



**LASAIR® II**  
**310A/310B, 510A, 350L/550L**  
**Particle Counter**  
**Operations Manual**

**Without measurement, there is no control.**



# **Lasair®II**

## **310A/310B, 510A, 350L/550L**

### **Particle Counter**

### **Operations Manual**



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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.

## **Environmental Information**

This equipment must be properly disposed of at end-of-life by means of an authorized waste management system. Information regarding dismantling of the equipment and location of any hazardous materials can be located on our web site at:  
<http://www.pmeasuring.com/support/papers/disassemblyinstructions>.

## Battery Disposal

At end-of-life, batteries should be recycled or discarded safely. Discarding batteries in unsorted waste is improper disposal, and may be harmful to the environment and human health. Your local waste authority will have information on return and collection systems in your area.

For California consumers, contact Particle Measuring Systems, Customer Service Department at (877)-475-3317 for instructions on returning used, rechargeable batteries for reuse, recycling, or proper disposal at no cost.

## Patent Information

The Lasair II particle counter is protected by the following patents held by Particle Measuring Systems: US 6167107; Japan 3559782; Germany 60005581.3; UK GB1196832.

## Manual Conventions

### WARNING

A warning in the text is used to notify the user of the potential for bodily injury or death.

### CAUTION

A caution in the text is used to highlight an item that if not done, or incorrectly done, could damage the instrument and/or any materials or devices affected by the instrument.

### — — NOTICE — —

A notice in the text is an instructional communication regarding requirements or policies issued by Particle Measuring Systems.

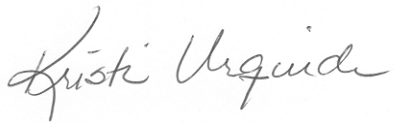
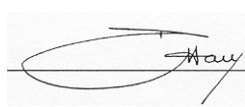
---

**NOTE:** A note in the text is used to highlight an item that is of operational importance to the user.

---

It is important that you observe cautions and warnings while performing the procedures described in this manual. Caution and warning labels are located on and inside the instrument to alert you to potentially hazardous conditions. Please familiarize yourself with this information.

## CE - Declaration of Conformity

|                                                                                                                                  |                                               |                                                                                       |                      |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------|----------------------|
| <b>Application of Council Directive(s):</b>                                                                                      | 89 / 336 /EEC, 73 / 23 /EEC                   |                                                                                       |                      |
| <b>Standard(s) to which Conformity is Declared:</b>                                                                              | EMC                                           | EN 61326: 1997/A1: 1998/A2: 2001                                                      |                      |
|                                                                                                                                  | Safety                                        | EN 61010-1: 2001                                                                      |                      |
| <b>Manufacturer's Name:</b>                                                                                                      | Particle Measuring Systems, Inc.              |                                                                                       |                      |
| <b>Manufacturer's Address:</b>                                                                                                   | 5475 Airport Boulevard, Boulder, CO 80301 USA |                                                                                       |                      |
| <b>Manufacturer's Telephone/FAX:</b>                                                                                             | (303) 443-7100 / (303) 449-6870               |                                                                                       |                      |
| <b>Distributor's Name:</b>                                                                                                       | Particle Measuring Technique, Great Britain   |                                                                                       |                      |
| <b>Distributor's Address</b>                                                                                                     | Unit B1 South, Willow End Park                |                                                                                       |                      |
|                                                                                                                                  | Danemoor, Malvern WR14 1XZ                    |                                                                                       |                      |
|                                                                                                                                  | Worcestershire, WR13 6NN United Kingdom       |                                                                                       |                      |
| <b>Distributor's Telephone/FAX:</b>                                                                                              | 011-44-1684-312950 / 011-44-1684-312969       |                                                                                       |                      |
| <b>Type of Equipment:</b>                                                                                                        | Particle Counter                              |                                                                                       |                      |
| <b>Model No:</b>                                                                                                                 | Lasair II                                     |                                                                                       |                      |
| <p>I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).</p> |                                               |                                                                                       |                      |
| <b>Signature:</b>                                                                                                                |                                               | <b>Signature:</b>                                                                     |                      |
|                                               |                                               |  |                      |
| <b>Full Name:</b>                                                                                                                | Kristi Urquidi                                | <b>Full Name:</b>                                                                     | David Hall           |
| <b>Position:</b>                                                                                                                 | Vice President Operations                     | <b>Position:</b>                                                                      | Managing Director    |
| <b>Place: Boulder</b>                                                                                                            | Date: April 26, 2005                          | <b>Place: Malvern</b>                                                                 | Date: April 26, 2005 |

### CAUTION

All I/O cables and accessories must meet current factory specifications in order for this unit to remain in compliance with CE marking requirements. Consult the factory for details.

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# Chapter 1

## Getting Started

---

### Product Overview

The Lasair II particle counter is an airborne-particle counter designed for either mobile or dedicated use. The sizing channel threshold and the sample flow rate vary with the particular model. See the chart below for each model's channel thresholds and flow rates.

| Model No. | Channel Thresholds                           | Flow Rate          | Available |
|-----------|----------------------------------------------|--------------------|-----------|
| 350L      | 0.3, 0.5, 1.0, 5.0, 10.0, 25.0 $\mu\text{m}$ | 1.77 cfm (50 LPM)  | Yes       |
| 550L      | 0.5, 1.0, 2.0, 5.0, 10.0, 25.0 $\mu\text{m}$ | 1.77 cfm (50 LPM)  | Yes       |
| 310A      | 0.3, 0.5, 1.0, 5.0, 10.0, 25.0 $\mu\text{m}$ | 1.0 cfm (28.3 LPM) | Yes       |
| 310B      | 0.3, 0.5, 1.0, 3.0, 5.0, 10.0 $\mu\text{m}$  | 1.0 cfm (28.3 LPM) | Yes       |
| 510A      | 0.5, 1.0, 2.0, 5.0, 10.0, 25.0 $\mu\text{m}$ | 1.0 cfm (28.3 LPM) | Yes       |
| 310       | 0.3, 0.5, 0.7, 1.0, 5.0, 10.0 $\mu\text{m}$  | 1.0 cfm (28.3 LPM) | No        |
| 325       | 0.3, 0.5, 1.0, 5.0, 10.0, 25.0 $\mu\text{m}$ | 1.0 cfm (28.3 LPM) | No        |
| 510       | 0.5, 0.7, 1.0, 2.0, 5.0, 10.0 $\mu\text{m}$  | 1.0 cfm (28.3 LPM) | No        |
| 525       | 0.5, 0.7, 1.0, 5.0, 10.0, 25.0 $\mu\text{m}$ | 1.0 cfm (28.3 LPM) | No        |

### Counting Technique

When the Lasair II particle counter begins sampling, the internal pump creates a vacuum to pull air into the sample inlet. The sample flow is controlled to maintain 1 CFM (50 LPM for the 350L and 550L) of airflow through the sampler. A variance of only  $\pm 5\%$  in airflow is allowed in a valid sample.

Air moves from the sample 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 leaves the sampling chamber, through the pump, and into tubing leading to a HEPA filter that removes 99.97% of particles 0.3  $\mu\text{m}$  or larger. From the filter, the sampled air exits through the sample outlet.

## Description

The Lasair II particle counter is a portable, lightweight, and durable airborne-particle counter. Its compact size and comfortable carrying handle enhances its portability. The Lasair II particle counter can be used for the following applications:

- Cleanroom monitoring
- Facility certification
- Troubleshooting
- Trending analysis
- 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 the model, the Lasair II particle counter measures particle sizes in the range of 0.3 to 25.0  $\mu\text{m}$ . It uses six channels with preset thresholds so that you can size the particle count. The particle counter 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 particle counter allows you to:

- Set up the 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 particle counter can be controlled and operated in the following ways:

- As a stand-alone unit
- Connected to Particle Measuring Systems facility monitoring software, Facility Net or Pharmaceutical Net
- From the web browser on your computer, when connected to the particle counter 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 particle counter 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 the communications protocols are set up from the Lasair II particle counter unit, you can modify and view the sampling process from a remote computer by means of Particle Measuring Systems' Facility Net<sup>1</sup> software.

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

## External Features

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

- Top
- Front panel
- Back panel
- Side panel

**Top Features** — The Sampling inlet and the T/RH sensor port are found on the top of the Lasair II particle counter:

- **Sampling inlet:** Air for particle count sampling is brought into the top of the particle counter 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.

---

1. This manual references Facility Net when discussing the user-interface software used to control the Lasair II particle counter. However, you can use either Facility Net or Pharmaceutical Net wherever you see Facility Net referenced.

- 1 **T/RH sensor port:** Directly behind the sampling inlet is a 5-pin LEMO® port that receives the Temperature/Relative Humidity sensor.

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

**Front Panel Features** — The controls and display on the front panel allow you to control the Lasair II particle counter, and view all its activities and consists of the following features:

- **Color LCD Display Screen:** The Lasair II particle counter has a color liquid crystal display (LCD) 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 particle counter. Control keys allow you to perform the following functions:
  - turn the particle counter 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 five 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 on a particular screen.

Pressing the softkey to the right of the icon causes the action that is represented by the icon to be performed.



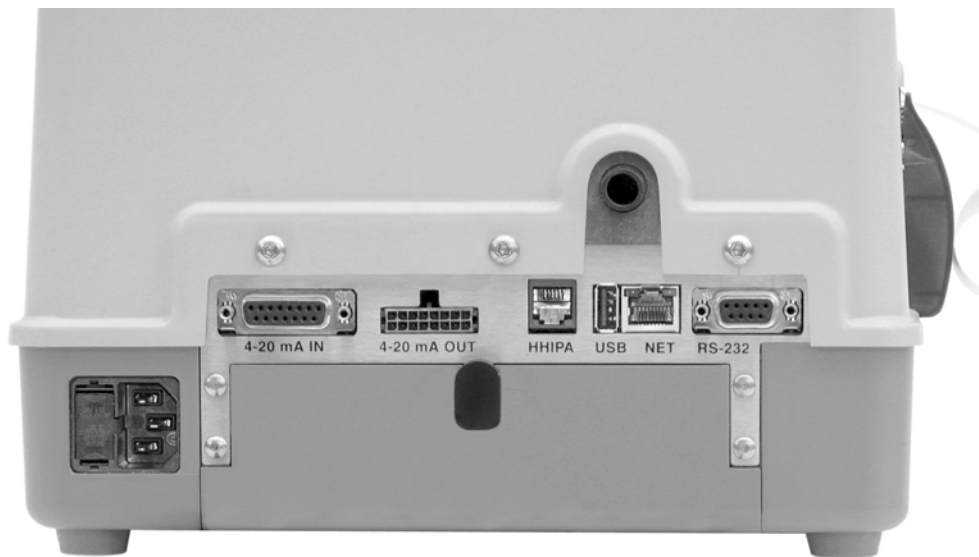
**Figure 1-1: Front View of Lasair II Particle Counter at 196 DPI**

**Back Panel Features** — The back panel is comprised of the power connection, the sampling outlet, and communications ports.

- **Power:** either an optional battery or by 100–240 volt AC power. The provided power cord will vary with location (US vs. non-US standards).
- **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 Particle Measuring Systems include: air velocity, differential pressure, and T/RH sensors.
- **4–20 mA Output Port:** Provides particle and status output as a 4–20 mA signal with an optional daughter board.
- **HHIPA Port:** HHIPA is hand-held isokinetic probe with an audible alarm. HHIPA can be enabled to produce an audible “beep” when a particle is counted. The Lasair II particle counter provides power to the HHIPA.
- **USB Port:** The USB port supports either of the following functions:

- Attaching a USB keyboard for faster entry and editing of screens **OR**
- Downloading a CSV file to a USB memory key/stick
- **Ethernet Port:** A 10Base-T Ethernet port, marked 'NET,' is used to connect:
  - Directly to a computer
  - Into a network hub that communicates with a remote facility monitoring system
- **RS-232 Port:** The RS-232 port is used for calibration, sensor control, or TouchRAM communications.

Each kind of connection requires its own cabling configuration.



**Figure 1-2: Rear View at 199 DPI**

- **Sample Outlet:** Sampled air is discharged from the sample outlet after passing through a HEPA filter.

---

**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 the following:

- **Tubing:** 3/4-inch I.D., polyethylene tubing is used between the sampling inlet and the pump, and the pump and the outlet.
- **Pump:** A regenerative blower pump is located at the base of the unit. The 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  $\mu\text{m}$  or greater. It is located just before the sample outlet to filter out particles before the air leaves the particle counter.

## Specifications

|                                                          |                                                                                                                                                       |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Size Range</b>                                        | 0.3–25.0 $\mu\text{m}$                                                                                                                                |
| <b>Number of channels</b>                                | 6                                                                                                                                                     |
| <b>Altitude correction</b>                               | Altitude correction is automatically performed with internal pressure transducers.                                                                    |
| <b>Altitude range</b>                                    | 0–3,000 m                                                                                                                                             |
| <b>Maximum concentration 350L</b>                        | >350,000/ft. <sup>3</sup> at 5% coincidence loss                                                                                                      |
| <b>Maximum concentration 550L</b>                        | >250,000/ft. <sup>3</sup> at 5% coincidence loss                                                                                                      |
| <b>Maximum concentration, models 510A, 310, 510, 525</b> | >900,000/ft. <sup>3</sup> at 10% coincidence loss                                                                                                     |
| <b>Maximum concentration, models 310A and 325</b>        | >375,000/ft. <sup>3</sup> at 5% coincidence loss                                                                                                      |
| <b>Counting efficiency, Models 310A, 310B, and 510A</b>  | >50% $\pm$ 10 % (exceeds JIS standard)                                                                                                                |
| <b>Zero count level</b>                                  | <1 count/5 minutes at minimum size (meets JIS standard)                                                                                               |
| <b>Laser source</b>                                      | Diode laser                                                                                                                                           |
| <b>Calibration</b>                                       | Materials traceable to US National Institute for Standards and Technology (NIST)                                                                      |
| <b>Environmental sensors</b>                             | Temperature/Relative Humidity sensor, plus interfaces with 4 external environmental sensors via 4–20 mA input                                         |
| <b>Data storage</b>                                      | 3,000 sample records                                                                                                                                  |
| <b>Statistical standards supported</b>                   | <ul style="list-style-type: none"><li>• EU GMP Annex #1</li><li>• ISO 14644-1</li><li>• FS-209E</li><li>• BS5295</li><li>• Simple averaging</li></ul> |
| <b>Communication Modes</b>                               | <ul style="list-style-type: none"><li>• Ethernet</li><li>• RS-232</li><li>• USB download</li><li>• Optional 4–20 mA output (board required)</li></ul> |

|                                              |                                                                                                                                                                                                                                                         |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Supporting Software</b>                   | <i>Facility Net, Pharmaceutical Net, Internet Explorer<sup>®</sup></i>                                                                                                                                                                                  |
| <b>External Surface</b>                      | ESD-compatible KYDEX <sup>®</sup>                                                                                                                                                                                                                       |
| <b>Tested Cleaning Materials</b>             | Bleach, formaldehyde, ethyl or isopropyl alcohol, peroxide/ quaternary ammonium solutions, DECON-Clean <sup>®</sup> , DECON-QUAT 100 <sup>®</sup> , HYPO-CHLOR <sup>®</sup> , STERI-PEROX <sup>®</sup> , and PHENE-AHOL <sup>®</sup> spray disinfectant |
| <b>Sample Output</b>                         | Internally filtered, HEPA standard (> 99.97% at 0.3 µm)                                                                                                                                                                                                 |
| <b>Display</b>                               | 1/4 VGA color LCD screen                                                                                                                                                                                                                                |
| <b>Languages</b>                             | English, Chinese (Traditional and Simplified), French, German, Italian, Japanese (Kanji), Korean, Spanish                                                                                                                                               |
| <b>Printer</b>                               | Built-in thermal printer                                                                                                                                                                                                                                |
| <b>Reports</b>                               | Sample printouts; final reports for EU GMP, ISO 14644-1, FS-209E, and BS-5295                                                                                                                                                                           |
| <b>Power</b>                                 | 100–240 V ±10%, 50–60 Hz, 1.25 A maximum                                                                                                                                                                                                                |
| <b>Battery (optional)</b>                    | Removable NiMH battery, 16.8 V nominal voltage                                                                                                                                                                                                          |
| <b>Dimensions (H,W,D)</b>                    | 11.5 × 10.7 × 9.0 inches (29 × 27 × 23 cm)                                                                                                                                                                                                              |
| <b>Weight</b>                                | 12.0 lbs. (5.4 kg.) without battery; 15.5 lbs. (7 kg.) with optional battery                                                                                                                                                                            |
| <b>Operating Environment</b>                 | Temperature 15–35°C; humidity: 10–90%, non-condensing                                                                                                                                                                                                   |
| <b>Storage or transportation environment</b> | Temperature: – 40 to 70°C<br>Humidity: 5–90% non-condensing                                                                                                                                                                                             |
| <b>Indoor/outdoor</b>                        | Indoor use only-not protected against harmful ingress of moisture                                                                                                                                                                                       |
| <b>Class</b>                                 | Class I Equipment (requires a grounded type electrical supply)                                                                                                                                                                                          |
| <b>Installation over-voltage</b>             | Category II for transient over-voltage                                                                                                                                                                                                                  |
| <b>Product laser classification</b>          | Class I, when used as designed                                                                                                                                                                                                                          |

## Battery Usage Specifications

| Battery Usage Specifications                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Battery run time</b>                            | <p>Varies with conditions:</p> <ul style="list-style-type: none"><li>• 4 hours with 10' tubing on the inlet jet, one minute samples, and a printout every sample.</li><li>• 7 hours with no tubing and no printout at the end of the sample</li><li>• Lasair II particle counter 350L and 550L:<ul style="list-style-type: none"><li>• 3 hours with 10 feet of tubing on the inlet jet, one minute samples, and a printout every sample</li><li>• 3.5 hours with no tubing, and no printout after every sample</li></ul></li></ul> |
| <b>Battery charging temperature</b>                | <ul style="list-style-type: none"><li>• Minimum: 15°C</li><li>• Maximum: 35°C</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Battery charge time (at 24°C ambient)</b>       | <ul style="list-style-type: none"><li>• 80% full in 4 hours</li><li>• 100% full in 5 to 10 hours</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Battery charge time (at 35°C ambient)</b>       | <ul style="list-style-type: none"><li>• 60% full in 3 hours</li><li>• 100% full in 8 to 16 hours</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Battery charge time, BC II external charger</b> | 2–3 hours to charge a 95%-depleted battery                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Battery charge indicator accuracy</b>           | Within 10%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Chapter 2

# Unpacking and Installation

---

When the Lasair II particle counter arrives, complete the following:

- Unpack the shipping container
- Determine the sampling location for your unit
- Connect the Temperature/Relative Humidity (T/RH) sensor

## Unpacking

If the shipping container was delivered in a damaged condition, the shipper should have already been notified. If the shipper has not been notified of damage, STOP UNPACKING and immediately notify the shipper.

