FAIL, or INCOMPLETE.
12	`By: Matt Michaelis`	The name of the LASAIR II's user
13	`Target 0.5µ`	From the chosen standard's table of target data. *BS-5295* will have this data for each valid size. *Average* will have data for all channels.

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14	95% U.C.L.	0.5µ	The statistical Upper Confidence Limit (for 2-9 locations only). Not applicable for BS-5295
15a	Max	0.5µ	The maximum of all locations
15b	Mean	0.5µ	The statistical mean—except BS-5295
16	S.D.	0.5µ	The Standard Deviation—except BS-5295
17	S.E.	0.5µ	The Standard Error—except BS-5295

Data Headers

18a	Location	The name or number of the location sampled
18b	#	The number of samples collected at the location.
18c	µ	The particle size being sampled for
18d	Σ(N/cf)	The particles detected, normalized to the volume sampled

A list of sample data with errors. Erroneous data are not used in calculations.

19a	INVALID (or VALID)	The condition of the data: VALID, INVALID, or INCOMPLETE. A sample is made invalid by one of the following conditions: • The user has marked the sample invalid in the Sample Acknowledge mode • A pump error has occurred. • A laser error has occurred. • The sample volume is insufficient.
19b	2000/11/16	The date of the last sample
19c	14:07:06	The time of the last sample (hour:minute:second)
20a	#002	The name or number of the area that was being sampled when an error occurred
20b	Alarm:Pump (or Laser)	The type of error detected by the LASAIR II

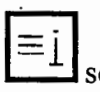
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Copying and Deleting Data

The LASAIR II saves 3,000 sample data records internally. Once the record file is full, any new record will displace the oldest record in the file.

If you want to save the sample data, monitor the status of your LASAIR II's data file and copy the sample data before the data file is completely full. Remember, once the data file is full, you *will* lose the oldest data when new sample data is collected.

To monitor the status of the sample data file from the LASAIR II.

1. From the Main Display, press the *Status Icon*  softkey to open the *Status Screen.*
2. Observe the condition of the *Data:* "thermometer indicator", which will display the number of records stored. The dark part of the "thermometer" indicates the relative degree to which the total storage space is filled. The white space in the "thermometer" is a relative indication of the amount of space remaining in the data file.

Saving the Sample Data File

You may want to copy the sample data file to another file so it can be saved for use in a certification report, long-term retention, or for data analysis. The data can be copied by accessing the LASAIR II from a web browser/Ethernet connection and using the LASAIR II data *Save* feature. See Chapter 5, "Using the LASAIR®II With A Computer, Facility Net, or Pharmaceutical Net" on page 63.

Deleting Data from the LASAIR II's Memory

See "Deleting Sample Data Records" on page 72.

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Chapter 7

Maintenance

Introduction

This chapter deals with the maintenance you can perform at your location. The main topics are:

- Cleaning and disinfecting the LASAIR® II
- Replacing the LASAIR II's printer paper roll
- Rconditioning the battery
- Other maintenance or operational problems

NOTE: There are **no** user-serviceable parts inside the LASAIR II case.

Cleaning and Disinfecting

Your LASAIR II is designed to be easily cleaned with common cleaning chemicals. Particle Measuring Systems has also performed compatibility testing with cleaning and disinfecting agents commonly used in manufacturing environments.

See the following sections for details about:

- Tested cleaning chemicals
- Cleaning method

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Tested Cleaning Chemicals

The LASAIR II is designed to permit external cleaning. The following cleaning agents have been tested on all exterior parts of the LASAIR II:

- PHENE-AMOL™ Spray disinfectant, consisting of o-phenylphenol and ethyl alcohol
- STERI-PEROX™, consisting of 3% Hydrogen Peroxide
- HYPO-CHLOR™, consisting of 5.25% Sodium Hypochlorite
- DECON-QUAT 100, a quaternary ammonium solution consisting of Alkyl Dimethyl Benzyl Ammonium Chloride and Alkyl Dimethyl Ethylbenzyl Ammonium Chloride
- DECON-CLEAN™, consisting of detergent, 2-Butoxyethanol, Potassium Hydroxide, and Tetrasodium Pyrophosphate
- A 50-90% solution of isopropyl alcohol in deionized water. This solution is useful for routine cleaning to remove smudges and hand prints.
- A 30% ammonia solution. This solution is also useful for routine cleaning to remove smudges and hand prints.
- Formaldehyde in a solution of less than 50 percent
- Ethyl alcohol in a solution of less than 50 percent

Call Instrument Service and Support at Particle Measuring Systems (1-800-557-6363) for advice about other cleaning chemicals.

Cleaning Method

The LASAIR II case is made of KYDEX®, a rugged plastic in the PVC family. The Polyester® display screen is sealed around its edges and all case openings are sealed with gaskets. Both KYDEX and Polyester are resistant to most cleaning chemicals. Never wipe the display screen with anything that is hard or sharp.

Although the LASAIR II is resistant to liquids, it is not liquid proof. Do not submerge your LASAIR II in any liquid or apply large amounts of liquid. Always wipe away free standing liquid and wet wipe the LASAIR II after applying a cleaner. Never put liquids into the air intake port.

CAUTION: Always wear eye protection when working with cleaning chemicals.

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Use the following steps to safely and effectively clean your LASAIR II.

To clean your LASAIR II,

1. Turn the LASAIR II off, unplug the power cord, and remove the battery.
2. Disconnect all other cables.
3. Remove the sample horn and place the shipping cap on the air intake tube.

   OR

   If you prefer to clean the LASAIR II and the isokinetic probe with the probe attached to the LASAIR II, place the shipping cap on the intake of the isokinetic probe.
4. Remove the Temperature/Relative Humidity probe and place the shipping cap on the LASAIR II's connection for the Temperature/ Relative Humidity sensor.
5. On the back of the LASAIR II, place the shipping covers on the two D-sub connectors.
6. There are no other covers for the connectors and openings on the back of the LASAIR II. The air discharge tube and the battery enclosure can be cleaned with a wet wipe or damp cotton swab.
7. Wet an approved wipe, paper, or cloth with the cleaning solution and then wipe the LASAIR II with the damp wipe. Finish by wiping the LASAIR II with a wipe that is damp with water. Use a cotton swab, in the same way, to clean areas that are difficult to reach. Use a spray, if necessary, on the front sides and top. A damp wipe, however, is the recommended method.
8. Do not use a spray on the back of the LASAIR II.

The battery, battery enclosure, Temperature/Relative Humidity sensor, and the printer enclosure can be cleaned the same as the other parts of the LASAIR II.

NOTE: The battery contacts can be wiped like any other part of the battery.

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Replacing the Paper Roll

To load a roll of paper,

1. Grasp the paper roll cover at the top and pull out and down to open the paper roll enclosure. The cover is hinged at its bottom.
2. If the plastic center of a depleted roll remains in the paper roll enclosure, remove the plastic center.
3. Insert the new roll of paper with the end of the paper coming toward you off the top of the roll. Ensure that about one inch (2.5 cm) of paper extends beyond the cutter at the top of the paper enclosure and that the paper roll is not crooked in the enclosure.
4. While holding the end of the paper in place against the instrument case, close the cover of the paper roll enclosure. Ensure that the cover is completely closed. The metal pin at the top front of the cover should not be visible. Test the printer operation by pressing the printer softkey. If your installation is correct, the paper will advance.

NOTE: The paper rolls have a pink indicator strip near the end of the roll. When you see the pink strip, you have only a few feet of paper remaining on the roll. Replace the expended roll as soon as you can.

Rconditioning the Battery

Over time the battery charge level indicator will not indicate the actual charge of the battery as accurately. In the worst case the variance between the charge level indicator and the actual battery charge will be less than 10%.

If it is important to maintain the maximum correlation between the battery charge indicator and the actual battery charge, you should purchase and use the optional external battery charger (BC II). See "Accessories and Supplies" on page 141. When the BC II senses the need, it will automatically recondition the battery. When reinstalled, the reconditioned battery will communicate the correct charge level to the battery charge indicator.

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Other Maintenance or Operational Problems

If you believe there is some other maintenance you could or should be performing, call Particle Measuring Systems first for advice and technical information at 1-800-557-6363. There is nothing within the LASAIR II case that requires user maintenance.

If you are experiencing operational problems that you are unable to solve, see Troubleshooting in Chapter 7.

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Chapter 8

Troubleshooting

Introduction

Particle Measuring Systems engineers have selected components, materials, and design elements that provide high reliability as well as superior function. Anything, however, can eventually fail. This chapter is for those times when something unexpected happens and you don't know how to proceed.

If the troubleshooting tips do not solve the problem, call Instrument Service and Support at Particle Measuring Systems: 1-800-557-6363.