If the shipping container appears to be in good condition, continue to carefully unpack the container, while inspecting the contents for damage.

**Table 2-1: Standard Packing List**

| Lasair II particle counter                                                                                                                                                                                                                                   | Lasair II 350L and 550L                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Printer paper</li><li>• Operator's manual</li><li>• Sample probe</li><li>• Sample tubing</li><li>• Sample tubing adapter</li><li>• Zero-count filter<sup>a</sup></li><li>• Power cord</li><li>• Spare fuse</li></ul> | <ul style="list-style-type: none"><li>• Printer paper</li><li>• Operator's manual</li><li>• Sample probe and adapter</li><li>• Sample tubing</li><li>• Sample tubing adapters (2)</li><li>• Zero-count filter<sup>a</sup></li><li>• Power cord</li><li>• Spare fuse</li></ul> |

a. The same zero-count filter is used for both versions.

Ensure that the items listed above are included in your shipment. If anything is missing, contact Particle Measuring System's Customer Response Center at 1-877-475-3317.

If 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.

## Installing the Particle Counter

The following sections are provided to assist in the installation of the Lasair II particle counter.

### Connecting the Power Source

The power input is a standard EIA fused power input of 100–240 VAC, 50–60 Hz. A power cord is supplied with the Lasair II particle counter. The power cord for European shipments may require the attachment of the appropriate wall plug, according to the electrical requirements. **Ensure the main supply is properly grounded!**

#### To connect power for the particle counter:

- 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 the power source.

| CAUTION                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Particle Measuring Systems recommends the use of a good quality surge protector to isolate the particle counter from voltage spikes. Surge protectors are inexpensive and easily obtainable from many office supply or computer equipment sources. |

---

**NOTE:** The main power disconnect is the power cord. Ensure that it is easily accessible!

---

### Installing the Battery Pack

the Lasair II particle counter can be powered solely by an optional rechargeable battery pack. The battery pack can be charged while it is installed in the particle counter or outside the particle counter with its optional BC II battery charger.

**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 particle counter.
- 4 Turn the battery retainer to a horizontal position.
- 5 With the battery contacts entering first and the battery label facing up, slide the battery pack into the particle counter'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 particle counter or by trying to pull the battery out without turning the battery retainer to a horizontal position.
- 8 Close the battery chamber door.

---

**NOTE:** To completely remove Lasair II particle counter's power, the battery pack must be removed.

---

**Connecting the Sample Probe, 310 and 510 Versions**

The Lasair II particle counter 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 that is connected to the sample inlet

The sample tubing included in your shipment 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:** If the sample tubing is longer than 10 feet (3.05 meters), Particle Measuring Systems cannot guarantee valid particle measurement.

Also, if you intend to sample for particles greater than 5  $\mu\text{m}$ , you should not use any tubing at all.

---

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 the particle counter:

- 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 Particle Measuring Systems.

**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.

**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 sample inlet and gently move it side-to-side while pressing down until it reaches the base of the inlet.
- 3 Connect the adapter (optional) onto the free end of the tubing.
- 4 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 Sample Probe, 350L and 550L Versions**

The Lasair II particle counter 350L and 550L come with a special sample probe, which can be connected in one of the following two ways:

- directly to the sample inlet by means of the provided adapter
- to the end of sample tubing that is connected to the sample inlet

The sample tubing included in your shipment is lined internally with a material that reduces electrostatic attraction and subsequent particle sticking. Cut it to the length that meets your needs. It connects to the sample inlet by means of a barb adapter.

---

**NOTE:** If the sample tubing is longer than 10 feet (3.05 meters), Particle Measuring Systems cannot guarantee valid particle measurement.

Also, if you intend to sample for particles greater than 5  $\mu\text{m}$ , you should not use any tubing at all.

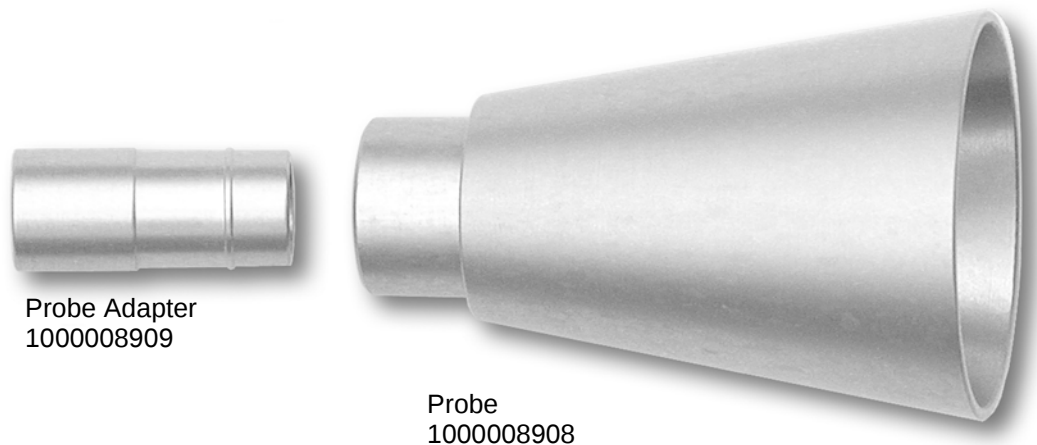
---

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

- 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. 1000008907) from Particle Measuring Systems.

**To connect the sample probe directly to the sample inlet:**

- 1 Remove the protective cap from the sample inlet.
- 2 Place the probe adaptor over the sample inlet. The adaptor's internal O-ring will hold it to the sample inlet.
- 3 Place the sample probe over the adaptor tube. The sample probe's internal O-ring will hold it to the adaptor tube.
- 4 Gently, but firmly, press downward on the sample probe until it will not move down any further.



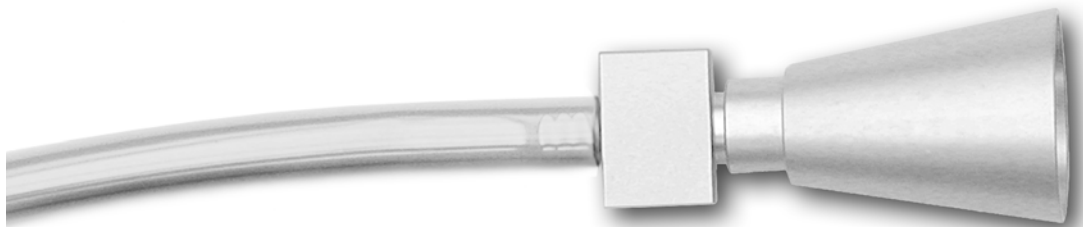
**Figure 2-3: 350L and 550L Probe Adaptor and Sample Probe**

**To connect the sample probe to tubing:**

- 1** Insert the ribbed end of the cylindrical sample inlet adaptor fully into one end of the tube.
- 2** Insert the ribbed end of the sample probe adaptor fully into the other end of the tube. See Figure 2-5, “350L and 550L Assembled Sample Probe end of the Tubing,” on page 2-7.
- 3** Fit the sample probe over the open end of the sample probe adaptor. The sample probe’s internal O-ring will hold it securely to the adaptor.
- 4** Remove the protective cap from the sample inlet.
- 5** Fit the open end of the 1/2-inch adapter over the instrument’s sample inlet. Gently but firmly, press downward on the adapter until it will not go down any further. The adapter’s internal O-ring will hold it in place.



**Figure 2-4: 350L and 550L Tubing, Tripod Adaptor, and Sample Probe**



**Figure 2-5: 350L and 550L Assembled Sample Probe end of the Tubing**



**Figure 2-6: 350L and 550L Tubing and Fittings Assembled**

**To secure the sample probe to a tripod:**

- 1** Fit the screw on the tripod plate into the threaded hole on the tripod adapter.
- 2** Make the screw secure but hand tight only.
- 3** Position the tripod where you wish to sample.

---

## Connecting and Disconnecting the T/RH Sensor

The Temperature/Relative Humidity (T/RH) sensor is an optional accessory that mounts on the top of the unit, behind the sample inlet. When connecting this sensor, look for the red dot at the bottom of the sensor and a corresponding red dot on the particle counter's sensor connection.

| 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 an attempt to remove it. |

### To connect the T/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 straight down into the connector. You should hear a slight click as it locks into place.

### To disconnect the T/RH sensor,

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

## Connecting to a Computer or FMS

For information about connecting the Lasair II particle counter to a computer or a Facility Management System (FMS), please see Chapter 7.

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## Chapter 3

# Controls and Displays

---

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

This chapter discusses the following topics:

- Layout of control panel keys, softkeys and screens
- Menu options
- Display screens

### Front Panel Layout

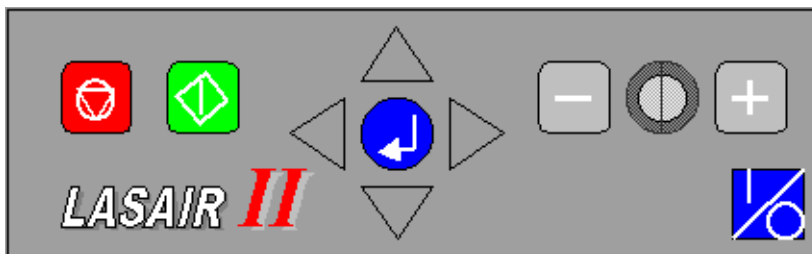
By using the control panel keys and softkeys, you can perform all of the tasks necessary to set up and operate the Lasair II particle counter.

In this section, we will discuss:

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

### Control Panel Keys

The control panel keys are located below the screen display. The panel houses a number of keys for the setup and operation of the particle counter.



**To turn the particle counter on and off:**

Press the On/Off key. 

**WARNING**

This is not a power disconnect. To remove power, unplug the power cord and remove the battery.

**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 activate the edit mode on a setup screen:** Press the Enter key. 

**To move the cursor while in edit mode:**

press the Left  or Right  arrow key.

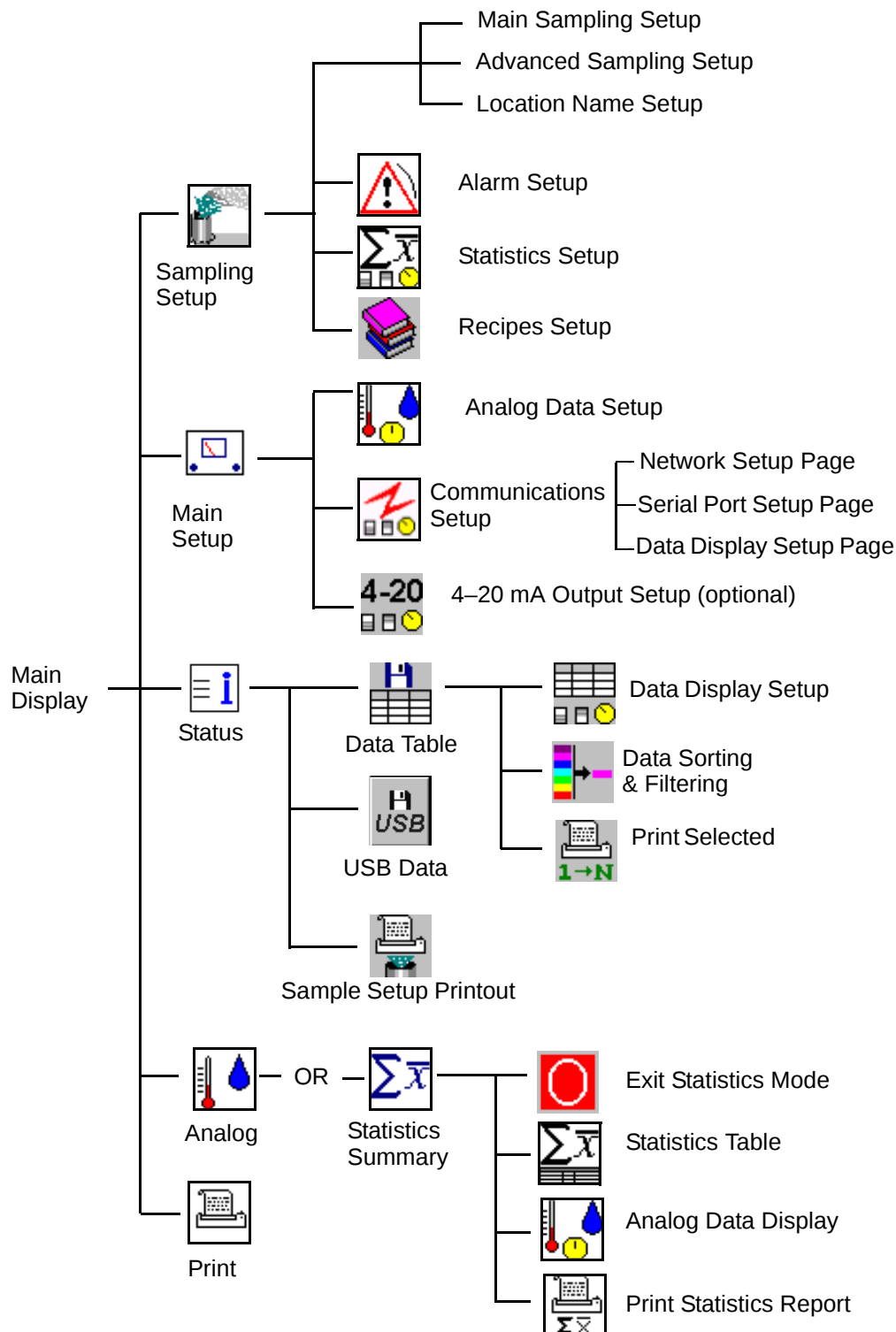
**To increase or decrease a value while in edit mode:**

Press the Up  or Down  arrow key.

**To enter a setup selection into the system:** Press the Enter  key.

## Hierarchy of Screens

The Lasair II particle counter uses a hierarchy of screens and displays. By becoming familiar with the following hierarchy, you can navigate to the menus and displays with greater ease.



When the Lasair II particle counter is turned on, the Main Display Screen appears. See “Main Display Screen” on page 3-5. From the Main Display Screen, you can view sampling data and access all the other screens.

On the right side 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 the softkey to its right. When you press the softkey to the right 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 its 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 edit icons for that screen 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.

## Display Screens

The Lasair II particle counter has the following display screens:

- The **Main Display Screen** shows sampling data, as well as some key status and alarm information.
- The **Data Table Screen** displays all stored data. In this screen, data can be filtered to display only what you are interested in. The data can also be browsed in blocks and printed.
- 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.

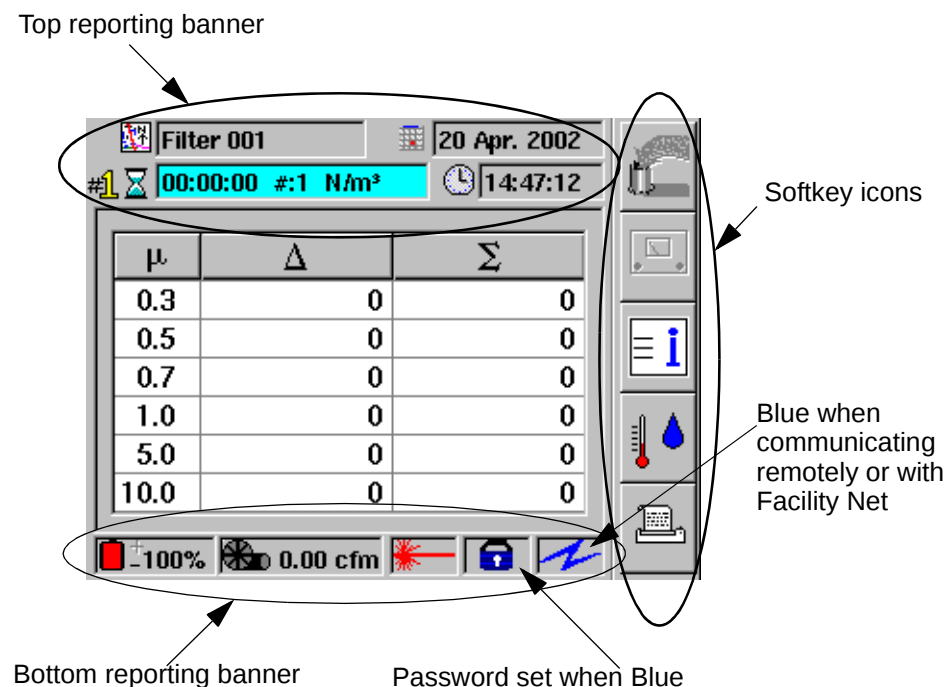
---

**NOTE:** If the particle counter can 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 particle counter.

---

## Main Display Screen

The *Main Display Screen* appears when the Lasair II particle counter is turned on. If you are viewing any other screen and press the Up Arrow softkey, you will eventually arrive at the Main display.



**Figure 3-1: Main Display Screen**

**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 navigation or editing icons on the far right of the screen.

---

**NOTE:** 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 particle counter 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 key 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 the 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 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 real time.

| CAUTION                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If the particle counter stops because of low battery power, charge the battery immediately. A Nickel-metal-hydride battery that remains uncharged for several weeks will lose additional charge due to its chemistry. Allowing the battery to fully discharge may damage it and cause it to be unchargeable. |

- 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  $\pm 5\%$  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 the Lasair II particle counter is connected to Facility Net and the addresses have been properly set, the *lightning bolt* will be blue.
- **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
    - Date of last calibration

### To display the Status Screen:

Press the third softkey icon  on the Main Display Screen.