Problem Conditions

A. When you press the printer soft key, or when a sample is completed, paper does not advance from the printer.

If the LASAIR II does not produce a printed strip of paper, try the following steps:

1. Ensure that there is a roll of paper in the paper enclosure.
2. Ensure that the paper roll is free to rotate within the paper enclosure.
3. Ensure that the end of the paper roll is not stuck to the roll.
4. Remove the paper roll in the roll enclosure then position it with the end of the roll coming toward you from the top of the roll.
5. Hold about one inch (2.5 cm) of paper against the case above the paper cutter and then close the paper enclosure cover.
6. Test the printer by pressing the Print soft key.

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B. Paper advances from the printer, but nothing is printed on the paper.

Make sure the paper roll is installed properly. Thermal paper will not print on the back side.

If the paper is installed correctly but there is no print on the paper, call Instrument Service and Support.

C. You do not hear a tone when the LASAIR II is started.

When starting the LASAIR II, the software generates an audible tone to indicate a successful startup check. The lack of a tone means the LASAIR II startup was not successful. Press the OFF button and then try restarting the LASAIR II with the ON button. If you are still unable to get a tone, call Instrument Service and Support.

D. The display is backlit, but there nothing on the display.

First try turning your LASAIR II off and then on again. If the problem persists, your LASAIR II software may be corrupted. Call Instrument Service and Support.

E. The sample is invalid because air flow is different from 1 cubic foot per minute (1 CFM).

The LASAIR II will detect variable or inadequate air flow and print "Alarm: pump ..." on the sample printout. This condition could be caused by intermittent wall power, or an obstruction in the air intake or exhaust port.

Try the following steps:

1. Run the sample again. The low airflow problem usually is self-correcting.
2. If the problem does not correct itself, test your power source.
3. If the power source appears to be adequate, look for obstructions in the LASAIR II's intake port, exhaust port, and sample tubing. Remove any obstructions that you find.
4. If there are no obstructions, call Instrument Service and Support.

F. The LASAIR II does not work on AC power.

Try the following steps:

1. Ensure that the power cable is firmly connected at the power source and at the LASAIR II case.

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2. Have an electrician test the power cable to ensure it is not damaged.
3. If you have bought the battery option, try running the LASAIR II on battery power.
4. If the power cable is connected properly, the power cable is undamaged, and the LASAIR II runs on battery power (if you bought the battery option), then open the fuse cover next to the LASAIR II power supply module and remove the fuse.
5. Test the fuse for continuity. If the fuse has failed, replace it with the spare fuse provided with the LASAIR II. Be sure the fuse is correct for your operating voltage.

If none of these steps work, or to order more fuses, call Instrument Service and Support.

G. The LASAIR II will not run on battery power.

NOTE: When running on battery power, if the recharging circuit senses that the battery charge is inadequate to support sampling, the LASAIR II will shut down automatically.

1. Try operating the LASAIR II on AC power to determine if the problem is in the battery system.
2. If the LASAIR II does not operate on AC power, call Instrument Service and Support.

If the LASAIR II operates on AC power:

3. With the LASAIR II connected to AC power, allow the LASAIR II battery to recharge for at least an hour.
4. Restart the LASAIR II and look at the battery power indicator on the display. If the battery power level is low, allow the battery to charge to over 50%. A fully discharged battery should recharge to 100% in two to three hours in the optional battery charger. A fully discharged battery in the LASAIR II will recharge to 100% in four to eight hours.
5. If the battery is not recharging, disconnect the LASAIR II from AC power and try the following steps:
6. Open the battery enclosure cover and remove the battery.
7. Look into the battery enclosure and remove any foreign material that is preventing a good battery connection.
8. Clean the battery contacts with a clean dry cloth.

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9. If nothing is obstructing the battery connections, call Instrument Service and Support.

H. The battery is not recharging.

A fully discharged battery will recharge to 100% in two to three hours in the optional battery charger. A fully discharged battery in the LASAIR II will recharge to 100% in four to eight hours.

As the battery is recharged, the percent of a full charge is displayed over the battery icon. If there is no change in the percent of full charge do the following:

1. Remove the battery from its enclosure and examine the contact points on the battery and in the enclosure. Look for signs of obstruction or corrosion. If you find corrosion, clean and polish the contacts and then try recharging the battery.
2. If the battery still does not take and hold a charge, call Instrument Service and Support.

I. The laser is not operating at an adequate power level.

When this condition occurs the LASAIR II will print "Alarm: Laser ..." on the sample printout. Try running your sample again. If the problem continues, call Instrument Service and Support.

J. The pump will not start. During extreme over-current conditions software shuts down the pump.

1. Check for foreign objects clogging the pump flow.
2. Cycle power on the LASAIR II to clear the error condition.
3. If the problem persists, call Instrument Service and Support.

K. When running your LASAIR II with Facility Net, you notice gaps in your data plots. In addition, the date on the front panel of your LASAIR II changes to Jan 1, 1970.

There is an incompatibility between the LASAIR II and older versions of a DLL used by Facility Net. To determine if your Facility Net software is compatible with your LASAIR II, complete the following steps:

1. Start Facility Net and connect to the LASAIR II.
2. Select "*About*" under the "*Help*" menu.
3. Look at the scroll-down list and find the "pdrvlpen.dll" file. If the listed version number (to the right of "Label") is LESS than 2.9.10

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(that is, 2.9.08 or 2.9.07), call your Particle Measuring Systems representative or distributor.

L. When attempting to use the web browser-to-LASAIR II interface, you are blocked by a request for a password even though the password has been disabled on the LASAIR II.

If a password has been assigned, it is always enabled in the web browser even if it is disabled on the Front Panel.

M. When using the web browser-to-LASAIR II interface, the web page does not update properly.

Internet Explorer 5.x saves the image of a page when you open it. The next time you open that page Internet Explorer displays the saved version rather than updating the page with new data.

To reload the page with new data, press and hold down both the Ctrl and Alt keys while clicking on the refresh button.

Getting Technical Support

Call Instrument Service and Support at Particle Measuring Systems: 1-800-557-6363.

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Appendix A

Connecting to a Remote Computer or Network

Introduction

The LASAIR II can be monitored and controlled indirectly from any system with a web-capable browser such as the following:

- A laptop computer
- A desktop computer
- Facility Net or Pharmaceutical Net
- A hand held or palm-size computer

This appendix describes how to establish communications between your LASAIR II and any of these other systems.

Hardware Requirements

Your connecting computer must meet the following requirements:

- The computer must have a communications card and a communications cable connection. You can use any computer that runs one of the three common operating systems; Windows, UNIX, or Apple.
- If the computer is a palm-size or hand held device, it must run the Microsoft Windows CE operating system.

Software Requirements

Your computer must have have one of the following browser software packages loaded on its hard drive:

- Microsoft Internet Explorer, version 5.0 or higher

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- Netscape Communicator, version 4.61 or higher

You can download browser software from Microsoft's web site: www.microsoft.com or Netscape's web site: www.netscape.com.

Cable Requirements

If you are connecting your LASAIR II to a computer directly or indirectly, you will need the appropriate cabling.

- If you are connecting from the LASAIR II directly to a computer, use a *crossover* cable or adapter.
- If you are connecting the unit into a hub of other devices on an Ethernet network, use a *straight-through* cable between the LASAIR II and the hub as well as from the hub to the computer.

Select the cable appropriate for you. Your IS/computer support personnel will be able to assist you in procuring a cable or fabricating a custom-length cable.

NOTE: Both types of cable are available through Particle Measuring Systems, Inc. The Ethernet cables and their part numbers are listed below:

Crossover Cable	AE1938
Straight-through Cable	CD22

Connecting via Ethernet

Connecting an Ethernet Cable

To connect the Ethernet cable:

1. Having selected the appropriate cable, insert one end of the cable into the port labelled NET on the back of your LASAIR II.
2. Connect the other end of the cable into the Ethernet port of your hub or computer.

NOTE: Your computer may have an Ethernet port into which you may directly connect the cable. Alternatively, you would connect the cable to an Ethernet card that has been inserted in the computer.

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When you have connected the Ethernet cable, you can set the TCP/IP addressing for unit and computer (or network). Refer to the following section, "Ethernet Setup," for more information.

Connecting LASAIR II Directly to a Computer

If you choose to control and communicate with your LASAIR II from a computer using a direct connection follow these steps.

To connect your computer to the LASAIR II, plug one end of a crossover cable into the computer's Ethernet connection and plug the other end into the NET connection on the back of the LASAIR II.

Network Connection to LASAIR II

If you have an Ethernet network in your facility, and if your LASAIR II is connected the network, then you can access and control the LASAIR II from a computer that is also linked to the network.

This section explains how to connect to your LASAIR II over an Ethernet network.

To connect your computer to a LASAIR II over an Ethernet network.

1. Connect an Ethernet cable from the NET connection on your computer to an Ethernet network connection.
2. Connect an Ethernet cable from your computer's communications card connection to an Ethernet network connection.

Network Addresses

A minimum setup involves assigning network addresses to both the LASAIR II and your computer. On the LASAIR II, the Communications Setup Screen allows you to enter the different types of communications addresses. You must assign an address and netmask to the computer making a TCP/IP connection. You may also wish to specify other types of addresses, such as gateway and multicast addresses.

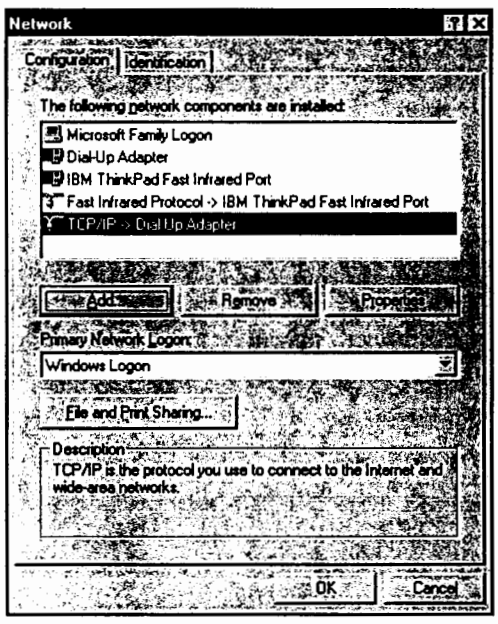
After entering or changing your PC's network address, you must reboot your PC or the address will not be recognized. This is also true for the LASAIR II. You must reboot your LASAIR II after entering or changing the network address.

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To assign a TCP/IP address to your computer (Windows 95 and Windows 98):

1. Click Start>Settings>Control Panel.

2. Select the Network icon. The Network dialog box will open:

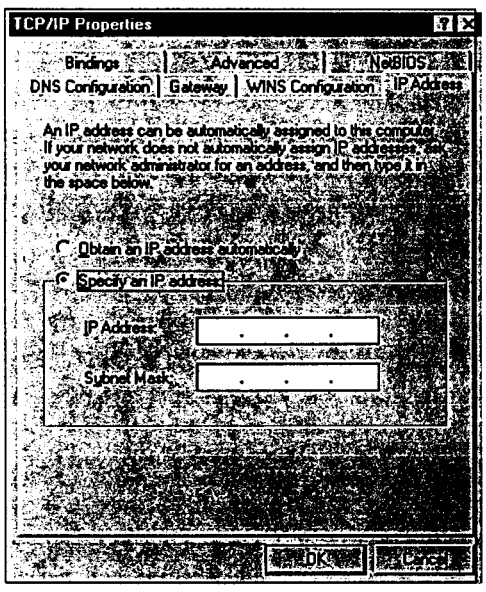


3. Highlight the TCP/IP network component.

NOTE: There may be more than one TCP/IP network component. Choose the one that corresponds to your network card.

4. Select **Properties**. The TCP/IP Properties dialog box will open:

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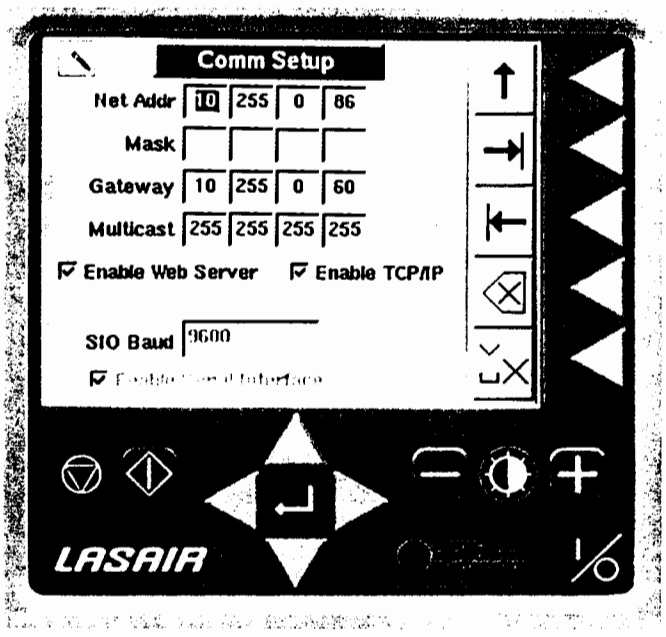
5. Select the **IP Address** option. The dialog box will become active.
6. Type in the desired IP address.
7. Type in the Subnet Mask
8. Click **OK**. Once you reboot, your IP address will be set for your computer.

NOTE: If you need to set the Gateway address, you can do so from the TCP/IP Properties menu. See your System Administrator for the proper addresses. Multicast addresses are set in Facility Net or Pharmaceutical Net.

To look up or set the net address on the LASAIR II:

1. On the initial display, press the Main Setup softkey [ ]. The Main Setup menu will be displayed.
2. Press the Comm Setup softkey [ ]. The Comm Setup menu will open.
3. If you need to change any of the data communications parameters, press the Enter button to activate Edit mode.
4. Change the address fields as required.
5. After entering the net address, a dialog box will prompt you to reboot the LASAIR II by turning it off and then on.

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Net Address	Sets the IP address in a decimal notation form of aaa.bbb.ccc.ddd. Each 3-numeric series represents a value from 0-255, separated by period characters (.). This address is unique to each LASAIR II. An example of a valid IP address is: 010.255.000.099.
Mask	Sets the net mask address in a a decimal notation form of aaa.bbb.ccc.ddd. Each 3-numeric series represents a value from 0-255, separated by period characters (.). The mask must be unique to the network it serves. An example of a valid mask address is: 255.0.0.0.
Gateway	The gateway address is used when communicating across a different network. This field sets the gateway address in a decimal notation form of aaa.bbb.ccc.ddd. Each 3-numeric series represents a value from 0-255, separated by period characters (.). An example of a valid gateway address is: 10.255.0.60.
Multicast	The multicast address needs to be assigned if you are using Pharmaceutical Net or Facility Net. This field sets the multicast address in a decimal notation form of aaa.bbb.ccc.ddd. Each 3-numeric series represents a value from 0-255, separated by period characters (.). An example of a valid multicast address is: 224.100.100.1.

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Enable Web Server	The default setting for this field is Enable; note the check-mark in the box. It allows a user to connect to the LASAIR II from a web browser such as Internet Explorer or Netscape Navigator. Disabling this function on the unit removes the ability for remote control and viewing of sampling.
Enable TCP/IP	The default setting for this field is Enable; note the checkmark in the box. It allows a user to connect to Facility/Pharmaceutical Net. Disabling this function on the unit removes the ability to use these applications.
SIO Baud	The serial I/O port baud rate is set at 9600.
Enable Serial Interface	This field is currently used only for calibration.

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Appendix B

TCP/IP Protocol: A Brief Overview

NOTE: This information is provided to help LASAIR II users who are not familiar with TCP/IP protocol understand more about the LASAIR II initialization process. It is not a substitute for the guidance of your network administrator.

On small networks (such as that used for a workgroup in a small office) a simple, fast protocol like NetBEUI can be completely reliable. However, when multiple networks are connected together it becomes necessary to use routers or bridges to send communication packets from one network to another. If there are so many routers that it is physically possible for message packets to take different routes between two computers, the protocol must be able to handle the possibility of packets showing up out-of-order. A more complex protocol such as TCP/IP becomes necessary when multiple networks are interconnected to form an "internet".

TCP/IP is an "open system", and as such is in the public domain and is not proprietary to any one vendor. Its early versions were invented by researchers working for the US. Department of Defense Advanced Research Projects Agency (ARPA) and were the protocol used for the ARPANET—the government/university precursor of today's global Internet.

The protocol is governed by the Internet Activities Board's Engineering Task Force. Documents knows as *Request for Comments* (RFCs) include definitions for the processing functions of the TCP/IP protocol. Anyone wishing to design a network system to use TCP/IP is free to do so, and will be able to learn everything necessary from the RFCs. RFCs are available from the Network Information Center (or *NIC*), 14200 Park Meadow Drive, Suite 200, Chantilly, VA 22021, phone (703) 802-4535.

Note that TCP/IP does not require connection to the global Internet to function. A network of only two computers, or a small company's internet connecting several buildings with routers could also use it.

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However, if the company's network is connected to the global Internet, the company must contact the NIC for Internet Protocol (IP) address assignments.

TCP/IP's **Internet Protocol** or IP is designed to interconnect packet-switched communication networks to form an internet. (Note: internet with a lower-case "I" means any two or more networks, for example: in a small company with two buildings. Internet (with a capital I) means the global Internet that was an outgrowth of the ARPANET).

IP transmits blocks of data called *datagrams*. It provides a "best effort" or "connectionless" delivery service between the source and destination. It is said to be "connectionless" as the source does *not* establish a session with the destination before transmission. This layer is also responsible for the protocol addressing.

In summary, the IP protocol's main functions are:

- Provide the basic unit for data transfer
- Addressing
- Routing
- Fragmentation of datagrams

Internet Control Message Protocol, or ICMP, is not part of the IP layer; rather it works with the IP layer so that routers can report certain error or test conditions on the network. The *PING* utility (explained later) uses ICMP.