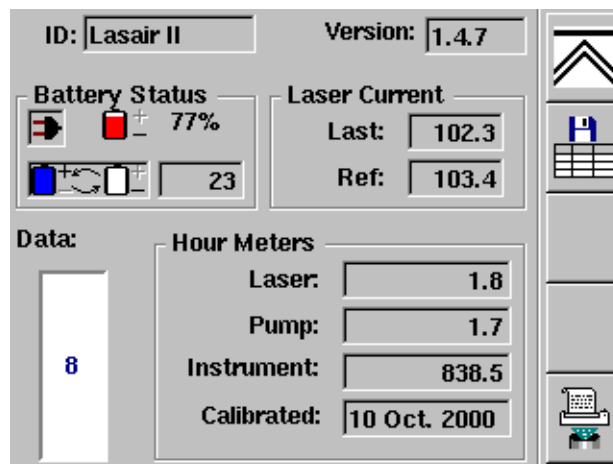


Figure 3-2: Status Screen

**ID** Entered in the Main Setup Screen, 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.

**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 is red and a minus (-) sign appears near the battery icon. When charging, the battery icon is blue and a plus (+) sign appears near the battery icon.

The % value (77%) indicates the remaining battery charge.

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

If communications with the battery charger has failed, the percentage will show "???".

---

**NOTE:** When a depleted battery, which has been left unused for an extended period, is installed into the Lasair II particle counter, the battery status may display "???" for about 5 minutes.

---

The recycle field shows how many charge/discharge cycles the battery pack has been through. The example in figure 3-3 indicates 23 cycles.

**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.

---

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 particle counter 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 data item entered overwrites the oldest set of data.

Data files can be downloaded and/or erased from the particle counter with the Web Server function. For more information see Chapter 6.

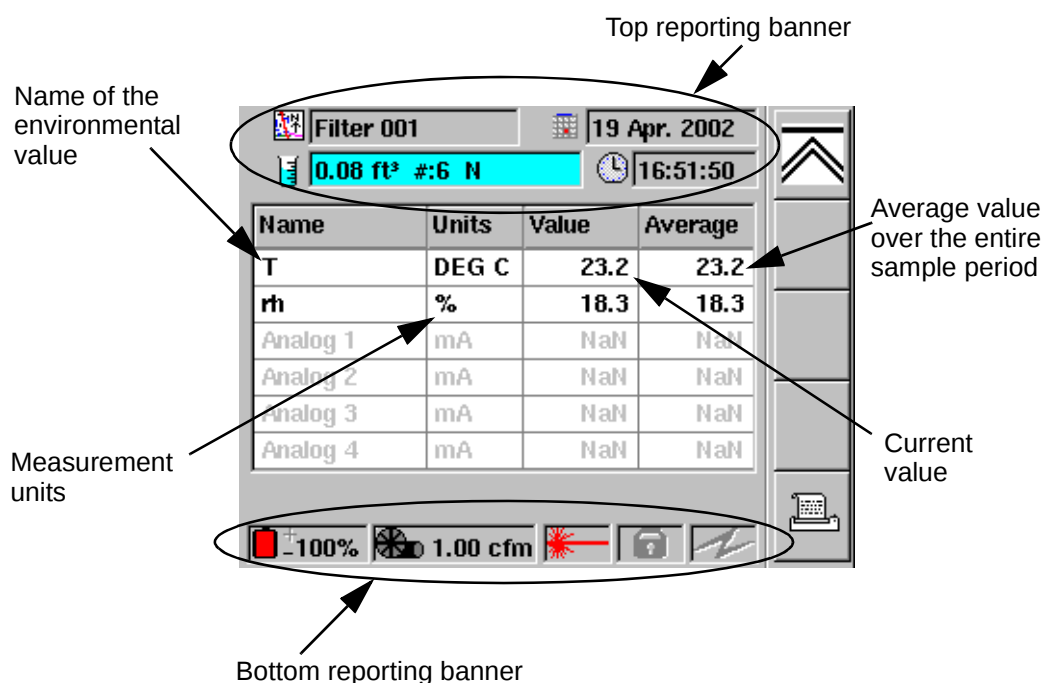
**Hour Meters** The number of hours the laser, the pump, and the instrument have been used.

**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, the Temperature/Relative Humidity Sensor would show temperature and relative humidity values.

To view the Analog Data Display Screen, press the softkey to the right of the Analog Data display icon (fourth icon). A sample Analog Data display screen is shown below. 



**Figure 3-3: Analog Data Display Screen**

**Analog Data Display Layout** — The Analog Data Display Screen is divided into the following areas:

- **Data Area:** When sampling is first started, no data is shown. As data is generated, it is 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:** See Figure 3-3 above. The information displayed in the banners are identical to those in the Main Display Screen. See Figure 3-1, “Main Display Screen,” on page 3-5.

## 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-Advanced | 1st softkey                                       |
| Sampling Units          | Sampling Setup-Advanced | 1st softkey                                       |
| Raw vs. Normalized Data | Sampling Setup-Advanced | 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                                       |
| Language                | Main Setup              | 2nd softkey                                       |
| Analog Name & Units     | Analog Data Setup       | 2nd softkey, then press 2nd softkey (Analog Data) |
| Communications          | Comm Setup              | 2nd softkey; then press 3rd softkey (Comm)        |
| 4-20 mA Output          |                         | 2nd softkey; then press 4th softkey               |
| Battery                 | Status                  | 3rd softkey                                       |
| Pump                    | Status                  | 3rd softkey                                       |
| Laser                   | Status                  | 3rd softkey                                       |
| Data Storage            | Status                  | 3rd softkey                                       |
| Software Version        | Status                  | 3rd softkey                                       |
| USB Download            | Status                  | 3rd softkey                                       |
| Data Review             | Status                  | 3rd softkey                                       |

## Chapter 4

# Taking a Quick Sample—Software Version 2.0

---

The following information is a simplified and brief instruction for setting up sample parameters and taking a sample.

- 1 Press the ON key  to start the Lasair II particle counter.
- 2 Press the top softkey  on the right side of the instrument to move to the Sampling Setup Screen.
- 3 Press the Enter key  below the screen to enable the Edit Mode.  
*You can now change or keep the current sampling setup values.*
- 4 Press the Tab Right softkey  once to move to the Sample Size box.  
Take a 1:00 minute (or a 1.0 cubic foot) sample as follows
- 5 Press the Right key  to move the cursor to the position of the sample duration setting field to be changed.
- 6 Use the Up  and Down  keys to set the example to 00:01:00.
- 7 Press the Green ON key  to start the sample.

*The pump will automatically turn ON, and the screen will switch to the Main display Screen. The Lasair II particle counter will automatically take the sample and print the results.*

***Congratulations! You have successfully taken a Lasair II particle counter sample!***

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## Chapter 5

### Setup

---

Setup is defining the parameters that will be used when collecting sample data.

The Lasair II particle counter uses Setup Screens for the following functions:

- **Sampling Setup Screen:** Assign parameters that directly relate to sampling.
- **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 the analog devices connected to the particle counter.
- **Communications Setup Screen:** Set the communications protocol mode and enter the addresses for connections to a computer or to facility monitoring software.
- **4–20 mA input and Output:** (Refer to Appendix I)
- **Statistics Setup:** (Refer to Chapter 8)
- **Recipes:** (Refer to Chapter 9)

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

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

---

**NOTE:** If you have configured the Lasair II particle counter to be accessed by means of Ethernet or serial communications, always leave the instrument's display on either the Main Display Screen or the Analog Display Screen. Otherwise, the remote computer will be unable to access the particle counter.

---

## Edit Mode

To make any modifications to the current settings in a setup screen, you must enable the Editing Mode by pressing the Enter button.

Editing mode icons will replace the screen navigation icons.

### Edit/Navigation Softkey Icon Functions



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 Softkey Icon Functions



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.

### Location Name Editing Softkey Icon Functions



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**

### *Setting parameter values in Lasair II particle counter Setup Screens*

- 1** Verify that the screen has a blue pencil icon in the upper left corner. If the icon is present, the screen is a setup screen and values can be changed.
- 2** Press the Enter key to enable the Edit Mode.
- 3** Press the Tab Keys to move the cursor to the parameter to be changed.
- 4** Press the Enter key to access the parameter.
- 5** Press the arrow or Enter keys to change the parameter.
- 6** Press Tab or Enter to record the desired setting.
- 7** Use the Return Arrow softkey to Exit the Edit Mode.

## Sampling Setup Screen

The sampling setup screen is comprised of three pages, each of which contain sampling setup options. The most commonly used setup functions are on the Main page. The pages and their functions follow:

### Main Page Setup Functions

- Location name
- Sample size
- Number of samples
- Continuous sampling
- Print average of samples
- Group repeat mode
- Print sample report

### Advanced Page Setup Functions

- Sample type
- Initial delay / Purge delay
- Inter-sample delay
- Sample by time-of-day
- Save setting as recipe
- Units (cf or cm)
- Data (raw or normalized)
- 0.5 and 5.0  $\mu\text{m}$  channels only (Pharmaceutical mode)
- Beep mode

### Location Page Setup Functions

- Select location name
- Edit location name
- Add new location name
- Delete location name
- Add number locations 001-100
- Erase all location names

**To open the Sampling Setup Screen:**

Press the top (or first) softkey  on the Main Display Screen.



**Figure 5-1: Sampling Setup Screen-Main Page**



**Location** Select the name of the location that will be included in display screens, sample data, and printouts.

**Sample Time/Size:** Sets Time or Volume to sample.

**#:** (number of samples) Sets the number of times a sample will be repeated in a sequence.



**Continuous sampling** For continuous sampling, select the Infinity icon.



**Print the sample average** Select this icon to calculate and print a sample average at the end of a series of samples.



**Group Repeat** Continuously collects a finite number of samples. Typically, Sample Average is activated with Group Repeat. The Group Repeat setting is saved in both TouchRam buttons and recipes. When Off, the icon is greyed out.

For example, suppose the user wants to perform the following process: “Take 3 samples, calculate the average, then print the average, and print every sample.” Further, the user wants to perform this process repeatedly until manually stopping the instrument.

To perform this sequence, the following settings must be made:

Sample size = Infinity

 = Enabled

Group repeat = Enabled

Autoprint = Enabled

If there were no set values for the initial and inter-sample delays, these pauses will be performed in every cycle.

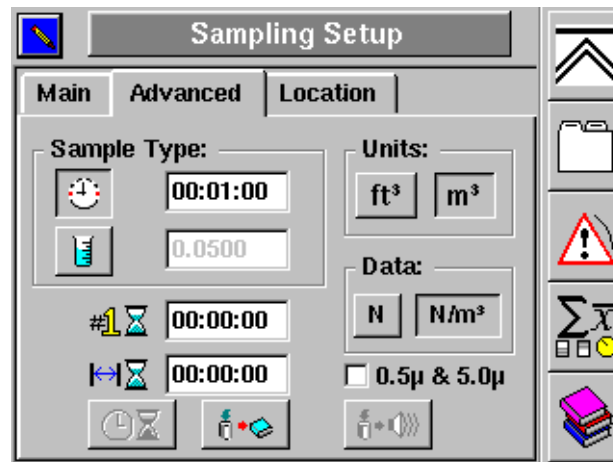


**AutoPrint** Select this icon to automatically print at the end of each sample. When On, the Printer icon is visible. When Off, the icon is greyed out.

---

**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.

---



**Figure 5-2: Sampling Setup Screen - Advanced**



Sample by Time Enable this icon to sample by *time*.

---

**NOTE:** Sampling is performed for either a designated time or a designated volume.

---



Sample by Volume Enable this icon to sample by volume. Volume is rounded to the nearest one-second time interval. Volume in cubic feet per minute are displayed to two decimal places. Volumes in cubic meters are displayed to four decimal places.



Initial Delay (or purge) Time Set the amount of time the pump will run before the particle counter begins to sample.



Inter-sample Delay Set the time between samples.

---

**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.

---

Units:

ft.3 Cubic feet Enable this icon to display sample data by cubic feet.

m3 Cubic meters Enable this icon to display sample data by cubic meters.

N Raw particle count Enable this icon to display and store raw particle count data.

N/m3 or N/ft3 Normalized particle count Enable this icon to display normalized particle count data.

0.5 $\mu$  & 5.0 $\mu$  Pharmaceutical Mode Fill this check box to enable Pharmaceutical Mode.



Start by time-of-day Select this icon to enable “start by time-of-day.” See “Start Sampling by Time-of day” below.



Save the sample parameters to a recipe Select this icon to save the current sample parameters to a recipe. See Chapter 9.



Activate the beep mode Select this icon to activate/deactivate the beep mode.

## Start Sampling by Time-of-day

The Sampling by Time-of-day function allows you to automatically start sampling at a time of your choosing.

When start by time-of-day is enabled, the Lasair II particle counter disables the user-set initial delay and sets purge time internally to allow the sampling to begin at the set time. For example: if you set the particle counter to begin sampling at 2:00 A.M., the Lasair II particle counter will start the pump at 1:50 A.M., purge for 10 minutes, and then start counting particles at 2:00 A.M.

If the sampling time is greater than 600 seconds later than the current time, the Lasair II particle counter will automatically shut down the laser and pump to reduce wear.

The auto-print function remains under user control.

### To enable the start by time-of-day time feature:

- 1 From the Sampling Setup Screen, press the Enter softkey to enable the edit mode.
- 2 Press the Tab Forward softkey until you reach the Time-of-Day Icon. The icon is a small square with a blue background, featuring a white clock face and a blue hourglass.
- 3 Press the Enter softkey. The Time-of-Day Icon will appear to be depressed below the surface of the display.
- 4 Push the green *Start* button. The *Enter Start Time* dialog box will open, prompting you to set the sampling start time.
- 5 Using the “arrow heads” around the Enter softkey and the editing softkeys, set the start time.
- 6 When the time is correct, use the Tab Forward softkey to navigate to “OK” and then press the Enter softkey.

The particle counter dynamically sets the initial delay to 60 seconds so that sampling will begin at the specified time.

### To exit from the start by time-of-day mode:

- 1 Press the “Stop” softkey.

---

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

---

## Sampling Beep Mode (Models 310-550L Only)

 The “Beep Mode” is essentially a “Geiger counter” mode which provides audible feedback while sampling. The mode is enabled by means of the Sampling Setup screen. When enabled, a pop-up selection box is shown on the main screen. See below.

The pop-up selection box allows the user to set the number of particles per beep, (1, 10, 100...100,000), or turn the mode off. Thus, if an area has so many particles that the beep becomes annoying, the user can reduce the beep frequency by selecting a larger number of counts per beep.

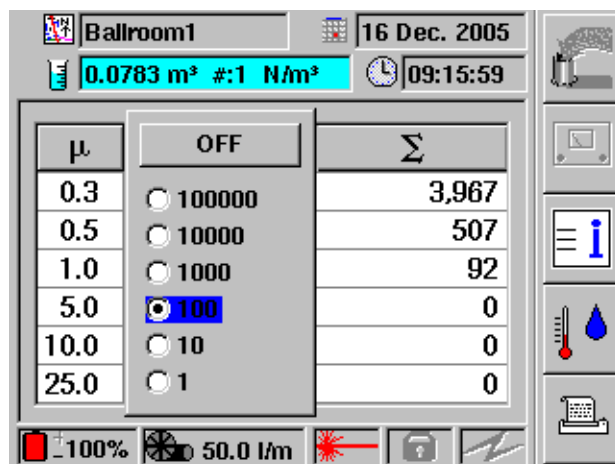


Figure 5-3: Main Setup Screen with Beep-Mode Enabled

## Printing Sampling Parameters

The current sampling setup and alarm settings can be printed from the Status Screen. From the main display screen, select the  button to open the Status Screen. Then select the  button to print the sampling parameters.

## Location Name Setup Screen

If you are moving the unit to different sampling locations, the Lasair II particle counter 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 the sampling data.

Initially, no location names will appear in the list box on the left side of the screen. Location names can be added individually, or locations numbered 1–100 can be added automatically. The web browser option can also be used to download a file of location names from a computer into the particle counter. See Chapter 7.

Location setup options are as follows:

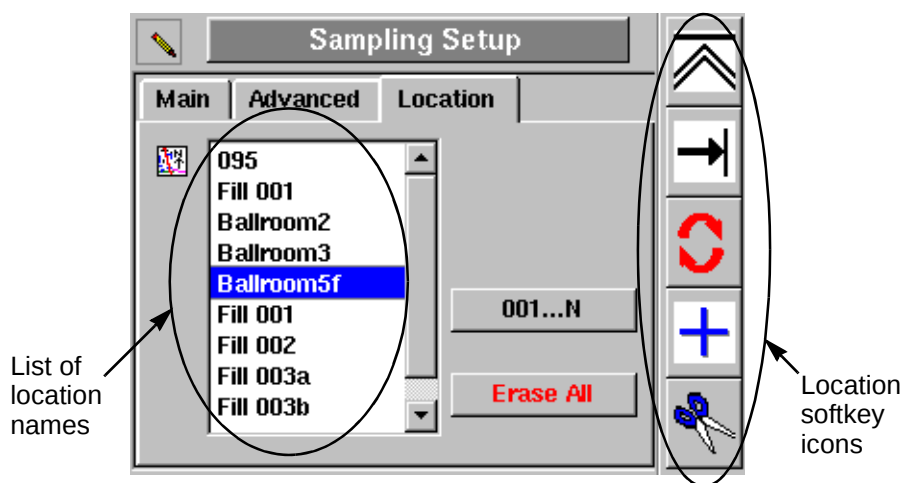
- Select location name
- Delete location name
- Edit location name
- Erase all location names
- Add location name
- Add locations numbered 1–100

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 notebook  softkey until the *Location Sampling Setup Screen* opens.