Address Resolution Protocol or ARP is not truly part of the network layer, as it resides between the IP and datalink layers. It translates between the 32-bit IP address and a 48-bit physical LAN address.

TCP/IP'S Transport Layer

Transmission Control Protocol (TCP). Whereas IP is a connectionless delivery service; *TCP* provides network access to application programs with a reliable connection-oriented transport layer service. TCP establishes sessions between applications, and ensures reliable communications between two or more processes.

TCP:

- Monitors incoming session establishment requests
- Requests sessions from other network stations
- Sends and receives data reliably
- Closes sessions

User Datagram Protocol (UDP) provides an unreliable connectionless transport-layer service to application programs. It allows the transfer of

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data between source and destination stations without having to establish a session before data is transferred. UDP does not use the end-to-end error checking used by TCP. So, UDP is a low-overhead, faster protocol; it is used for applications that do not require the robustness of TCP. E-mail, broadcast messages, naming service, and network management functions are examples of common uses of UDP.

A discussion of the complete structural design of an IP packet goes beyond the scope of this manual. This discussion will be confined to those aspects that might be most useful in system operation and troubleshooting efforts.

A portion of an IP packet is the 32-bit-long IP address. The address is separated into four fields of one byte each, and are typically expressed using *dotted decimal notation*, like this:

192.100.100.5

The first bits indicate the "network number"; the later bits indicate the "host number" (the division between network and host bits will be explained later). The bytes are sometimes called *octets* when they are expressed in decimal notation.

If the network is to be connected to the global Internet, the network portion of the IP address will be assigned by the Network Information Center (NIC) mentioned earlier. If the TCP/IP network does not have an Internet connection the system's LAN administrator can assign any numbers (within the limits imposed by TCP/IP: 0 to 255, with some values reserved). Individual hosts' IP address values are never assigned by the NIC, they are assigned by the system LAN administrator.

IP Address Classes

The NIC assigns five different Internet IP address classes: A, B, and C are used to represent host and network addresses. Class D is a special type of address used for multicasting. Class E is reserved.

Although IP addresses are usually shown in dotted decimal notation, sometimes they are written in hexadecimal (in the field, it might be handy to have access to a calculator that can convert from hex to decimal—note that the "calculator" in *Microsoft Windows* can do this). Converting the IP address to binary and examining the first bits can help you determine the IP address class:

Class A IP Address: 0xxxxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx
Class B IP Address: 10xxxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx
Class C IP Address: 110xxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx
Class D IP Address: 111xxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx
Class E IP Address: 1111xxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx

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In Class A addresses the first byte represents the network number and the last three bytes identify the host number. Since the first bit of a Class A address must be a 0, only 127 Class A network addresses are available—worldwide. Actually, only 126 are available as 127.xxx.xxx.xxx is reserved for loop-back functions, and cannot be assigned to a network. This leaves the last three bytes available to represent host numbers: 256^3 (16,777,216) individual hosts on each of the 126 Class A networks. Note that the NIC almost never assigns a Class A license. Loop-back functions may be used by multiple applications running on the same host that use TCP to communicate with each other. Packets with the loop-back address will be discarded by a router.

Class B addresses use the first two IP address bytes for the network number, and the last two for the host number. This allows a potential of 16,384 network numbers (10000000.00000000.xxx.xxx through 10111111.11111111.xxx.xxx) with each Class B network having as many as 65,536 hosts (256^2). Class B licenses are popular with universities and corporations.

Class C addresses use the first three bytes to identify the network, and the last byte to identify the host. Since the first three bits in the first byte are 110xxxxx, the allowable range of the first byte for a Class C address is 192 to 223. This scheme allows about 2 million Class C networks, each with 254 hosts. Class C addresses are the type most commonly assigned by the NIC—however if you (or your organization) can justify a need for a Class B license, one will be assigned to you.

In sum:

Class A addresses range from (1-126).<host>.<host>.<host>
Class B addresses range from (128-191).(1-255).<host>.<host>
Class C addresses range from (192-223).(1-255).(1-255).<host>

Note: IP addresses written with zeros in the host fields are used to express a network. For example 112.0.0.0 would indicate a Class A network. 192.100.100.0 indicates a Class C network.

If each bit of the IP address is a 1 (if the bytes equal 255 in decimal) the packet is defined as a *limited broadcast*. This is a message that is received by all network stations on the local network. Limited broadcasts are used by routers to update other routers' network numbers and hop-counts; limited broadcasts are not forwarded by routers.

A *directed broadcast* is used to send information to all hosts on a particular network. Packets with IP address 192.100.255.255 will be

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forwarded by routers (if routers are used) to *all* hosts on network 192.100.0.0

A packet with zeros in the network portion of the IP address such as 0.0.112.5 is an indication that the packet is intended for host 112.5 on "this" network (whatever is the network number of the host originating the message).

Multicast (Class D) Messages

Multicasting is used to send identical packets to groups of hosts. Routers update their neighboring routers using these messages; PMS *Facility Net* uses multicasting to send several types of messages and data. For example, *Facility Net* Real Time Stations transmit sample point data to *Facility Net* Network Stations using multicasting. Multicasting is more efficient than broadcasting, as multicast packets are passed by the transport layer software only if the packet is needed by that particular host. However, all broadcast packets are passed to upper-layer software.

Subnet Masking

When the NIC assigns an IP network license number to a site, it may be awkward to use all the host numbers in one network. For example, if a company has a Class B license there could be 65534 hosts on one network—a potential management and troubleshooting problem. A scheme known as *subnet masking* can be used to reassign some of the host bits to the network bit function, allowing more logical networks under the one Class B network number.

A typical network management choice would be to segment a single Class B network into 256 subnets, each with 256 hosts (minus the reserved network and host address numbers). However, the quantity of host bits that can be reassigned as subnet bits is variable—so the network administrator could decide to divide the Class B network into more than 256 subnets (each with less than 256 potential hosts) or less than 256 subnets (each with more than 256 potential hosts).

NOTE: *All devices on the same subnetwork must have the same subnet mask number*, or they will not actually be on the same network and may not be able to communicate with each other, depending on how the software and routers work at the facility.

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Default Subnet Masks

TCP/IP networks use subnet masks even if the network is not subnetted. In that case, standard default mask numbers are used. Some software automatically enters the correct default subnet mask when you enter the IP address (although you have to alter the mask if your facility doesn't use the default number).

Class A	255.	0.	0.	0.
(binary)	(11111111)	(00000000)	(00000000)	(00000000)

Class B	255.	255.	0.	0.
(binary)	(11111111)	(11111111)	(00000000)	(00000000)

Class C	255.	255.	255.	0.
(binary)	(11111111)	(11111111)	(11111111)	(00000000)

Like an IP address, a subnet mask is 32 bits (4 bytes) long. The subnet mask is used in an Boolean *AND* operation to define which IP address bits are "borrowed" from the host section to be used as subnet bits. In the following example, network 192.9.202.0 will be split into two subnets, one with hosts 0-127, the other with hosts 128-255. The subnet mask 255.255.255.128 is used; in the example the decimal values are converted to binary so as to show each bit:

IP Address 192.9.202.15	11000000	00001001	11001010	00001111
Subnet Mask 255.255.255.128	11111111	11111111	11111111	10000000
AND Result	11000000	00001001	11001010	00000000

The AND function preserves the value of the IP address bit *only if* the mask bit value is a 1. In the example shown above, the most-significant bit of the fourth byte has been borrowed from the host numbers and lent to the network numbers. In the following example, a host number higher than 128 is used, so the subnet mask passes that bit along in the AND result:

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IP Address 192.9.202.130	11000000	00001001	11001010	10000010
Subnet Mask 255.255.255.128	11111111	11111111	11111111	10000000
AND Result	11000000	00001001	11001010	10000000

Ports and Sockets

Sometimes there will be many TCP/IP applications (programs) running on one host (computer) at the same time. To avoid having to assign an IP address to each application, a scheme exists wherein each application on a particular host will have an assigned *port number*. There are some port numbers that are predefined ("static") for internal TCP/IP functions. "Dynamic" port numbers (of which there are about 65000) can be assigned by application writers.

The whole combination of IP number (network and host numbers) and port number is called a *socket* and must not be duplicated on any TCP/IP network.

[Adapted from the **PMS SERIAL COMMUNICATIONS & NETWORKING MANUAL** Revised 18 July 1996. ©1995, 1996 Particle Measuring Systems, Inc.]

Ping

TCP/IP systems can use a utility named *PING* (Packet InterNet Groper) to test station and network integrity. The TCP/IP-32 add-on protocol for *Microsoft Windows for Workgroups 3.11* includes a *PING* function that must be run from a *Windows* DOS window.

To use the Windows for Workgroups TCP/IP PING:

1. With Windows running, open a DOS window by double-clicking on the MS-DOS Prompt icon.
2. At the DOS prompt, type **PING <IP ADDRESS>** (using the address of the device for which you wish to test your computer's LAN communications).

The *PING* utility will report whether or not the other device responded, and what the response time was.

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Appendix C

Comma Separated Value (CSV) Format

Introduction

This appendix describes the CSV file format. With the file format, you can properly label the value headings. The following items are numbered in the order that they will appear in the CSV file. The CSV file, however, will not include the order numbers.

1. **Sample Date**: Formatted YYYY/MM/DD
2. **Sample Time**: Formatted HH:MM:SS {End of Sample}
3. **Sensor Name**: User entered name. Up to 16 characters. Name is delimited by quotation (") marks.
4. **Sensor Type**: Hardcoded value. Example: "LasairII-310"
5. **Sensor S/N**: This value programmed during initial calibration.
6. **Statistics**: This field is a "" if statistics are not used. If they are used, then the field contains both the name of the room in which the statistics were taken and, the type. The type can be FS-209E, ISO-14644-1, BS-5295, or AVERAGE. The room name is prepended to the statistics type with a "--" separating the two. An example is "BallroomA--FS209E". (Maximum room name length is 16 characters, thus the maximum string length is less than 32 characters.)
7. **Loc Chg**: When outputting a CSV block, this field will be set to a "*" if the location has changed from the last record printed. Otherwise this field will be a ".".
8. **Location**: User location name. Up to 16 characters. Name will be delimited by " marks. If the first characterof the location is a "?", then the location name has been changed since the data sample was saved. (The sample only has an index to the name.)

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9. **Manifold**: The manifold position. The value will be 0 (zero0 if no manifold exists. With a manifold, lowest number will be 1.
10. **Laser OK**: 1 = OK, 0 = bad. (Language independent)
11. **Flow OK**: 1 = OK, 0 = bad. (Language independent)
12. **Sample Valid**: The sample will be declared invalid if the laser current is bad during the sample, or if the sample flow falls outside the 5% ISO limit, or if the user invalidates the sample manually (only under statistics mode).
13. **Sample Interval**: In time. Format is HH:MM:SS
14. **Volume Units**: CF or CM
15. **Sample Volume**: Floating point value. In "Volume Units" given above.
16. **Number Channels:** Currently 6.
17. **Size 1**: This is fixed for the instrument
18. **Counts 1**: The total differential raw count value.
19. **Size 2**: This is fixed for the instrument
20. **Counts 2**: ditto
21. **Size 3**: This is fixed for the instrument
22. **Counts 3**: ditto
23. **Size 4**: This is fixed for the instrument
24. **Counts 4**: ditto
25. **Size 5**: This is fixed for the instrument
26. **Counts 5**: ditto
27. **Size 6**: This is fixed for the instrument
28. **Counts 6**: ditto
29. **Number Analog**: This can vary from 0 to 6 depending upon what is enabled on the instrument. To prevent column alignment issues when adding analog channels, all unused physical channels that are before the last used channel will be reported. Thus the value reported here includes those unused channels which are before the last used channel.
30. **Name 1**: User name (16 char max) or dedicated temperature probe. Name of temp. probe is currently "T". If the first character of the name is a "?", that indicates the name has changed since the data

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sample was saved. (The data sample only has an index to the name.)

31. **Units 1**: User name (10 char max). Might be dedicated to temperature sensor if probe enabled. If the first character of the units is a "?", that indicates the units has changed since the data sample was saved. (The data sample only has an index to the units.)
32. **Avg 1**: Average value for channel. Internally the box will save the data as a 10 bit integer, and then apply the scale and offset when dumping the data.
33. **Min 1**: Minimum value for channel. Stored internally as a 10 bit integer.
34. **Max 1**: Max value for channel. Stored internally as a 10 bit integer
35. **Name 2**: Dedicated relative humidity probe. Name of probe is "rh".
36. **Units 2**: See above.
37. **Avg 2**: See above.
38. **Min 2**: See above.
39. **Max 2**: See above.
40. **Name 3**: Analog channel name. Channel 3 is the first of four user channels.
41. **Units 3**: See above.
42. **Avg 3**: See above.
43. **Min 3**: See above.
44. **Max 3**: See above.
45. **Name 4**: See above.
46. **Units 4**: See above.
47. **Avg 4**: See above.
48. **Min 4**: See above.
49. **Max 4**: See above.
50. **Name 5**: See above.
51. **Units 5**: See above.
52. **Avg 5**: See above.
53. **Min 5**: See above.

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54. **Max 5**: See above.
55. **Name 6**: See above.
56. **Units 6**: See above.
57. **Avg 6**: See above.
58. **Min 6**: See above.
59. **Max 6**: See above.

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Appendix D

Software Version History

Introduction

This appendix lists the changes in each software release.

1.0.3: Initial release.

1.1.0:

- Added European language support
- Added statistics calculations.

1.2.0:

- Added support for TouchRAM
- Added support for Facility Net Remote Mode
- Added start by time-of-day setting
- Added calibration support for model 325

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Appendix E

Accessories and Supplies

Replacement Part or Accessory	Part Number
Replacements for Standard Parts	
Printer paper (3 rolls)	1000000975
Sampling probe, standard, horn only	1000000970
Sample tubing, 3/8" ID, poly	MI153
Zero count filter	To Be Determined
Spare fuse, 100-115 V	1000001107
Spare fuse, 220-240 V	FS48
Operations Manual	1000000982
Accessories - Optional	
Battery pack	90101110
External Battery Charger	9010115
External filter	90104016
Sampling probe, isokinetic, with wall/hand/tripod adapter	90103070
Adapter for tripod & hose for standard sampling probe	1000000971
Tripod, floor-mounted	MI008
Tripod, table-top	1000000979
Cable,10', Ethernet 10 base T w/crossover	AE1938
Touch Memory reader (wand)**	MI399
Touch Memory locations**	MI398
Touch Memory serial adapter	To Be Determined

** Only works with LASAIR IIs reconfigured to emulate Minilaz.

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Replacement Part or Accessory	Part Number
Environmental Sensors, etc. - Optional	
TRH probe (same as for Abacus)	PB28
AFV-C: Air Flow Velocity Sensor (includes 10' cable)	502015
AFV-PS: Power Supply for AFV-C (115V ONLY)	502025
DAP-C: Differential Air Pressure Sensor (includes 10' cable)	501515
Cable, 10', for connecting both AFV-C and DAP-C	To Be Determined
TRH-C-W: TRH Sensor w/10' cable, wall mount (0-100°F)	501015
TRH-C-W: TRH Sensor w/10' cable, wall mount (-5 to 55°C)	501017
TRH-C-D: TRH Sensor w/10' cable, duct mount (0-100°F)	501020

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Appendix F

4-20mA Sensors

Introduction

One of four optional sensors can be connected to LASAIR II's 4-20mA connector (type DB15F) on the rear of the case. Use this appendix to find the following information:

- cable pin-outs
- 4-20 mA setup values
- examples of 4-20 mA setups for each accessory

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Cable Pin-outs

Standard PMS Cable	Pin Number	Pin Use
Temperature	1	Analog signal 1 input
	2	Analog signal 1 GND
	3	+12Vdc
Relative Humidity	4	Analog signal 2 input
	5	Analog signal 2 GND
	6	+12Vdc
Differential Air Pressure	7	Analog signal 3 input
	8	Analog signal 3 GND
	9	+12Vdc
Air Velocity	10	Analog signal 4 input
	11	Analog signal 4 GND
	12	+12Vdc
	13	GND
	14	GND
	15	GND

4-20 mA Input Setup Values

Scale = Total range ÷ 16

Offset = Minimum value

Units = Unit of measure

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Examples of Setup for Each Accessory

Temperature

	English	Metric
Range	0-100 °F	-5 to 55 °C
Scale	6.25	3.75
Offset	0	-5
Units	Deg F	Deg C

Relative Humidity (R/H)

Range	0-100 %
Scale	6.25
Offset	0
Units	%

Differential Air Pressure (DAP)

	English	Metric
Range	0-0.25 inches of water	0 to 6.35mm of water
Scale	15.625	0.397
Offset	0	0
Units	MIN (miliinch) H_2O	mm H_2O

Air Velocity

	English	Metric
Range	0-200 Feet per Minute	0 to 1.016 meters per second
Scale	12.5	.0635
Offset	0	0
Units	FT/Min	M/Sec

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Appendix G
International Precautions

Precautions

The following terms have specific meanings in this manual:

WARNING: information to prevent personal injury.

CAUTION: information to prevent damage to the equipment.

NOTE: important general information.

The hazard symbols appearing on the equipment have the following meanings:

Symbol	Nature of Hazard	Reference in Manual
	Laser Radiation	"NOTE: Laser" on page 149.
	Electrical power source and fuses.	"WARNING: Electrical Hazards" on page 148.

CAUTION: General Conditions for Use

This instrument complies with the requirements of EN 61010-1/EC 1010-1, for Class 1 portable equipment used in a Pollution Degree 2 environment. The equipment is designed to operate from an Installation Category 2 supply.