**Figure 5-4: Sampling Setup Screen - Location**

**List of location names** The location names that have been entered individually or automatically.

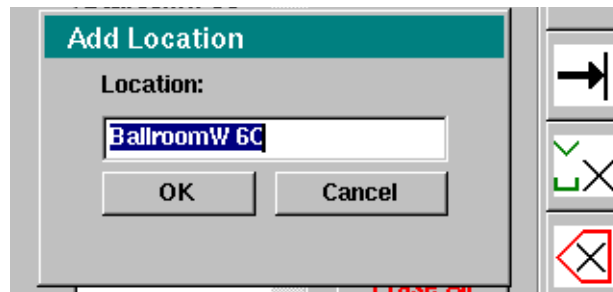
**001....N** Generates a list of locations numbered from 1 to 100. This option works only if no other names have been entered.

**Erase All** Allows you to delete all entered locations in the list at once.

**Location Softkeys** Opens setup menus to edit, add, or delete locations.

### To Add a location name:

- 1 From the Location Name Setup screen, press the Add Location softkey. **+** The *Add Location Screen* will be displayed:



**Figure 5-5: Add Location Screen**

---

**NOTE:** If an existing location name was highlighted when you pressed the Add Location softkey, that location name will appear in the Add Location name field.

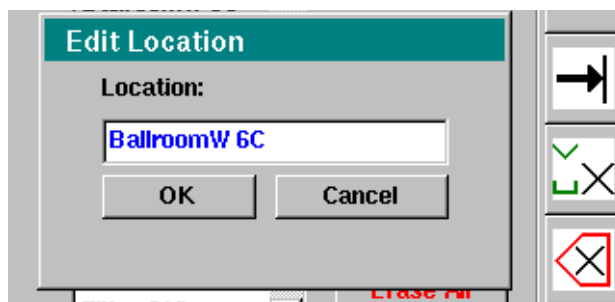
---

- 2 Using the editing softkeys and directional arrow buttons on the control panel, enter the location name.
- 3 When editing is completed, press the Enter button on the control panel to highlight the **OK** button.
- 4 Press the Enter button again to save the new location name.

### To Edit a location name:

- 1 In the Location Name Setup screen, highlight the location name to be edited.

- 2 Press the Edit Location softkey . The *Edit Location Screen* will open:



**Figure 5-6: Edit Location Screen**

---

**NOTE:** When a location name is edited, stored sample records from that location will use the new name in the data output. To indicate a change, a “?” is placed by the new location name. To ensure data validity, you 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 moves the cursor. Pressing the Up or Down Arrows change the alphanumeric value.
- 4 When editing is complete, press the Enter button on the control panel to highlight the **OK** button.
- 5 Press the Enter button again to save the edited location name.

**To delete a location name:**

- 1 In the Location Name Setup screen, use the Up and Down Arrow buttons on the control panel to highlight the location name to be deleted.
- 2 Press the Delete Location softkey . The highlighted location name will be deleted from the list.

## 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 particle counter 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 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 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.

## Accessing the Alarm Setup Screen

### To access the Alarm Setup Screen:

- 1 Press the first softkey  on the Main Display Screen. The Sampling Setup Screen will be displayed.
- 2 Press the Alarm softkey.  The Alarm Setup Screen will open:

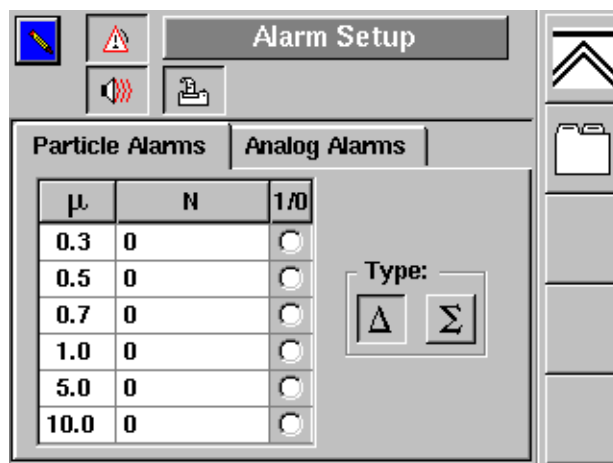


Figure 5-7: Alarm Setup Screen, Particle Alarms Page

Alarms Enable/Disable  Allows you to turn all alarms ON or OFF.

Audio Enable/Disable  Determines whether audio alarms will accompany the visual alarms.

**Print on Alarm**  This icon enables or disables the Print on Alarm feature. For details, see “Printing on Alarm” on page 5-14.

**Particle Alarms** The particle alarm setup fields. An alarm limit can be set for each particle channel. Each channel’s alarm limit can be enabled (**1**) or disabled (**0**). Enabled alarm will activate if the particle count exceeds the set limit. The alarm limit set to a differential or total count value.

**Analog Alarms** The analog alarm set up fields. 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.

## Printing on Alarm

This feature automatically prints one of the following error reports when an alarm occurs:

- Flow Error
- Particle Alarm
- Laser Error
- Analog Alarm

Print-on-Alarm can be enabled or disabled on the Lasair II particle counter’s Alarm Setup Screen or on the HTML page. See “Printout and Legend” on page 8-23.

### To enable Print-on Alarm:

- 1 From the Main Display Screen, open the Sampling Setup Screen by pressing the Main Setup icon softkey. 
- 2 From the Main Setup Screen, open the Alarms Setup Screen by pressing the Alarms softkey. 
- 3 Enable the edit mode by pressing the Enter softkey.
- 4 If necessary, press the Enter softkey to activate the alarm function.
- 5 Navigate to the “printer” icon  and press the Enter softkey. The icon will appear to be depressed below the surface of the LCD display.

- 6 Press the Return icon softkey  to exit the Alarm Setup Screen.

### To Edit the Alarm Setup:

- 1 press the Enter button.
- 2 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.
- 3 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. Pressing the Enter softkey, puts 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.

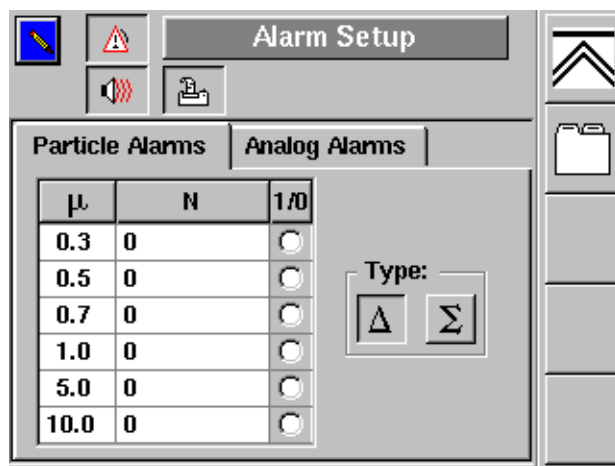


Figure 5-8: Alarm Setup Screen, Particle Alarms Page

### 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.<sup>3</sup>, or N/M<sup>3</sup>).

---

**NOTE:** N, N/M,<sup>3</sup> or N/ft.<sup>3</sup> 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.
- 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. The 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. If the Alarm is set to 10 particles and Time is set to 00:01:00, and 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  $(\text{Old Alarm}/\text{volume}) \times (1 \text{ ft.}^3/\text{minute})$ .
- If data is changed from Normalized to Raw, the opposite happens. That is,  $\text{New Alarm} = (\text{Old Alarm} \times \text{Volume}) \times (1 \text{ ft.}^3/\text{minute})$ .
- If data is in Normalized mode and units change from ft.<sup>3</sup> to m<sup>3</sup> or from m<sup>3</sup> to ft.<sup>3</sup>, the alarm is also automatically adjusted.

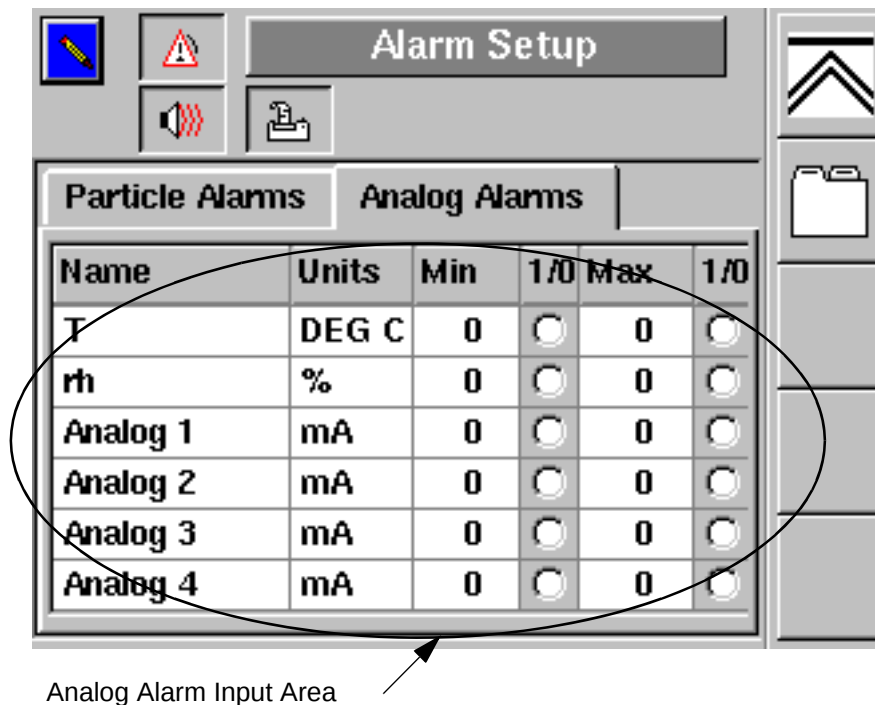
## Setting Analog Alarms

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 the 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 Open the Analog Alarm Setup Screen.



**Figure 5-9: Alarm Setup Screen, Analog Alarms Page**

- 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 Use the editing icon softkeys and the up and down arrows to set or change the alarm limit.
- 6 Press Enter to record that value and to move to the 1/0 radio button.
- 7 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.

## Printing Sampling and Alarm Parameters

The current sampling setup and alarm settings can be printed from the Status Screen. From the main display screen, select the  button to get to the Status Screen. Then select the  button to print the sampling parameters.

## The Statistics Mode

Pressing the softkey for the statistics mode symbol opens the Statistics Setup Screen. For details, see Chapter 8, "Statistics Mode".

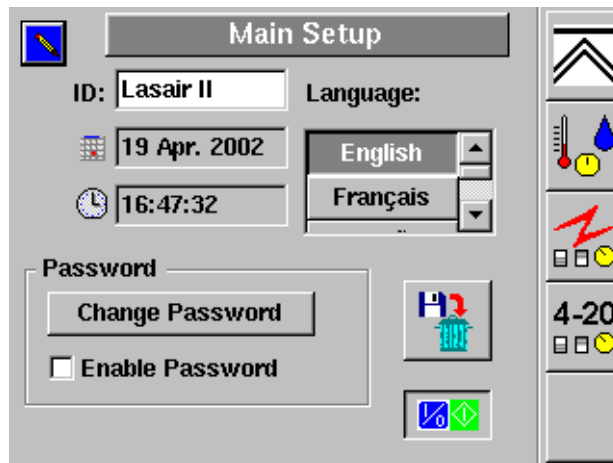
## Recipes

Pressing the softkey for the recipe mode icon opens the Recipe Setup Screen. for details, see Chapter 9, "Recipes".

## Main Setup Screen

**To edit the Main Setup Screen:**

- 1 Open the Main Setup Screen by pressing the second softkey  from the top on the Main Display Screen.



**Figure 5-10: Main Setup Screen**

Table 5-1: Main Setup Screen Fields and Buttons

| Field or Button                                                                                                          | Function                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ID</b>                                                                                                                | The Lasair's identification name or number—up to 16 alphanumeric characters.                                                                                                                                                                                                                                                 |
| <b>Date</b>                                                                                                              | The date in the format of <i>dd:month:yyyy</i> .                                                                                                                                                                                                                                                                             |
| <b>Time</b>                                                                                                              | The time in the format of <i>hh:mm:ss</i> . Time is in military notation only. That is, one o'clock in the afternoon is 13:00:00. Hours range from 00:00:00 to 23:59:59.                                                                                                                                                     |
| <b>Password</b>                                                                                                          | <p>Add, change, or delete a password, as well as enable/disable the password function. If a password is set and enabled, the user must always enter it when selecting the Main Setup Screen.</p> <hr/> <p><b>NOTE:</b> Once a password has been set, it is always enabled for the web browser connection.</p> <hr/>          |
| <b>Language</b>                                                                                                          | Select English, French, Spanish, German, Italian, Japanese (Kanji), Korean, or Mandarin (classical).                                                                                                                                                                                                                         |
| <b>Data Erase button</b><br>          | <p>Pressing this button erases all stored sample data. A pop-up screen prompts the user to confirm the erase. A data recovery feature allows the user to restore erased data. See the data recover button below.</p> <hr/> <p><b>NOTE:</b> The Data Erase feature is disabled when the Statistics Mode is enabled.</p> <hr/> |
| <b>Data Restore button</b><br>        | <p>This button is displayed after data has been erased. It allows recovery of data that is erased by mistake. The data recovery function will work even after the particle counter has been powered off and back on. However, once a new sample has been taken, old data cannot be recovered.</p>                            |
| <b>Start sampling at power-on</b><br> | <p>When enabled, this button causes the Lasair II particle counter to begin sampling immediately after it is turned on with the On/Off softkey</p>                                                                                      |

- 2 Press the Enter button to move into the Edit mode.

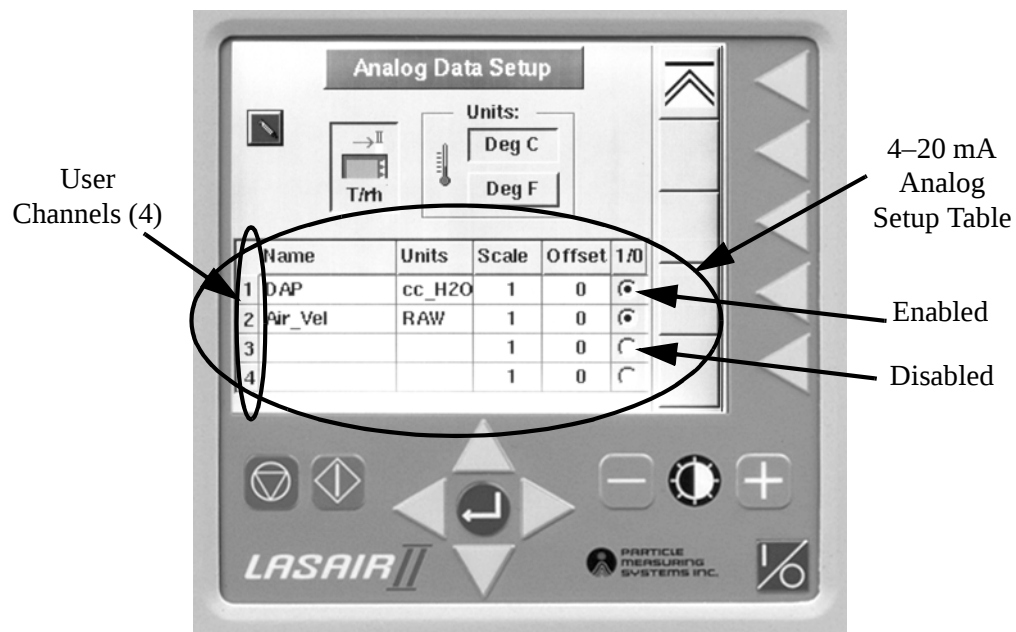
- 3 Use the forward and backward tab keys to move to the desired location.
- 4 Change any fields that are necessary.

Refer to the section, “Edit Mode” on page 5-1, for more information about changing values and selecting options in the fields.

## 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:



**Figure 5-11: Analog Data Setup Screen**

**Table 5-2: Analog Data Setup Screen Fields and Buttons**

| Field or Button               | Function                                                                                                                                                                                                                                                                                         |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>T/rh</b>                   | Enables or disables the optional Temperature/Relative Humidity (T/RH) sensor mounted on top of the particle counter.                                                                                                                                                                             |
| <b>Units (Deg C or Deg F)</b> | This group box relates to the T/RH field, and determines whether the temperature readings will be displayed in Centigrade or Fahrenheit.                                                                                                                                                         |
| <b>Name</b>                   | Enter up to 16 alphanumeric characters for the name of any additional analog sensor.                                                                                                                                                                                                             |
| <b>Units</b>                  | Enter up to 10 alphanumeric characters to describe the measurement units that will print.                                                                                                                                                                                                        |
| <b>Scale</b>                  | Enter a scaling factor for the data from the corresponding probe.                                                                                                                                                                                                                                |
| <b>Offset</b>                 | Enter an offset factor for the data from the corresponding probe.<br>A scale of 1 and an offset of 4 will produce an output in raw milliamperes (mA).                                                                                                                                            |
| <b>Enable/Disable</b>         | Determines whether the individual sensor is enabled or disabled. If the sensor is enabled, <input checked="" type="radio"/> its measurements will be displayed on the <i>Analog Display Screen</i> , 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 I/O cell for the Analog Channel you want to enable.
- 2 Press the Enter key to activate the field. The background 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.

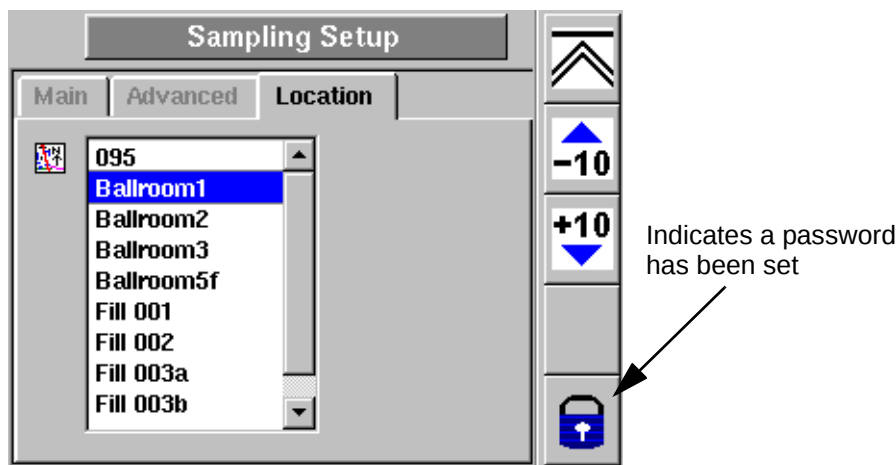
## Password and Remote Access Security

The password protection feature enables you to set a password for a Lasair II particle counter, and then enable or disable the password. A Password can be set and enabled or disabled from the instrument only.