Protect the instrument from the ingress of liquids and precipitation. When moving the instrument from a cold to a hot environment, allow the instrument's temperature to stabilize before connecting it to electrical power. Operate the instrument only within the environmental conditions specified in Chapter 1.

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This product is not approved for use in hazardous atmospheres. If the instrument is to be used in a safety-related application, the suitability of the product must be assessed and approved for use by a competent person.

WARNING: Electrical Hazards 

AC Supply Voltage. This instrument conforms with IEC Safety Class 1, meaning that it is provided with a protective grounded lead. To maintain this protection, the electrical source must be a grounded socket connection.

Capacitors. The AC supply filter contains capacitors that may remain charged after the equipment is disconnected from the supply. Although the stored energy is within the approved safety requirements, a slight electrical shock may be felt if the plug pins are touched immediately after removal.

Removal of the Cover. There is nothing within the LASAIR II case that is user-serviceable. All internal service should be performed by Particle Measuring Systems personnel. If you must remove the cover, ensure that electrical power is disconnected first to avoid the risk of electrical shock.

Fuses. The AC supply fuses for instruments intended for European use are in series with both the live (brown) and neutral (blue) conductors of the supply lead. Refer to Appendix D for proper fuse selection.

WARNING: Toxic Hazards

This equipment may include resins and other materials which give off toxic fumes if incinerated. Take appropriate precautions when disposing of these items.

WARNING: Lithium

The memory back-up battery in this instrument contains Lithium. This material, if incorrectly handled, could cause a danger to health. Refer to local regulations on the handling and disposal of lithium batteries.

WARNING: NiMH

NiMH (nickel metal hydride) is used in the construction of the optional battery. This material, if incorrectly handled, could cause a danger to health. Refer to local regulations on the handling and disposal of these batteries.

CAUTION: Static Sensitive Components

This equipment contains static sensitive components which may be damaged by handling. Refer to the equipment service manual for proper handling of these sensitive components.

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NOTE: Laser 

The laser in this product is a Class 1 device and complies with DHEW radiation performance standards 21CFR Subchapter J.

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Précautions

Ces termes ont une signification particuliere dans ce manuel:

AVERTISSEMENT: information pour éviter des blessures aux personnes.

ATENTION: information pour éviter d'endommager l'appareil.

NOTE: information Générale importante.

Des symboles représentant les risques sont placés sur l'appareil. Leur signification est la suivante:

Symbole	Nature du risque	Référence au manuel
	Radiations laser	NOTE: Laser en page 97.
	Alimentation secteur et fusibles.	Avertissement: Risques éléctriques en page 96.

ATTENTION: Conditions géneralés d'utilisation

Cet instrument est conforme aux exigences des normes EN 61010-1/EC 1010-1, pour les équipements portables de Classe 1 pouvant etre utilisés en environnement pollué de degré 2. L'appareil est concu pour etre alimenté a partir d'une installation électrique de catégorie 2.

L'appareil doit etre protégé contre les infiltrations de liquides et les projections d'eau (pluie, neige, etc.). Apres un déplacement d'un environnement froid vers un environnement chaud, il est important de laisser l'appareil se stabiliser en température avant de le mettre sous tension, afin d'éviter la formation de condensation. Il ne doit etre utilisé que dans les conditions d'environnement décrites au chapitre 1.

Cet équipement n'est pas prévu pour fonctionner dans des atmospheres dangereuses. Dans le cadre d'une utilisation soumise a des regles de sécurité, la compatibilite du produit doit etre évaluée et approuvée par un personnel compétent.

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AVERTISSEMENT: risques éléctriques 

Alimentation secteur. Cet équipement est conforme avec les regles de sécurité IEC Classe 1, ce qui signifie qu'il dispose d'une liaison de protection a la terre. Afin d'assurer cette protection, le cable d'alimentation doit toujours etre connecté sur une prise secteur possédant une mise a la terre.

Condensateurs. Le filtre d'alimentation AC contient des condensateurs qui peuvent rester chargés apres la déconnexion du cordon secteur. Bien que l'énergie résiduelle ainsi stockée ne dépasse pas les limites de sécurité, une légere décharge électrique est perceptible si l'on touche les broches de la prise du cordon, immédiatement apres l'avoir retirée du secteur.

Démontage du capot. Rien à l'intérieur du LASAIR II ne peut être effectué par l'utilisateur. Seul le personnel P.M.S. peut intervenir à l'intérieur du LASAIR II. En cas cas de démontage du capot, s'assurer que l'alimentation secteur est déconnectée pour prévenir tous risques électriques.

Fusibles. Les fusibles de l'alimentation secteur pour l'Europe sont montés en série avec les fils de phase (marron) et de neutre (bleu). Se référer a la l'appendice C pour une sélection appropriée des fusibles.

AVERTISSEMENT: Risques Toxiques

Certains des composants utilisés dans cet équipement peuvent contenir des résines et autres matériaux qui degagent des fumées toxiques lorsqu'ils sont incinérés. Par conséquent, prendre les précautions nécessaires lors du rejet ou de la destruction de ces éléments.

AVERTISSEMENT: Lithium

Le Lithium est utilisé dans la fabrication des batteries de sauvegarde des mémoires non volatiles. Une mauvaise manipulation de cet élément peut présenter un danger pour la santé. Se reporter aux réglementations locales en vigueur concernant la manipulation et le rejet de ces batteries.

AVERTISSEMENT: NiMH

Le NiMH (nickel metal hydrure) est utilisé dans la fabrication des batteries optionnellés. Une mauvaise manipulation de cet élément puet présenter un danger pour la santé. Se reporter aux réglementations locales en vigueur concernant la manipulation et de rejet de ces batteries.

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ATTENTION: Composants a l'electricite statique

Cet appareil contient des composants sensibles a l'électricité statique, qui peuvent etre endommagés par simple manipulation. Se référer au Manuel de maintenance de l'appareil pour connaitre les regles de manipulation de ce type de composants.

NOTE: Laser 

Le laser de cet équipement est de classe 1 et est conforme aux normes relatives aux performances des radiations DHEW-21CFR sous chapitre J.

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Vorsichtsmassregeln

Diese Ausdrucke haben in diesem Handbuch besondere Bedeutungen:

WARNUNG: Bei Gefahr von Personenschaden.

ACHTUNG: Bei Gefahr von Sachbeschadigungen.

HINWEIS: Allgemeine wichtige Informationen.

Die, an dem Gerat angebrachten Warnschilder haben folgende Bedeutungen:

Symbol	Gefahrenart	Referenz im Handbuch
	Laserstrahlung	Anmerkung : Laser auf Seite 101.
	Spannungsversorgung und Sicherungensi	Warnung: Elektrische Gefahren auf Seite 100.

ACHTUNG: Allgemeine Gebrauchshinweise

Das Gerat entspricht den Bestimmungen EN61010-1/IEC1010-1 fur tragbare Gerate der Klasse 1 und ist bestimmt fur den Einsatz in einer Umgebung mit einem Verschmutzungsgrad 2. Es ist fur eine Stromversorgung der Kategorie 2 ausgelegt.

Gerat vor eindringender Flussigkeit, wie zum Beispiel Regen, Schnee usw.schutzen. Bei einem Standortwechsel (z.B. von kalt nach warm) muB sich die Temperatur des Gerates vor einem AnschluB an die Stromversorgung erst stabilisieren, um die Bildung von Kondensat zu vermeiden. Die in Kapitel 3 definierten Umgebungsbedingungen sind fur den Betrieb des Gerates zu beachten.

Das Produkt ist nicht fur den Gebrauch in einer gefahrlichen Umgebung geeignet. Bei sicherheitsrelevanten Anwendungen muB das Gerat durch eine zustandige Person zugelassen und genehmigt werden.

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WARNUNG: Elektrische Risiken

Wechselspannung. GemaB den IEC Sicherheitsbestimmungen Klasse 1 ist das Gerat mit einem Sicherheitserdleiter ausgerustet. Stromkabel immer uber einen Stecker mit Erdungsschutz an die Stromversorgung anschlieBen.

Kondensatoren. Der Wechselstromfilter enthalt Kondensatoren, die nach Trennen des Gerates von der Stromversorgung noch unter Spannung stehen konnen. Obwohl die gespeicherte Energie innerhalb der Sicherheitsbestimmungen liegt, kann es zu einem leichten elektrischen Schlag kommen, wenn die Steckerkontakte unmittelbar nach Herausziehen des Steckers beruhrt werden.

Entfernung des Gehäusedeckels: Das LASAIR II besitzt keine Komponenten, die vom Anwender ausgetauscht oder repariert werden können. Die im LASAIR II befindlichen Komponenten sollten ausschliesslich von geschultem Servicepersonal der Firma PMS durchgeführt werden. Um elektrischen Gefahren vorzubeugen, sollte beim Entfernen des Gehäusedeckels unbedingt darauf geachtet werden, dass der Netzstecker von der Spannungsversorgung getrennt worden ist.