When a password is enabled, the user is restricted from entering the Main Setup screen, and any portion of the Sampling Setup screen, except for location selection. Figure 5-12, “Sampling Setup with Password Active but not Entered. The Sampling Setup screen restriction is intended to be used with recipes. See Chapter

9, "Recipes". A sampling or statistical recipe may be tied to each location. When the user selects the location, the recipe for that location is loaded. Thus, the particle counter allows specific sampling plans to be effectively administrated within a user/supervisor framework by means of the password feature.

Further, once a password has been set, a user trying to remotely access a Lasair II particle counter must always enter the password even if the password function has been disabled at the instrument.



**Figure 5-12: Sampling Setup with Password Active but not Entered**

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 particle counter from a web browser or Facility Net.

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

#### **To set and enable a password:**

- 1 From the Main Display Screen press the Main Setup Screen softkey. The Main Setup Screen will open. 
- 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.

## Communications Setup Screens (Comm Setup)

### To open the Comm Setup Screens:

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

Notice that *Comm Setup* is comprised of the following three screens:

- the **Network** setup screen. Figure 5-13, “Comm Setup Screen, Network Page.
- the **Serial** setup screen. Figure 5-14, “Comm Setup Screen, Serial Page.
- the **Data** setup screen.

The three screens are opened by sequentially pressing the *Screen Select* softkey.



## Comm Setup - Network Page

| Network   | Serial | Data       |
|-----------|--------|------------|
| Net Addr  | 10     | 168 33 49  |
| Mask      | 255    | 255 224 0  |
| Gateway   |        |            |
| Multicast | 224    | 100 100 20 |

☒ Enable Web Server    ☐ Enable TCP/IP  
☐ TCP/IP Remote Mode

**Figure 5-13: Comm Setup Screen, Network Page**

The *Data* display setup window is used to enable and disable the 0.5 $\mu$  and 5.0 $\mu$  data display mode. See Chapter H, "Pharmaceutical (Two-channel) Output Mode".

This setup screen is also used for TouchRAM configuration. See Chapter M, "Touch RAM".

### Network Parameters

**Net Addr** Sets the IP address of this unique Lasair II particle counter 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** Used when communicating across networks. The gateway address is a decimal notation form of nnn.nnn.nnn.nnn. Each 3-numeric series represents a value of 0–255, separated by period characters ".". An example of a valid gateway address is: "10.255.0.60".

**Multicast** Required when using Facility Net software. 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 is Enabled; note the check mark in the box. It allows a user to connect to the Lasair II particle counter 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 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 particle counter rather than sampling data collected on-line. See “Preparing for Remote Mode” on page 7-8 for additional details. “Enable TCP/IP” must also be checked to enable this function.

---

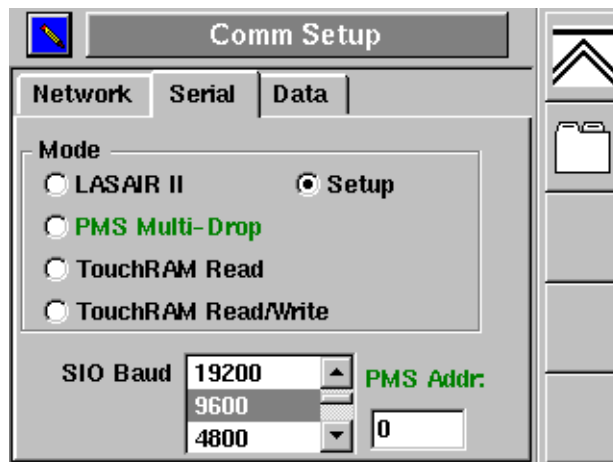
**NOTE:** Before editing this screen we recommend that you record and save the initial values as received from the factory.

---

## Comm Setup - Serial Screen

**To open the Comm Setup - Serial Screen:**

From any screen under Comm Setup, press the *Screen Select* softkey.



**Figure 5-14: Comm Setup Screen, Serial Page**

**LASAIR II** The default communications mode. Select this button to use the Lasair II particle counter as a stand-alone instrument. For more information, see Appendix G, "Native Serial (RS-232) Communications".

**PMS Multi-Drop** Selecting this button activates the mode used to enable the particle counter to emulate older MiniLaz drivers in a Facility Net/RS-485 system with multiple, individually-addressable instruments. All communications is polled with a sensor address, and the host program must take care of querying the unit for data. For more information, see Appendix F, "PMS Multi-Drop Protocol (MiniLaz Emulation)".

**TouchRAM Read** Select this button to read TouchRAM buttons only. For more information, see Appendix M, "Touch RAM".

**TouchRAM Read/Write** Select this button to read or write TouchRAM buttons. For more information, see Appendix M, "Touch RAM".

**Setup** The instrument service mode, not intended for customer use.

**SIO Baud** The serial I/O port baud rate is selectable from 1200–38400.

**PMS Addr.** A user-entered numeric field with values of 0–99. This value is used by the PMS Multi-Drop communications mode to identify each Lasair II particle counter.

---

**NOTE:** When using the TouchRAM feature, the address is stored in the button. Reading a button will over-write this parameter with the value in the button.

---

## Chapter 6

# Operation

---

Once you have setup the unit for sampling, operations is a simple matter.

This chapter includes the following sections:

- Collecting Sample Data
- Viewing Sample Data
- Printer Output
- Silencing Alarms
- Saving Data to Other Media
- Deleting Data from Lasair II particle counter's Memory

## Collecting Sample Data

### To collect sample data:

- 1 Place the Lasair II particle counter unit in the area where you will conduct sampling.
- 2 Plug in the unit. If the particle counter 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 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 press the Stop softkey or turn the unit off.

### To turn sampling OFF:

Press the red Stop button on the left side of the control panel.

When you stop sampling before the sampling sequence reaches completion, the sample data will be marked as **invalid**.

## Viewing Sample Data

Sample data can be viewed on the following two screens:

- Main Display Screen
- Data Table Screen

### Viewing Data on the Main Display Screen

The Main Display Screen displays data collected from the last sample. Data remains on the screen until a new sample is started. The data on this screen is preserved and stored in the Lasair II particle counter's memory. The newly created data can be printed if you choose that option.

### Viewing Data on the Data Table Screen

Data stored in the Lasair II particle counter can be viewed on the *Data Table Screen*. If no filter parameters have been set, all stored data will be available for review in the *Data Table Screen*.

You can also determine which of the sample data are displayed and the order in which they are displayed. the Data Table Screen automatically updates each time a new sample is completed. You can print displayed data if you wish.

---

**NOTE:** Automatic display of newly created data does not work while the printer is being used.

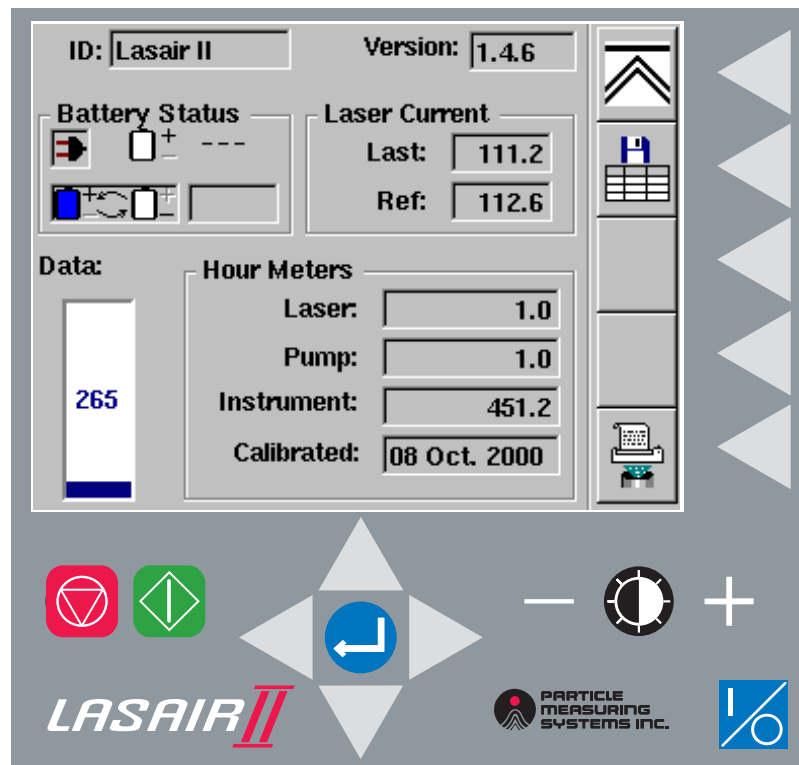
---

#### To view stored sample data:

- 1 From the *Main Display Screen*, open the *Status/Information Screen* by pressing the Status/Information icon's softkey.



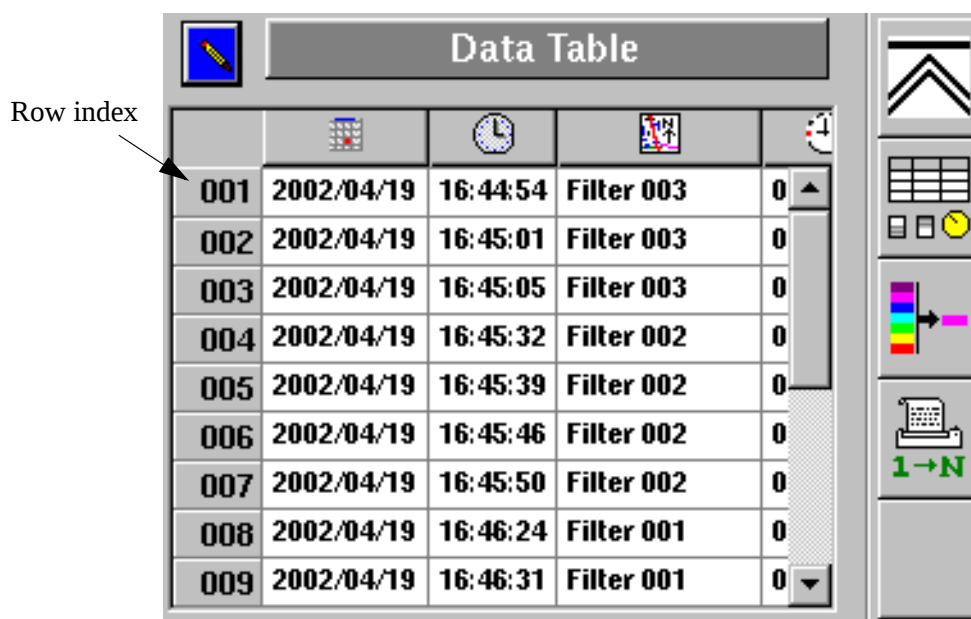
The *Status/Information Screen* will open.



**Figure 6-1: Status/Information Screen**

- 2 Open the *Data Table Screen* by pressing the *Data Table* icon softkey. The *Data Table Screen* will open and, after a few seconds, data will fill the table cells.





Row index

| 001 | 2002/04/19 | 16:44:54 | Filter 003 | 0 ▲ |
|-----|------------|----------|------------|-----|
| 002 | 2002/04/19 | 16:45:01 | Filter 003 | 0   |
| 003 | 2002/04/19 | 16:45:05 | Filter 003 | 0   |
| 004 | 2002/04/19 | 16:45:32 | Filter 002 | 0   |
| 005 | 2002/04/19 | 16:45:39 | Filter 002 | 0   |
| 006 | 2002/04/19 | 16:45:46 | Filter 002 | 0   |
| 007 | 2002/04/19 | 16:45:50 | Filter 002 | 0   |
| 008 | 2002/04/19 | 16:46:24 | Filter 001 | 0   |
| 009 | 2002/04/19 | 16:46:31 | Filter 001 | 0 ▼ |

Navigation icons on the right: Up arrow, 4x4 grid, 3x3 grid, Yellow circle, Color bar, 1→N, Down arrow.

Figure 6-2: Data Table Screen

When the *Data Table Screen* is displayed, you may view *all* the stored data, displayed in the order received, or you can select, sort, and order the stored data according to your needs.

### Navigating in the Data Table Screen

The Data Table Screen (see above) displays all stored particle and analog data, or the subset of the data you select to view. To enable the table's navigation mode, press the Enter  softkey.

In the edit mode, press the left  or right  arrow softkeys to move to columns that are not visible on the screen.

Use the -10, +10, -50, and +50 softkeys to move up or down the data record columns in blocks of 10 or 50 records, or use the up and down arrows to move one record at a time.

---

**NOTE:** Pressing the Enter softkey normally enables the edit mode. In this screen, however, pressing the *Enter* softkey enables a navigation mode, that allows you to move left, right, up, and down with the Arrow softkeys and other softkeys. You **cannot** edit data on the *Lasair II* particle counter.

---

**Data Format** — The sample data in are described by columns, from left to right, as follows:

- **Row Index:** This number, which is always visible on the display, is useful for keeping track of your place in the table. In addition, when printing samples the number shown in the row index is the sample which will be printed. See Figure 6-2, “Data Table Screen,” on page 6-4
- **Date:** the date the sample was completed in the format YYYY/MM/DD
- **Time:** the time the sample was completed in the format HH:MM:SS
- **Location:** the location name assigned to the sample data.
- **Sample duration:** the duration of the sample in the format HH:MM:SS
- **Sample volume:** the volume of air sampled expressed in the units selected on the *Data Display Screen*. See Figure 6-3, “Data Table Display Setup Screen,” on page 6-6.
- **Particle Data:** the particle count data is displayed in your choice of the following ways:
  - raw counts or normalized counts (particles per cubic foot or cubic meter)
  - differential counts or cumulative counts

---

**NOTE:** If Pharmaceutical mode is enabled, only 0.5  $\mu$  and 5.0  $\mu$  particles will be displayed. See Appendix G for more information.

---

- **Analog data:** Analog data is listed under the standard headings of *T* for temperature, *r/h* for relative, and as many as four other user-selected headings. Invalid samples will cause the entire row of data to be masked in gray. Analog or particle alarms that occurred during the sample will cause the out-of-tolerance number to be displayed in red.

## Controlling how the Data is Displayed

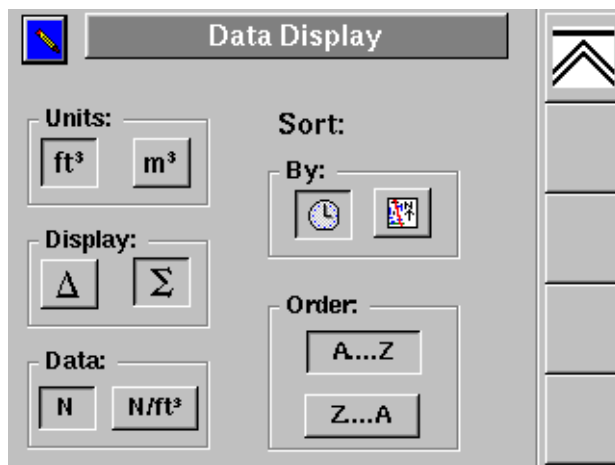
You can manipulate the displayed data in the following two ways:

- You can determine how the data are displayed by controlling the *Data Display Screen*.
- You can determine which data are displayed by controlling the Data Filter Screen on the *Data Table Screen*.

**To control how the data are displayed:**

- 1 From the *Main Display Screen*, press the  Icon softkey, and then press the  icon softkey on the next screen
- 2 Open the *Data Display Setup Screen* by pressing the *Data Display* icon  softkey.

The *Data Display Setup Screen* will open.



**Figure 6-3: Data Table Display Setup Screen**

The options in the *Data Display Setup Screen* allow you to choose the units of data displayed, the kind of data displayed, how the data is sorted, and the order of the data (ascending or descending.)

The following information describes the *Data Display Setup Screen* options in the order that they would be activated when pressing the *Tab Forward* softkey. 

**Units: [ft.<sup>3</sup> or m<sup>3</sup>]**

Select cubic feet or cubic meters. The default is read from the instrument's *Sampling Setup Screen* when the particle counter is turned on.

This selection determines the units displayed for the Sample Volume and sample readings.

**Display: [ $\Delta$  or  $\Sigma$ ]** Determine whether data is displayed in Differential ( $\Delta$ ) or Cumulative ( $\Sigma$ ) values. This setting is saved in battery-powered RAM when the Lasair II particle counter is shut down.

**Data: [N or N/ft.<sup>3</sup>]** Select *N* to display raw counts. Select *N/ft.<sup>3</sup>* to display normalized counts, that is, counts per unit of volume.

---

**NOTE:** If you change the sampling setup after setting your units choice in the *Data Display Setup Screen*, the units will be over-ridden by the display units you have chosen in the *Data Display Setup Screen*.

---

**Sort By:** [Date and time  or Location ] Select Time to sort by the date and time the sample data was created. Select Location to sort by the location where the sample was collected. Before selecting “sort by location”, location names must have already been created and assigned to the sample.

If location is selected, the data will first be sorted first by location and then by date/time.

This setting is saved in battery-powered RAM when the particle counter is shut down.

**Order:** [A...Z or Z...A] Select (**A...Z**) to view data in ascending order or select (**Z...A**) to view data in descending order.

This setting is saved in battery-powered RAM when the particle counter is shut down.