Sicherungen. Die Wechselstromsicherungen sind mit den spannungsfuehrenden(braunen) und neutralen (blauen) Adern des Stromkabels in Serie geschaltet. Die Auswahl der richtigen Sicherung wird in Anhang C ausgewiesen.

WARNUNG: Gefahr durch Giftstoffe

Einige der Baugruppen des Gerates enthalten Harze und andere Materialien, bei deren Entzundung giftige Dampfe frei werden. Bei der Entsorgung dieser Baugruppen sind entsprechende VorsichtsmaBnahmen zu treffen.

WARNUNG: Lithium

Bei den Batterien des nicht-fluchtigen Speichers wird Lithium eingesetzt. UnsachgemaBe Handhabung kann zu Gesundheitsschaden fuhren. Die ortlichen Bestimmungen bzglueglich der Handhabung und Entsorgung dieser Batterien sind zu beachten.

WARNUNG: NiMH

Die Batterien des nicht-fluchtigen Speichers enthalten Nickel-Cadmium. Unsachgemaesse Handhabung kann zu Gesundheitsschaden fuhren. Die ortlichen Bestimmungen bzueglich der Handhabung und Entsorgung dieser Batterien sind zu beachten.

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ACHTUNG: Statisch empfindliche Bauteile

Das Gerat enthalt statisch empfindliche Bauteile, die durch unsachgemaBe Handhabung beschadigt werden konnen. Die Anweisungen in dem Wartungshandbuch sind zu beachten.

Hinweis: Laser 

Der Laser in diesem Geraet ist ein Klasse-1 Laser und entspricht der DHEW Strahlungsverordnung 21 CFR, Unterkapitel J.

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Voorzorgsmaatregelen

Deze aanduidingen hebben elk een specifieke betekenis in deze handleiding:

WAARSCHUWING: informatie om te beschermen tegen persoonlijke verwondingen.

VOORZICHTIG: informatie om schade aan het toestel te voorkomen.

NOTA: belangrijke algemene informatie.

Betekenis van de gevarensymbolen welke op de toestellen vermeld worden:

Symbool	Aard van het gevar	Referentie
	Laser straling	Nota: Laser zie pagina 105.
	Voedingen en zekeringen.	Waarschuwing: elektrische gevaren zie pagina 104.

VOORZICHTIG: Algemene Gebruiksaanwijzingen

Dit instrument voldoet aan de eisen van EN61010-1/IEC1010-1, aan Klasse 1 voor draagbare apparatuur en kan gebruikt worden in een omgeving met vervuilingsgraad 2. Het toestel werd ontworpen om te werken op de voeding van een installatie categorie 2.

Het toestel moet beschermd worden tegen insijpeling van vloeistoffen en precipitatie van regen, sneeuw, enz.... Indien het toestel verplaatst wordt van een koude omgeving naar een warmere omgeving, is het belangrijk om de temperatuur van het apparaat eerst te laten stabiliseren, voor men het opnieuw aansluit op het net, om condensatie te voorkomen. Het toestel mag enkel gebruikt worden volgens de milieucondities bepaald in hoofdstuk 1.

Dit produkt werd niet goedgekeurd voor gebruik in gevaarlijke omgevingen.Indien het toestel toch gebruikt moet worden in een te beveiligen toepassing, dan moet de geschiktheid van het toestel ingeschat en goedgekeurd worden door een competent persoon.

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WAARSCHUWING: Elektrische gevaren

AC voedingsspanning. Dit toestel voldoet aan de eisen van IEC Veiligheidsklasse 1, wat betekent dat het voorzien is van een geaarde stekker. Om deze bescherming te kunnen handhaven moet het netsnoer steeds aangesloten worden op een netvoeding via een stopcontact met aardingspin.

Condensatoren. Het AC voedingsfilter bevat condensatoren die nog geladen kunnen zijn nadat het toestel werd uitgeschakeld. Hoewel de opgeslagen energie binnen de veiligheidseisen valt, kan een lichte elektrische schok ervaren worden wanneer de stekkerpinnen aangeraakt worden onmiddellijk nadat de verbinding met het net werd verbroken.

Verwijderen van de afdekkap. Geen enkele componenten onder de afdekkap van de LASAIR II veriesen onderhoud van de gebruiker. Interne afstellingen of reparaties kunnen alleen uitgevoerd worden door Particle Measuring Systems personeel. Verwijder de stekker uit het stopcontact voor u de kap van het toestel verwijdert om gevaar van blootstelling aan onderdelen op hoge spanning uit te sluiten.

Zekeringen. De AC voedingszekeringen, voor toestellen bestemd voor Europa staan in serie met zowel de geladen(bruine) als met de neutrale(blauwe) geleiders van het netsnoer. Zie appendix C voor keuze van de juiste zekeringen.

WAARSCHUWING: Toxisch gevaar

Bepaalde componenten die in het toestel gebruikt werden, kunnen harsen en andere materialen bevatten die bij verbranding toxische gassen afgeven. Neem daarom de nodige voorzorgen bij de afvalverwijdering van deze elementen.

WAARSCHUWING: Lithium

Lithium wordt gebruikt bij de vervaardiging van de niet-vluchtige data back-up batterijen. Bij onoordeelkundig gebruik kan dit materiaal een gevaar zijn voor de gezondheid. Raadpleeg de locale reglementeringen om de batterijen als afval te verwijderen.

WAARSCHUWING: NIMH

NiMH (nikel metaalhydride)wordt gebruikt bij de vervaardiging van de optionele batterij. Bij onoordeelkundig gebruik kan NiMH een gevaar zijn voor de gezondheid.

VOORZICHTIG: Statisch gevoelige componenten

Dit toestel bevat statisch gevoelige componenten. Raadpleeg de onderhouds- en reparatiehandleiding voor correcte behandeling van deze gevoelige componenten.

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Nota: Laser 

De laser in dit product is een klasse I laser en voldoet aan de DHEW radiatie prestatie standaards 21CFR hoofdstuk J.

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Precauzioni

Qusti termini hanno significati precisi in questo manuale:

ATTENZIONE: informazione per prevenire pericoli personali.

AVVERTENZA: informazione per prevenire danneggiamenti agli strumenti.

NOTA: informazione generale importante.

Il significato dei simboli di pericolo che appaiono sugli strumenti il seguente:

Simbolo	Natura del pericolo	Riferimento nel anuale
	Radiazione Laser	NOTE:LASER" A PAGINA 109.
	Tensione DI Alimentazione E Fusibili	ATTENZIONE: Pericolo Elettrico. A pagina 108.

AVVERTENZE: Condizioni Generali per lutilizzo

Questo strumento e progettato per soddisfare le richieste delle norme UNI EN 61010-1 relative alla classe I degli strumenti pertatili e per essere usati in classe 2 del grado di inquinamento L' apparecchio e progettato per funzionare nella categoria di installazione (categoria di sovratensione) II

L' apparecchio dovrebbe essere protetto contro l' ingresso di liquidi e contro le precipitazioni come quelle della pioggia, della neve ecc. Quando lo strumento viene spostato da un ambientefreddo ad uno caldo e importante permettere alla temperatura dello strumento di equilibrarsi prima di alimentarlo per evitare che si formi condensa. Lo strumento deve operare solamente all' interno delle condizioni ambientali specificate nel capitolo 3.

Questo prodotto non pu essere utilizzato in ambiente pericoloso. Se lo strumento deve essere usato in condizioni di sicurezza ambientale, deve essere valutata l opprtunit del suo utilizzo mediante una persona esperta.

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ATTENZIONE: Pericoli elettrici

Corrente alternata. Questo apparecchio e conforme alla classe 1 delle norme di sicurezza IEC ci significa che e fornito di terra di protezione. Per mantenere questa protezione il cavo di alimentazione dello strumento deve essere collegato alla presa di corrente con connessione a terra.

Condensatori. Il filtro di alimentazione AC contiene condensatori che possono rimanere carichi anche dopo che lo strumento viene sconnesso dalla rete. Sebbene l' energia immagazzinata e dentro i valori di sicurezza stabiliti, pu essere avvertita una scarica elettrica se vengono toccati i capi della spina di alimentazione subito dopo averli staccati.

Rimozione della Copertura. all'interno della scatola del LASAIR II non c'e' niente che e' riparabile dall'utilizzatore. I componenti all'interno della scatola del LASAIR II dovrebbero essere riparati solo da personale della Particle Measuring System. Se dovete rimuovere la copertura, assicuratevi innanzitutto che l'alimentazione elettrica sia disconnessa per evitare i rischi di una scossa elettrica.

Fusibili. I fusibili della tensione di alimentazione ac per gli strumenti utilizzati in europa sono in serie sia sul conduttore della fase (marrone) sia sul conduttore del neutro (blu) sulla linea d'alimentazione. Riferirsi all'appendice c per la scelta del fusibile corretto.