## Controlling what Data is Displayed

### To determine which data are displayed:

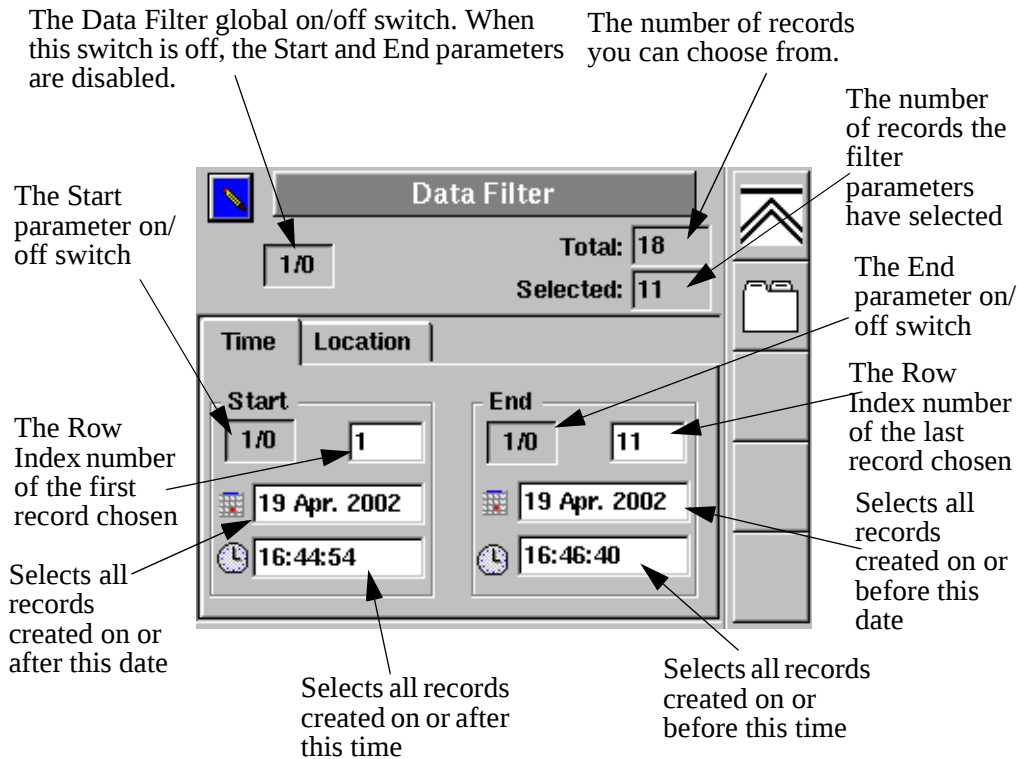
- 1 If the *Data Table Screen* is not open, navigate to it.

Or

- 2 If the *Data Table Screen* is already open but it is in the navigation mode, disable the edit mode by pressing the Return Arrow  icon softkey.

- 3 Open the *Data Filter Screen* by pressing the *Data Display* icon softkey. The *Data Filter-Time Screen* will open.





**Figure 6-4: Data Filter-Time Screen**

You can filter (select) data by the following six means:

- by the Start filter parameters — that is, data that was generated **on or after** a user-entered date and time
- by the End filter parameters — that is, data that was generated **on or before** a user-entered date and time
- by Start and End Row Index numbers. For example: if you have a total of 100 stored records and you want to see the last 10, set the Start Row Index number to 91 and the End Row Index to 100. Setting the Row Index numbers directly overrides the Start and End settings.
- time data that was generated **on or between** two user-entered dates and times
- by location
- a combination of user-entered dates, times, and locations

**To filter data by time:**

- 1 If the *Data Filter-Time Screen* is not open, press the *Screen Select* icon softkey until the *Data Filter-Time Screen* is displayed.
- 2 Press the *Enter* softkey to enable the edit mode. The Data Filter mode 1/0 (on/off) button will be highlighted.
- 3 Press the *Enter* softkey again to enable the Data Filter mode.



---

**NOTE:** The following instructions describe how to enable and set the *Start* parameters. The same instructions apply to the *End* parameters.

---

- 4 Use the *Tab Forward* and *Tab Back* icon softkeys to navigate to the filter mode Start 1/0 button located on the upper left part of the screen.
- 5 Press the *Enter* softkey to enable the Start filter.
- 6 After enabling the *Start* filter, press the down arrow ▼ key to move to the date field.

---

**NOTE:** If you know that you have data that can be filtered, but you are unable to advance to the date filter field it probably means that someone has changed the instrument date after some data had been stored in memory.

---

- 7 Use the right and left arrow keys to move the cursor to the right of the part of the date (day, month, year) you want to change and then use the up ▲ or down ▼ arrows to set the date field to the date you want.
- 8 When the date is correct, press the *Enter* button to move to the time field.
- 9 Use the right and left arrow keys to move the cursor to the **left** of the part of the time you want to change.
- 10 Use the up and down arrows to set the time field to the time you want and then press the Enter key to accept the time and move the focus back to the 1/0 button.
- 11 Press the *Tab Forward* icon softkey to move to the *End* filter 1/0 button and use the same procedure as above to set the parameters.

**To disable Start or End filtering:**

- 1 Navigate to the *Data Filter Screen*.
- 2 Activate the Edit mode by pressing the *Enter* button.
- 3 Navigate to the 1/0 button of the filter function you want to disable, *Start* or *End*.

- 4 Press the *Enter* button to toggle the 1/0 button to *OFF*.

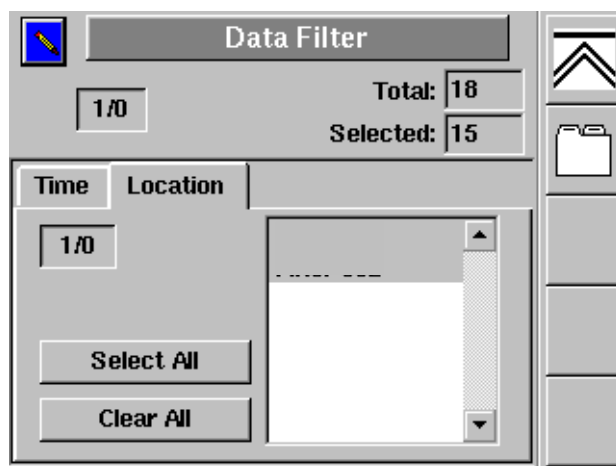
**To filter data by location:**

- 1 Navigate to the *Data Filter-Location Screen*.

---

**NOTE:** Several clicks of the *Tab Forward* or *Tab Back* icon softkeys in the Data Filter/Time Screen will take you to the Data Filter/Location Screen.

---



**Figure 6-5: Data Filter-Location Setup Screen**

- 2 Press the *Enter* button to activate the Edit mode.

---

**NOTE:** The edit mode will open with the global Data Filter **1/0** button highlighted and enabled.

---

- 3 Press the *Tab Forward* icon softkey to advance to the Location Filter **1/0** button. 
- 4 Press the Enter key to enable the Location Filter.
- 5 Press the *Tab Forward* softkey to advance sequentially through *Select All*, *Clear All*, and the first of the location names.
- 6 To select data from all location names, press the *Enter* button when the *Select All* button is highlighted. The background for all the location names will turn gray.

- 7 To select data tagged with particular location names, after the first location name is highlighted, press the *Down Arrow* or *Up arrow* softkeys to navigate through the location list.
- 8 When the desired location name is highlighted, press the *Enter* key to select it.
- 9 Continue highlighting and selecting location names until all the location names you want are selected.

---

**NOTE:** Observe the number in the ***Selected*** field as you select location names.

---

- 10 Press the *Return Arrow* softkey  to disable the edit mode.
- 11 Press the *Back Screen* softkey to return to the *Data Table Screen*. In a few seconds the filtered data will appear on the screen. 

---

**NOTE:** The subset of records displayed will be assigned new Row Index numbers to reflect the number of records displayed. These Row Index numbers will only have meaning for the displayed subset. The Row Index numbers for the total data set will be unchanged. That is, the record that was assigned row index number one (1) will still be number one when the entire data set is viewed.

---

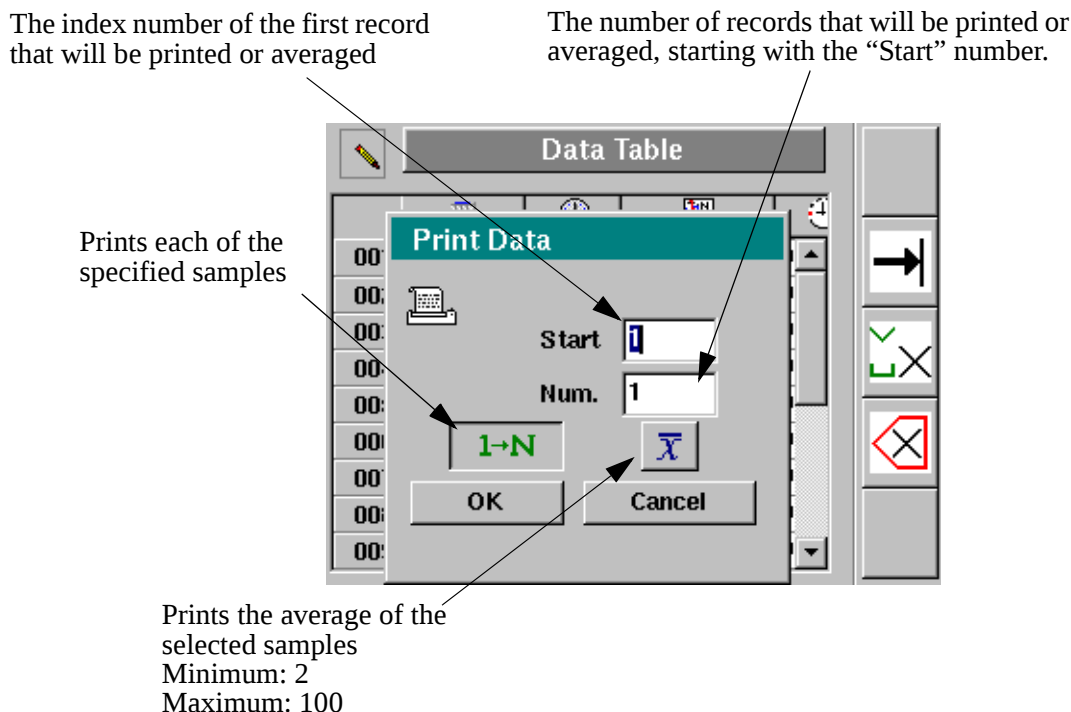
#### To deselect an individual location name:

- 1 Use the Tab Forward or Tab Back softkeys to move the selection into the location name selection list. One of the location names will be highlighted.
- 2 Use the up and down arrows to move the highlight to the location name you want to deselect.
- 3 Press the *Enter* key to deselect the location name. The deselected location name will have a white background.

#### To print filtered or unfiltered data:

- 1 In the *Data Table Screen*, press the *Print* softkey .

The *Print Data Screen* will open displaying ***Start*** xx and ***Num*** xx or ***Start 1*** and ***Num 1***.



**Figure 6-6: Data Table Screen with Print Dialog Box**

**Start:** *xx* the index number of the record you have scrolled to (or 1 if you haven’t scrolled through the records at all). See “Viewing Data on the Data Table Screen” on page 6-2. The number in the **Start** field is the first record that will be printed.

**Num** the number of records that will be printed.

**1 → N** Prints the records you have chosen.

 Prints the records you have chosen and then averages them.

---

**NOTE:** As many as 100 records can be printed.

---

- 2 Assuming that you want to print more records than the first one, press the *Tab Forward* icon softkey as needed to advance to the field you want to change. 
- 3 Press the *Up Arrow* or *Down Arrow* softkeys to change the **Start** field and the **Number** fields.

**NOTE:** Remember, you are always changing the digit to the *right* of the flashing cursor. This means that if you want a multi-digit number, you must use the Right Arrow softkey to move the cursor past the first digit before setting the

second digit. Also, use the  softkey to delete a number to the left of the

cursor, and use the  softkey to insert a zero between two digits.

---

- 4** When the **Start** and **Number** digits are correct, use the *Tab Forward* softkey to advance to either the Print Records button or the Print Average button. Press the Enter softkey to select the option of your choice.

- 5** **Navigate to the OK** button and press the *Enter* key to enable **OK**.

The printer will begin printing the records on the *Data Table Screen*. The *Abort Screen* will display *Hit Cancel to Abort*, allowing you an opportunity to abort the print job before it completes. Press the *Enter* key to abort the print job.

---

**NOTE:** After pressing the Enter key about seven records will still be printed.

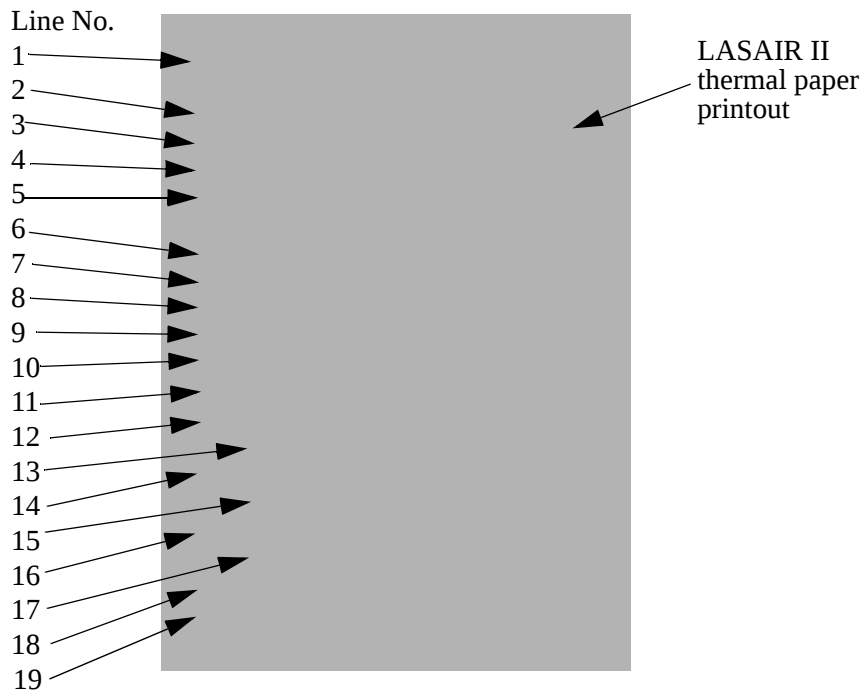
---

To interpret the printed data, see “Printer Output” on the next page.

## Printer Output

This section describes the messages and data that appear on the Lasair II particle counter's thermal printer 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.

A description of each line and the possible variations in each line follows this example.



**Figure 6-7: Printout Example**

---

**NOTE:** The line numbers are for reference only.

---

**Table 6-1: Printout Legend**

| <b>Line No.</b> | <b>Text or Data</b>                                                         | <b>Description</b>                                                                                                                                                                            |
|-----------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1a</b>       | <b>Final Sample Normalized</b>                                              | A sample will either be <i>final</i> or <i>partial</i> depending on the state of the sample cycle when the printer is run.                                                                    |
| <b>1b</b>       | <b>Partial Sample Normalized</b>                                            |                                                                                                                                                                                               |
| <b>2</b>        | <b>LASAIR II</b>                                                            | The name/ID of the particle counter that produced the data.                                                                                                                                   |
| <b>3a</b>       | <b>006 Valid</b>                                                            | <i>006</i> identifies the location name where the sample was drawn. <i>Valid</i> indicates that the Lasair II particle counter did not detect any condition that would invalidate the sample. |
| <b>3b</b>       | <b>006 Invalid</b>                                                          | <i>Invalid</i> indicates that the particle counter has detected a condition that invalidates the sample. Also see lines 17 and 18.                                                            |
| <b>4</b>        | <b>2007/12/06 12:01:00</b>                                                  | Start of the sample                                                                                                                                                                           |
| <b>5</b>        | <b>2007/12/06 12:01:05#1</b>                                                | A date stamp (year/month/day) followed by a time stamp (hour:minute:second) when the sample ended, and the number of the sample.                                                              |
| <b>6</b>        | <b>   <math>\mu</math>    <math>\Delta</math>    <math>\Sigma</math>   </b> | Column headers:<br>   Particle size in microns    number of particles detected of that size    The sum of all particles counted of that size and larger.                                      |
| <b>7</b>        | <b>   0.3    6459381    7470894   </b>                                      | The 0.3 micron channel:<br>   Total counts of 0.3 microns    Total counts $\geq$ 0.3 microns                                                                                                  |
| <b>8</b>        | <b>   0.5    713777    1011512   </b>                                       | The 0.5 micron channel:<br>   Total counts of 0.5 microns    Total counts $\geq$ 0.5 microns                                                                                                  |
| <b>9</b>        | <b>   0.7    133677    297735   </b>                                        | The 0.7 micron channel:<br>   Total counts of 0.7 microns    Total counts $\geq$ 0.7 microns                                                                                                  |
| <b>10</b>       | <b>   1.0    117950    164058   </b>                                        | The 1 micron channel:<br>   Total counts of 1 microns    Total counts $\geq$ 1 micron                                                                                                         |
| <b>11</b>       | <b>   5.0    30024    46108   </b>                                          | The 5 micron channel:<br>   Total counts of 5 microns    Total counts $\geq$ 5 microns                                                                                                        |

**Table 6-1: Printout Legend (Continued)**

|    |                        |                                                                                                                                      |
|----|------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 12 | 10.0    16084    16084 | The 10 micron channel:<br>   total counts of 10 microns    total counts<br>≥ 10 microns                                              |
| 13 | Avg    Min    Max      | Column headers for Environmental Data.<br>Average, Minimum, and Maximum are taken<br>over the Sample period.                         |
| 14 | T DEG C                | T: temperature DEG C: degrees centigrade                                                                                             |
| 15 | 25.1    24.94    25.23 | Average    minimum    and maximum<br>temperature in degrees centigrade. See lines<br>12 and 13.                                      |
| 16 | rh PCT                 | rh: relative humidity PCT: percent                                                                                                   |
| 17 | 15.4    15.33    15.43 | Average    minimum    and maximum relative<br>humidity in percent. (See lines 12 and 14.)                                            |
| 18 | Alarm: Pump            | This line prints when the particle counter<br>senses that the flow rate is outside the<br>boundary of 1 CFM ±5%. (Also see line 3b.) |
| 19 | Alarm: Laser           | This line prints when the particle counter<br>senses that the laser power is out of the<br>specified range. (Also see line 3b.)      |

## Statistics Mode Sample Print

When the Lasair II particle counter is operated in statistics mode, sample printouts have the room name appended to the sample strip. The room is printed directly above the location name.

## 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* key or one of the arrow buttons on the control panel until all alarms are off. The value in alarm 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 key 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.

## **Saving Data to Other Media**

The Lasair II particle counter saves 3,000 sample data records internally. Once the record file is full, a new record will displace the oldest record in the file. A Lasair II particle counter set to 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 particle counter'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.

### **Monitoring the Sample Data File**

**To monitor status from the particle counter:**

Follow these steps to monitor the status of the sample data file from the particle counter.

- 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 to another file so it can be saved for long-term retention or for data analysis. This can be done by any of the following methods:

- Data can be downloaded in CSV format by accessing the particle counter from a web browser/Ethernet connection and using the Lasair II particle counter data save feature. See Chapter 7 and Appendix E.

- Data can be saved continuously by connecting the Lasair II particle counter to a facility management system such as Facility Net and collecting your samples while so connected. When using such a system, the data is saved continuously on a computer, and the local data storage can be ignored. See Appendix B and C.
- Data can be saved from a mobile Lasair II particle counter by periodically connecting to Facility Net to download the particle counter's sample data. See "Preparing for Remote Mode" on page 7-8. Also see Appendix C.
- Data can be downloaded in CSV format by means of the USB port. See Appendix J.

## Erasing Data from Particle Counter's Memory

Data cannot be erased selectively from Lasair II particle counter memory. The erase function erases all data from memory without possibility of recovery. Data can also be erased by means of the browser interface. See "Deleting Sample Data Records" on page 7-16.

### To erase data from memory:

- 1 From the Main Display Screen, navigate to the Main Setup Screen by pressing the  softkey.
- 2 Enable the edit mode by pressing the Enter softkey.
- 3 Use the Tab Forward softkey to navigate to the Delete Button .
- 4 Press the Enter Softkey to activate the delete function. A confirmation dialog box will open.
- 5 Select **OK** to delete data or **Cancel** if you do not want to delete all data.

## Restoring Deleted Data

*If you have deleted the location names, you **cannot** restore the data.*

*If you have not collected another sample after deleting data, you **can** restore the data you have deleted.*

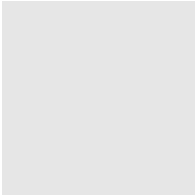
### To restore deleted data:

- 1 When you click OK to confirm deletion of data, the Delete Button will change into a Data Restore Button.



- 2** From the Main Setup Screen, enable the edit mode and click the Data Restore Button. The Unerase Data Dialog box will open confirming the number of records restored.
- 3** Press the Enter key to clear the dialog box.

This page is intentionally left blank.



## **Chapter 7**

# **Operation with a Computer or Control Software**

---

The previous chapters referenced using Lasair II particle counter in the “stand-alone” or “direct” mode. In these modes, you are interfacing directly with the Lasair II particle counter. All parameters are set by using the softkeys and all data is stored in and read from the display screens or printed on the thermal printer.

This chapter discusses the methods for communicating with a particle counter using a computer. It is organized as follows:

- Overview of the different communication protocols.
- Configuring (setting up) the Lasair II particle counter for communications.
- Details of using the different communication methods.

## **Communications Overview**

The Lasair II particle counter provides several methods for communicating with external computers. They are outlined here, then examined in more detail in the remainder of this chapter.

### **PMS TCP/IP Protocol**

This interface provides the capability of attaching a Lasair II particle counter to Facility Net via the Ethernet. The Lasair II particle counter can interact with Facility Net as an on-line platform, or as a remote platform. Using the instrument as a remote platform means taking samples with the instrument disconnected from Facility Net, and then periodically loading the data into Facility Net. As an on-line platform, the instrument remains in one location collecting and sending data samples based on Facility Net requests. See Appendices B, C, and D for additional details.

## **Web Server**

The Lasair II particle counter provides a Web interface which looks and functions similar to the front panel screens. The instrument may be controlled or simply monitored for status or problems using a standard Web browser such as Internet Explorer or Netscape®. In addition, data on the particle may be quickly transferred to a computer.

## **Lasair II Particle Counter Serial Interface**

This is an easy-to-use RS-232 protocol which allows users to write their own communications routines for talking with computers. The protocol is similar to the older Lasair communications interface, but it has been enhanced with status feedback messages. See Appendix F.

## **PMS Multi-Drop Protocol (MiniLaz Emulation)**

This is a second RS-232 protocol which can be enabled on the Lasair II particle counter. This protocol allows communicating in a multi-drop environment (like a telephone party-line) such as an RS-485 system. This communications mode allows the particle counter to emulate a MiniLaz instrument when connected to Facility Net using a serial interface rather than the network interface. See Appendix G.

## **4-20 mA Output**

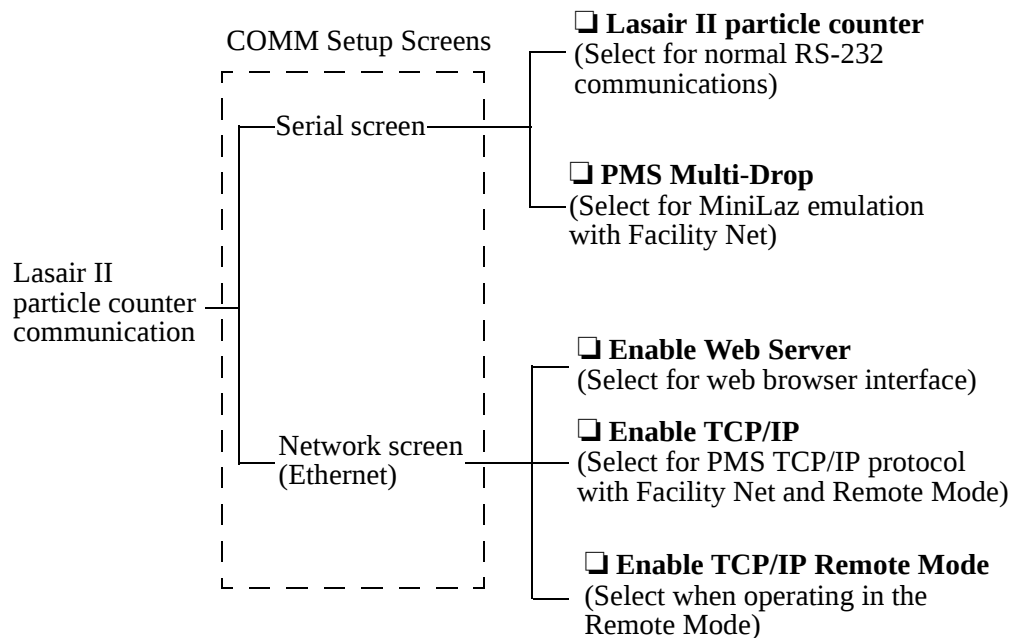
With the optional 4-20 mA output board, data can be output in this format. See Appendix I.

## **DataAnalyst**

With the use of external software called DataAnalyst reports can be recreated outside the instrument, along with data storage and retrieval capabilities.

## Configuring Communications

All communications are configured using the “Comm Setup” screens on the Lasair II particle counter. Figure 6-1 is an overview of the two communications setup screens. One screen is used for all Ethernet based communications, and the other screen is used for all serial communications. Each screen is discussed separately below.



**Figure 7-1: Setup paths for communications modes**

### Ethernet Communications Setup Screen

Figure 7-2 is the Ethernet communications setup screen where all network addressing parameters are set, and various network communication protocols are enabled or disabled. When a network address is changed, the particle counter must be rebooted. A pop-up message informs you of this when you try to exit the screen. The various setup parameters are discussed below.

| Comm Setup                                                                                                                                  |     |        |      |    |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|------|----|
| Network                                                                                                                                     |     | Serial | Data |    |
| Net Addr                                                                                                                                    | 10  | 168    | 33   | 49 |
| Mask                                                                                                                                        | 255 | 255    | 224  | 0  |
| Gateway                                                                                                                                     |     |        |      |    |
| Multicast                                                                                                                                   | 224 | 100    | 100  | 20 |
| <input checked="" type="checkbox"/> Enable Web Server <input type="checkbox"/> Enable TCP/IP<br><input type="checkbox"/> TCP/IP Remote Mode |     |        |      |    |

**Figure 7-2: Comm Setup Screen-Network Page**

**Net Addr (Net Address)** Sets the IP address in the form **aaa.bbb.ccc.ddd**. Each 3-digit series is a value of 0–255, separated by a period (.). This address is unique to each Lasair II particle counter. An example of a valid IP address is: 010.255.000.099.

**Mask** Sets the net mask address in a form of **aaa.bbb.ccc.ddd**. Each 3-digit series is a value of 0–255, separated by a period (.). 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 networks. This field sets the gateway address in the form of **aaa.bbb.ccc.ddd**. Each 3-digit series is a value of 0–255, separated by a period (.). An example of a valid gateway address is: 10.255.0.60. If this is blank, the instrument will be unable to communicate outside the local network.

**Multicast** The multicast address must be assigned if you are using Facility Net. This field sets the multicast address in a form of **aaa.bbb.ccc.ddd**. Each 3-digit series is a value of 0–255, separated by a period (.). An example of a valid multicast address is: **224.100.100.1**.

**Enable Web Server** The default setting is Enable; note the check-mark in the box. When enabled, a user can connect to the particle counter from a web browser such as Internet Explorer or Netscape Navigator. Disabling this function on the unit disables remote control and remote sample data viewing.

**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 Net. Disabling this function on the unit removes the ability to use these applications.

**TCP/IP Remote Mode** Enable this check box to cause Facility Net to treat this instrument as a “Remote Instrument”. When connected to Facility Net, stored data will be downloaded, and Facility Net will then disconnect. **Enable TCP/IP** must also be checked.

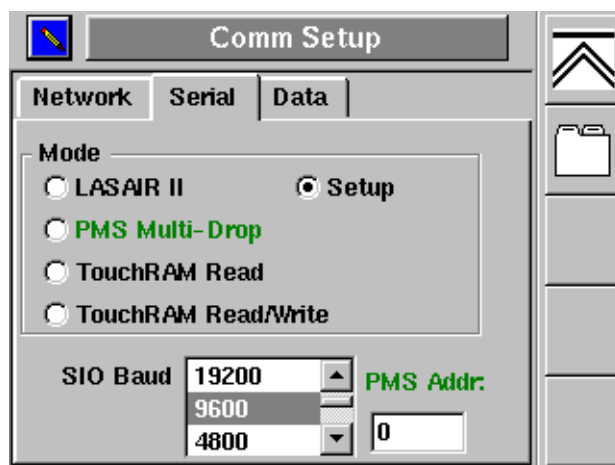
For details about changing the Enable TCP/IP check box, see “Preparing for On-Line Operation” on page 7-10.

See “Using the Remote Mode” on page 7-7 and “Preparing for Remote Mode” on page 7-8 for more details about using the Lasair II particle counter in Remote mode and information regarding Facility Net requirements.

To support pharmaceutical operations, the Lasair II particle counter can be configured to generate 0.5 and 5.0  $\mu\text{m}$  channel data only. For more information, see Appendix H, “Pharmaceutical (Two-channel) Output Mode”.

## Serial Communication Setup Screen

This screen allows selection of the RS-232 port interface protocol, and other serial communications selections. Changes in serial interface mode are accepted immediately, without the need to reboot the instrument.



**Figure 7-3: Comm Setup Screen-Serial Page**

**Mode** — This group box contains radio buttons which allow selecting one of five different uses for the RS-232 serial port. Each button is described below.

**Setup** This function is for service, and does not provide any user functions. In earlier versions of Lasair II particle counter firmware (Ver. 1.3.4 and before), this was labeled “Lasair II”. The instrument can be left in this mode, if there is no need to use the serial communications.

**LASAIR II** This sets the serial port to the native Lasair II communications mode. In older firmware (Ver. 1.3.4 and earlier) the “Lasair II” title was used to refer to the “Setup” mode mentioned above. This mode allows starting and stopping the

instrument, collecting data, and setting various configuration parameters. The protocol is similar, but not identical to the older Lasair serial communications. Full details for this protocol are provided in Appendix G, "Native Serial (RS-232) Communications".

**PMS Multi-Drop** This communications protocol is designed to be used in a party-line environment such as an RS-485 system. Each instrument must have a unique address. See the "PMS Addr." setting below. This protocol also provides MiniLaz emulation when communicating with a serial port to Facility Net. Details of using this mode for MiniLaz emulation are explained later in this chapter. Details of the protocol are found in Appendix F, "PMS Multi-Drop Protocol (MiniLaz Emulation)".

**TouchRam Read** This setting configures the serial port to use TouchRam memory buttons. These buttons can be used to store location and sampling parameters for the Lasair II particle counter. For additional details, see "Comm Setup - Serial Screen" on page 5-25 and Appendix M, "Touch RAM".

**TouchRam Read/Write** This is a second setting for communicating with TouchRam memory buttons. In this setting the buttons can be programmed as well as read. For additional details, see "Comm Setup - Serial Screen" on page 5-25 and Appendix M, "Touch RAM".

### **Other Settings —**

**SIO Baud** This sets the baud rate for all RS-232 protocols except for the TouchRam modes (which ignore the setting). The baud can be adjusted from 1200 to 38400.

**PMS Addr** This is the multi-drop address used when the instrument is in PMS Multi-Drop mode. The address can be set in the range of 0–99. The setting has no effect in any other communication mode. The address must be unique if multiple instruments are configured on an RS-485 system.

The following communication parameters are fixed, and cannot be adjusted:

- Parity: none
- Stop bits: 1
- Data bits: 8

Flow Control: depends on protocol. "Lasair II" mode uses software flow control (CTRL-Q/CTRL-S). "PMS Multi-Drop" mode does not have flow control.

---

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

---

For more information, see Appendix B, "Connecting to a Computer or Network".

## Setting for 0.5 and 5.0 $\mu\text{m}$ Output Only

The Communications Setup Screen (Data) may be set to cause output with 0.5 and 5.0  $\mu\text{m}$  output only. See Appendix H, "Pharmaceutical (Two-channel) Output Mode".

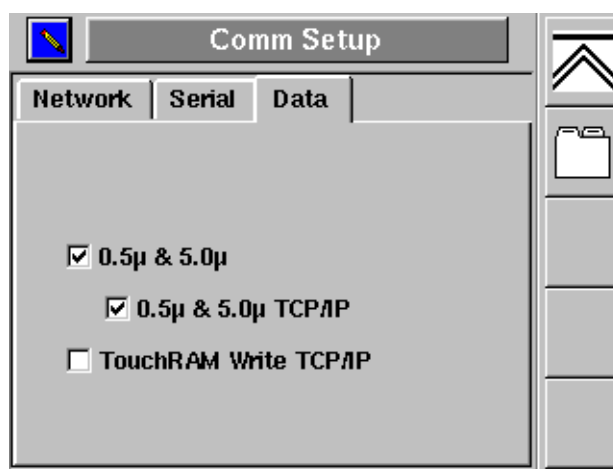


Figure 7-4: Comm Setup Screen, Data

## Using the Remote Mode

"Remote mode" means that Lasair II particle counter will not be permanently connected to any other communications or control network while it is collecting data. That is, it is used in a stand-alone mode to collect data from multiple locations. Periodically, the particle counter is connected to an Ethernet network to download its accumulated data to Facility Net. The downloaded data can then be stored in a digital file which has few if any size limitations and which can be backed up. Also, the data will then be available to analytical and graphical software.

## Preparing for Remote Mode

Complete the following steps to ensure that the Lasair II particle counter is ready for use in the Remote Mode.

---

**NOTE:** Before using this feature, ensure that your version of Facility Net has the required versions of the .dll and .hlp files listed on the following page. If these files are not correct, contact your local Particle Measuring Systems representative.

---

### To prepare the particle counter for remote mode:

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

---

**NOTE:** If you attach a Lasair II particle counter 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 particle counter 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 II particle counters.
- 3 Ensure that the Lasair II particle counter's Ethernet address is unique to all other Lasair II particle counters.
- 4 Ensure that the following files in your copy of Facility Net are of the correct versions:
  - pdrvlpn.dll: version 2.9.23 or later
  - pms\_util.dll: version 2.9.22 or later
  - pdrvlpn.hlp: dated Feb 20, 2001 or later
- 5 Before connecting the Lasair II particle counter to Facility Net, navigate to the *Communications Setup Screen* under the *Main Setup Screen*.
- 6 Navigate to the "TCP/IP Remote Mode" check box, and place a check in the check box.

---

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

---

- 7 If you want to automatically delete the data in the particle counter 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 particle counter, 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 particle counter's *Main Setup Screen*.

---

- 8 Connect the particle counter to the Facility Net system.
- 9 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 particle counter to Facility Net. When download is complete, Facility Net communications with particle counter will be automatically disabled.

## Connecting to a Computer

To connect the Lasair II particle counter to a dedicated or networked computer, please see Appendix A and perform all required actions for each of the following areas:

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

## Using the Facility Net (On-line Method)

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

- Direct control always takes precedence over indirect control. Facility Net will not gain control of the Lasair II particle counter if someone is already using it.

- If you are unable to gain control of the particle counter, the error message “Unable to gain control of the instrument at this time.” will appear on the computer display.
- When Facility Net has control of the Lasair II particle counter, its control functions will be locked out, but data will be displayed on the particle counter.
- Lasair II particle counter passwords cannot be set, enabled, or disabled from Facility Net. However, the same function can be achieved by disabling passwords in the Lasair II particle counter and then using Facility Net’s password feature.
- The Lasair II particle counter will retransmit up to 3000 data samples when it first attaches to Facility Net under the following circumstances:
  - The particle counter has already been connected to the same Facility Net system once before.
  - The particle counter is not rebooted or powered off before it reconnects to Facility Net.

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

## Preparing for On-Line Operation

### To prepare the particle counter for on-line operation:

- 1 Ensure that its identifier, on the Main Display Screen, is unique to all other Lasair II particle counters that will be used with your Facility Net system.

---

**NOTE:** If you attach a Lasair II particle counter 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 particle counter 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 II particle counters.
- 3 Ensure that the Lasair II particle counter’s Ethernet address is unique to all other Lasair II particle counters.
- 4 Ensure that the following files in your copy of Facility Net are of the correct versions:
  - pdrvlpn.dll: version 2.9.23 or later
  - pms\_util.dll: version 2.9.22 or later
  - pdrvlpn.hlp: dated Feb 20, 2001 or later

- 5 If necessary, start the particle counter.
- 6 Navigate to the COMM Setup-Network Screen.
- 7 Enable the edit mode by pressing the Enter key.
- 8 Enter the TCP/IP addresses provided by your network administrator.
- 9 Place a check mark in the Enable TCP/IP check box.
- 10 Exit the edit mode by pressing the Return Arrow softkey.
- 11 When the restart notification appears, press the Enter key.
- 12 Connect an Ethernet cable from the particle counter to an Ethernet hub.