ATTENZIONE: Pericolo di intossicazione

Alcuni componenti utilizzati in questa apparecchiatura possono includere resine o altri materiali che, se bruciati, emettono fumi tossici. Prendere le opportune precauzioni per lo smaltimento di questi prodotti.

ATTENZIONE: Litio

Il litio e utilizzato nella costruzione delle batterie che vengono montate nell apparecchio per mantenere i dati in memoria.Questo materiale, se non viene maneggiato correttamente, puo causare danni alla salute. Fare riferimento ai regolamenti locali per lo smaltimentodi queste batterie.

ATTENZIONE: NiMH

NiMH (nickel matal hydride) e' utilizzato nella costruzione della batteria opzionale. Se e' maneggiato non correttamente, il NiMH potrebbe causare un pericolo alla salute. Riferirsi alle regolamentazioni locali per il trattamento e lo smaltimento di queste batterie.

AVVERTENZA: Componenti sensibili al campo elettrostatico

Questo apparecchio contiene componenti sensibili al campo elettrostatico che si possono danneggiare durante la manipolazione. Fare riferimento al manuale di servizio dello strumento per manipolare in modo appropriato questi componenti.

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NOTE: LASER ⚠

Il laser in questo prodotto e' un congegno in classe 1 e segue lo standard DHEW sulle prestazioni delle radiazioni 21CFR Sottocapitolo J.

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PARTICLE MEASURING SYSTEMS, INC.
5475 Airport Boulevard, Boulder, CO 80301-2339 (303)443-7100 FAX (303) 449-6870

Certificate of Calibration

Customer: New Instrument

Field Office: Boulder, CO.

Instrument: LasairII-310

Serial Number: 23222

Temperature: 24.6 deg C

Relative Humidity: 17.0 %

Job Number: N/A

Customer Asset Number: N/A

Calibration Date: 19-Mar-2001

Calibration Due: 19-Mar-2002

PMS Recommended Calibration

PMS certifies that the instrument listed above meets or exceeds all published specifications and has been calibrated using equipment and standards whose accuracies are traceable to the USA National Institute of Standards and Technology (NIST). Our calibration processes satisfy BS EN ISO9001:1994. This instrument was calibrated in accordance with the PMS quality system documentation listed below.

PMS Procedure: LasairII.exe Revision: 1.0.1

Instrument Condition, Received: New

Out of Tolerance Description: N/A

Instrument Condition, Shipped: Meets PMS Specifications

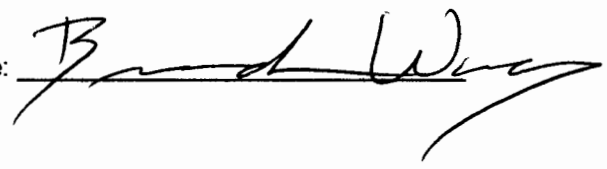
Standards Used:

Particle Size:	Standard Deviation:	Lot No:	Manufacturer:	Expiration Date:
00.300 um	0.0043 um	22357	Duke	30-Apr-2002
00.503 um	0.0063 um	22660	Duke	31-Jul-2002
00.701 um	0.0090 um	22416	Duke	30-Apr-2002
00.993 um	0.0100 um	22417	Duke	30-Apr-2002
04.800 um	0.5000 um	21979	Duke	None
09.600 um	0.8000 um	21587	Duke	None

Flowmeter:	Manufacturer:	Tolerance:	Serial Number:	Calibration Due:
1.0 CFM	Sierra	+/- 1%	10673	01-Jun-2029

Reference Instrument:	Manufacturer:	Serial Number:	Calibration Due:
Lasair-210	PMS	13398	29-Mar-2001

Calibrator Name: WANDS, BRANDON

Calibrator Signature: 

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PARTICLE MEASURING SYSTEMS, INC.
5475 Airport Boulevard, Boulder, CO 80301-2339 (303)443-7100 FAX (303) 449-6870

Calibration Data

Instrument: LasairII-310 Serial Number: 23222

Laser Serial Number: 12167-12

Calibration Date: 19-Mar-2001 Calibration Due: 19-Mar-2002

Threshold Values:

Threshold 1: 159

Threshold 2: 395

Threshold 3: 690

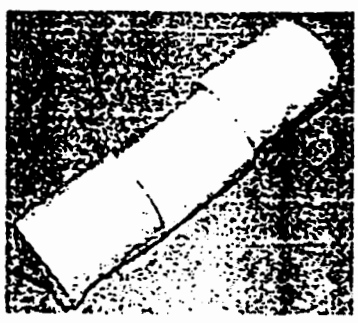
Threshold 4: 312

Threshold 5: 341

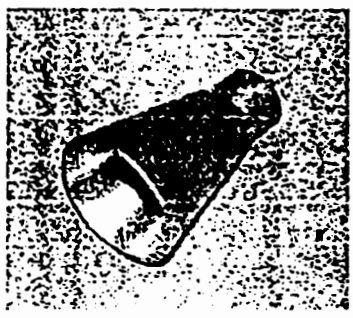
Threshold 6: 865

Calibration Tests:	Specifications:	Passing Results:
1st Sensitivity:	LasairII 1st(Accum) = Ref 1st(Accum)/2 85%-105%	8001 / 7897 = 101.32%
2nd Split:	LasairII 1st(Diff) / LasairII 2nd(Diff) = 0.91-1.10	4087 / 3946 = 1.04
Viewing Volume:	LasairII 1st(Accum) = Ref 1st(Accum) 85%-105%	7692 / 8025 = 95.85%
3rd Split:	LasairII 1st+2nd(Dif) / LasairII 3rd(Dif) = 0.91-1.10	5802 / 5975 = 0.97
4th Split:	LasairII 2nd+3rd(Dif) / LasairII 4th(Dif) = 0.91-1.10	3501 / 3397 = 1.03
5th Split:	LasairII 4th(Dif) / LasairII 5th(Dif) = 0.91-1.10	1657 / 1656 = 1.00
6th Split:	LasairII 5th(Dif) / LasairII 6th(Dif) = 0.91-1.10	2873 / 2793 = 1.03
Zero Count:	ISO 14644 Class 3	1 Counts in 35 Minutes

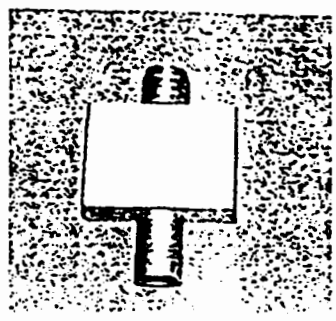
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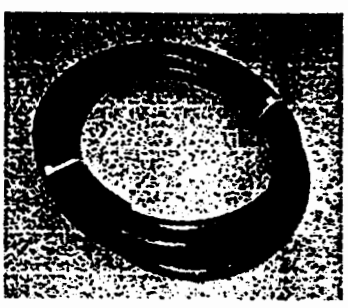
1 EA. MI PRINTER PAPER
1 PKG = 3 ROLLS



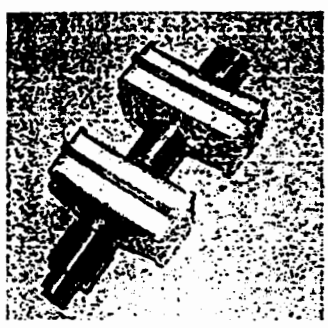
1 EA. 1000000970 MP - SAMPLE PROBE



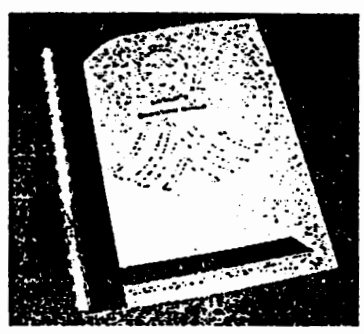
1 EA. 1000000971 MP - SAMPLE PROBE ADAPTER



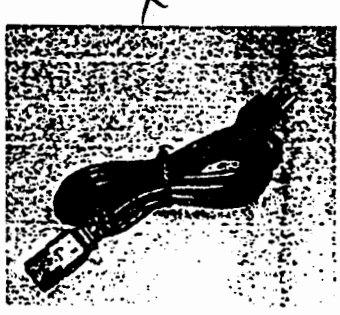
1 EA. 10 FT. MI 353 3/8 BEVLINE TUBING



1 EA. ZERO COUNT FILTER



1 EA. 1000000982 M - MANUAL



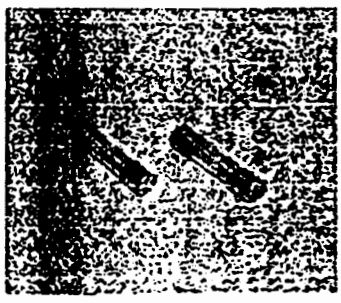
1 EA. CD-02 POWER CORD
(100 - 115V0



1 EA. CD-16 POWER CORD
(220 - 240V)



2 EA. 1000001107 FS - 1.25 AMP FUSE (100 - 115V)



2 EA. FS48 - .5 AMP FUSE
(220 - 240V)

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