**To prepare Facility Net for on-line operation:**

- 1 Facility Net configuration is beyond the scope of this manual. Refer to the *Facility Net Operations Manual* or contact your Particle Measuring Systems representative.

## Controlling the Particle Counter with Browser Software

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

- A direct cable connection to a computer
- A connection over an Ethernet network to a computer

### Web Browser Interface Advantages

Using a computer-browser to access and control a Lasair II particle counter has the following advantages:

- The Lasair II particle counter can be accessed and controlled from a remote location.
- A keyboard and mouse can be used for data entry and editing.
- More data can be displayed on a larger screen.
- Data can be copied from the particle counter directly to the computer's hard drive, spreadsheet software, or database software.

### Web Browser Interface Functions

- Display the particle and analog data from the Lasair II particle counter
- 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

## Establishing Communications Through a Web Browser

The same steps will be used to connect with a Lasair II particle counter whether connecting over an Ethernet network or directly from a computer with a crossover cable.

---

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

---

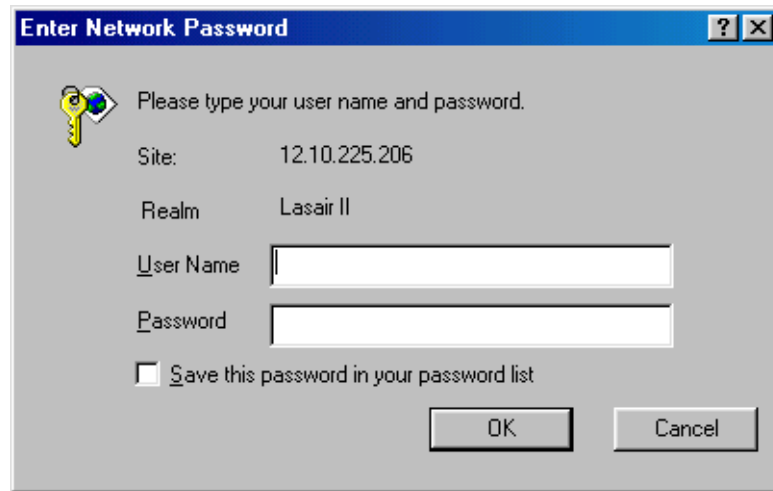
### To establish communications:

Follow these steps to establish communications between a computer and the Lasair II particle counter.

- 1 Start the particle counter and the computer.
- 2 If communicating directly to a computer, connect the Lasair II particle counter to the computer's Ethernet connection with a crossover cable.
- 3 Open the browser software.
- 4 Click on the IP address field to select the entire address.
- 5 Type the Lasair II particle counter'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 be similar to the following example:



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



- 7 The User Name field is **NOT** used for Lasair II particle counter access. Ignore it and move the cursor into the Password field.
- 8 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 Main Setup Screen.

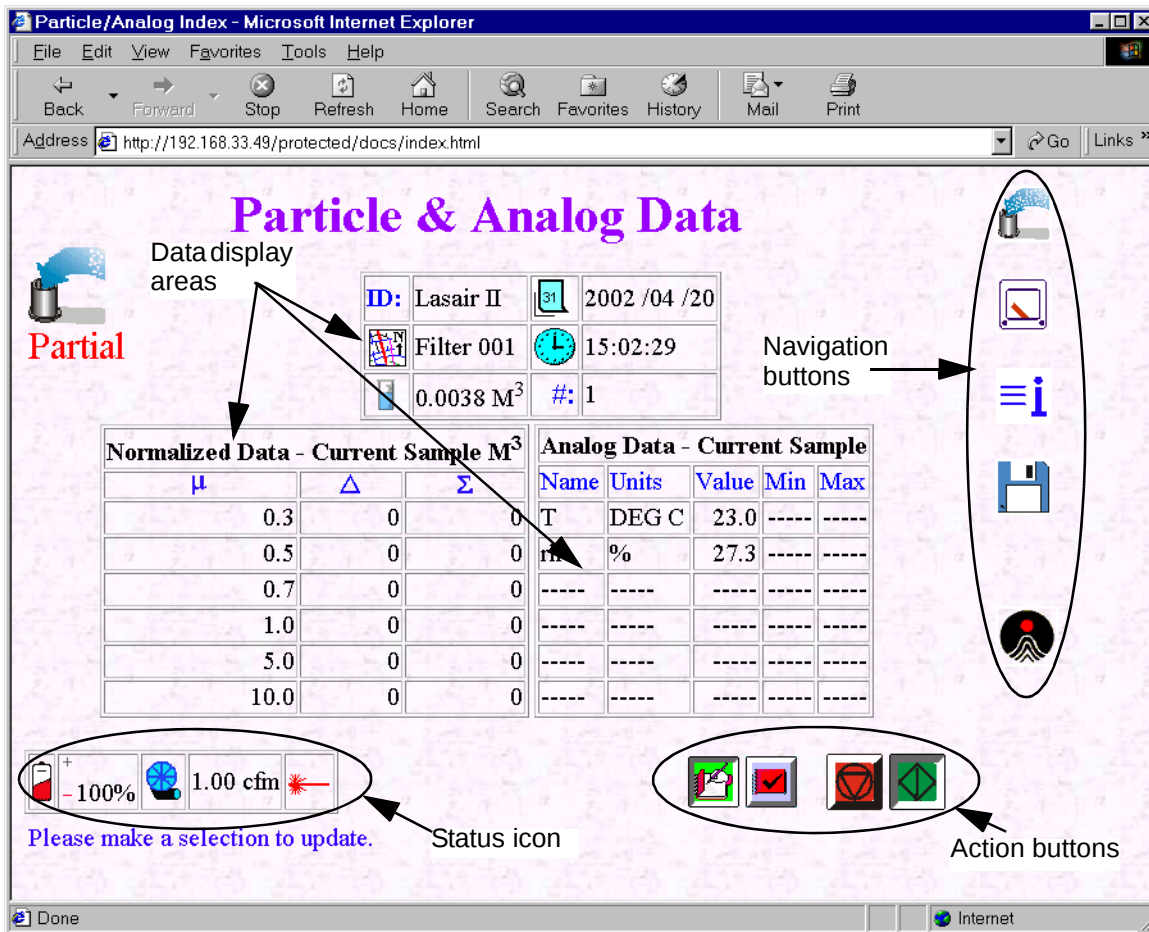
---

## Displaying Data on the Web Browser

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

- Data Display area
- Status Icons
- Control Buttons
- 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.



**Figure 7-5: Web Page, Particle and Analog Data**

**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. While sampling, the data on the Main Display is updated every 10 seconds.

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.



**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.



**Display the last completed sample data.** Either this icon or the previous icon is selected. Selecting one deselects the other.



**Stop a sampling run.** Either this icon or the next icon is selected. Selecting one deselects the other.



**Start a sampling run:** Either this button or the previous one is selected. Selecting one deselects the other.

## Saving Sample Data File

The sample data file may be copied to another file so it can be saved for long-term retention or for data analysis. The data is copied by accessing the Lasair II particle counter from a web browser/Ethernet connection and using the Lasair II particle counter 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 opens 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 Appendix E, "Comma Separated Value (CSV) Format".

- 2 Click on File > Save As in the browser's menu bar.
- 3 Complete the dialog box to name the new data file 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®.
- 4 Click Save.
- 5 Go to the file location and name to verify that the save was completed.

## Deleting Sample Data Records

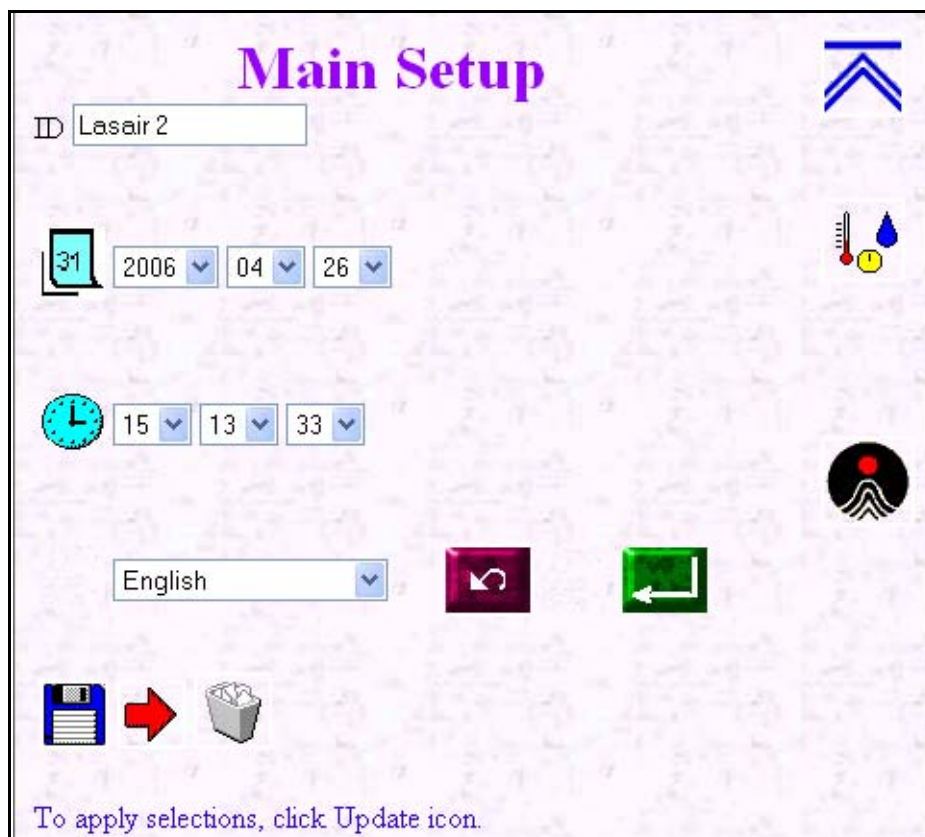
After saving the data records outside the particle counter, delete those records from the Lasair II particle counter to avoid duplication of data.

You may also want to delete invalid records from the particle counter.

**To delete the entire buffer of sample data:**

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





- 2 Click anywhere on the Stored Data Deletion Icon.



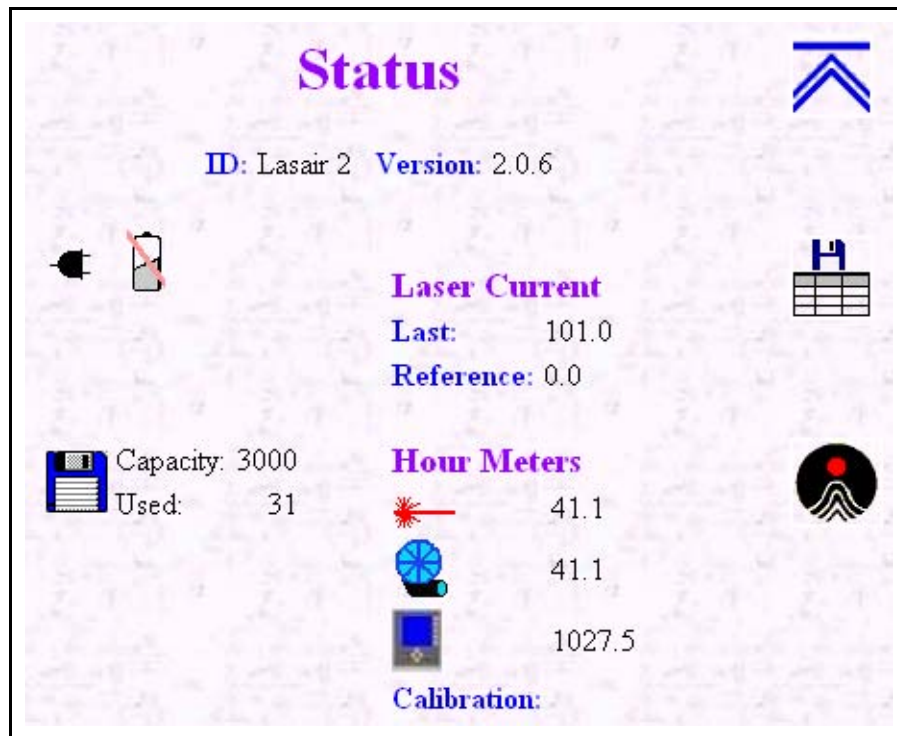
The Lasair II particle counter will require confirmation that you really want to delete all of the stored data records.

---

**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 particle counter or that the particle counter 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.
- 4 Click on the Escape button  to return to the Particle and Analog Data page.
- 5 Click on the Status button  to open the Status page.



The “Used:” line of the storage indicator will be zero, indicating that all records have been deleted.

## Setup Windows

To open the Setup page, click on the Escape button



**Sampling Setup**

14

**Sample Size**

00 00 15

0.25

**# of Samples**

0

**Units**

**Data**

**Add Recipe**

Recipe00

Please make a selection to update.

The web browser Setup page is different from the setup screens on the Lasair II particle counter 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 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.

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

Click on the clock icon to activate the time field

Hours, minutes, Seconds.

The screenshot shows a window titled "Sample Size". On the left side, there is a clock icon and a volume icon. To the right of these icons are three dropdown menus for time (00, 00, 15) and a text input field for volume (0.25). Arrows point from the text labels to the corresponding UI elements: one from "Click on the clock icon to activate the time field" to the clock icon, and three from "Hours, minutes, Seconds." to the three time dropdown menus.

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

The Enter  button accepts the settings for use in the next sampling run. You must click the Enter Button if you want these 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 particle counter
- copying location names from Lasair II particle counter to a file

**Copying Location Names from a File** — You may find it easier to create location names on a text editor and then transfer the list into the Lasair II particle counter in one action.

### To copy location names from a file:

Use this instruction to copy location names from a file to the Lasair II particle counter:

- 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

A single Lasair II particle counter 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 particle counter.

## **Copying Location Names from the Lasair II Particle Counter —**

**To copy Location Names from the particle counter 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.

## Considerations for MiniLaz Replacement Use

- The Lasair II particle counter 6-channel data is merged into 5 channels for MiniLaz data format. The Lasair II particle counter 510 model has an anomaly in this merge. The MiniLaz has a 3.0  $\mu\text{m}$  channel, which is replaced with the Lasair II particle counter 2.0  $\mu\text{m}$  channel. All other standard Lasair II models have correct reporting of data on all MiniLaz sizes. The new Lasair II 310A and 510A models emulate MiniLaz 325 and 525 instruments.
- Only Lasair II Temp/rh probe analog data is reported in the MiniLaz format. The four user analog channels are not reported.
- The Lasair II particle counter can save 3000 samples, while the MiniLaz can only save 500. If a long-term network outage occurs while the particle counter is still running, this may bog down the system for an unacceptable time period.
- The sample delay setting in Facility Net is only approximate when used with a Lasair II particle counter. The native Lasair II particle counter delay counts from the end of one sample to the start of the next, while the MiniLaz counts from the start of one sample to the start of the next.
- An external RS-232/RS-485 converter with automatic send data control is required on the Lasair II particle counter for use in RS-485 environments. An older converter with CTS control will not function properly.
- When using remote mode and location names, some care must be exercised. The MiniLaz only supports 7 character location names, while the Lasair II particle counter supports 16 character names. All characters in a location name are transmitted in a MiniLaz packet. Facility Net will only read 8-character names. Be careful not to use names longer than 8 characters.
- The Lasair II particle counter’s un-erase feature can be used if an error occurs downloading data in remote mode. (The un-erase feature is disabled as soon as additional data is taken, or the location names are deleted.)
- When emulating the MiniLaz, set the baud rate to 9600 for communications with Facility Net.

The PMS Multi-Drop mode enables Lasair II particle counter to be used as a drop-in replacement for MiniLaz. See appendix A for setup details. See Appendix E for the complete PMS Multi-Drop command set.

## Chapter 8

# Statistics Mode

---

This chapter describes setup and operation of the Lasair II particle counter 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 particle counter for routine sampling, see chapter 4, “Setup” and Chapter 5 “Operation.” Depending on the chosen certification standard and other variables, the Lasair II particle counter will determine the minimum requirements to certify a cleanroom.

Lasair II particle counter supports the following standards:

- ISO 14644-1
- EU-GMP
- Simultaneous EU-GMP and ISO 14644-1
- FS-209E
- BS5295

In addition, *Average* mode calculates simple statistics on data from one or more locations.

The settings that may be changed vary with the standard (or Average mode). If a standard does not allow change to a variable, that variable will be disabled in the setup screen.

## Statistics Mode 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, then 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, numerically without needing to manually input and select location names.

## Statistics Mode Screens

- **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 particle counter 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, and to set initial and inter-sample delays.

See the following sections for details about each screen.

The following screens are functionally changed 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.
  - Units cannot be changed while statistics is enabled.
  - Continuous sampling cannot be selected.
  - Group repeat mode 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.

## Cleanliness Standards

The standards tables are reproductions of the targets for each of the international standards supported by the Lasair II particle counter. The blank areas of the tables represent invalid settings. For example, the ISO 14644-1 standard does not allow certification of a class 1 cleanroom using a 0.3+  $\mu\text{m}$  particle size.

### ISO 14644-1 Standard

The document, ISO 14644-1 (1999-05-01), was used when designing the ISO 14644-1 module. Only the classes specified in the document's tables have been implemented; The Lasair II particle counter does not support intermediate class sizes or intermediate particle sizes.

| Maximum Particles per M <sup>3</sup> |           |           |           |            |           |           |
|--------------------------------------|-----------|-----------|-----------|------------|-----------|-----------|
| Class                                | 0.1 $\mu$ | 0.2 $\mu$ | 0.3 $\mu$ | 0.5 $\mu$  | 1.0 $\mu$ | 5.0 $\mu$ |
| ISO 1                                | 10        | 2         |           |            |           |           |
| ISO 2                                | 100       | 24        | 10        | 4          |           |           |
| ISO 3                                | 1,000     | 237       | 102       | 35         | 8         |           |
| ISO 4                                | 10,000    | 2,370     | 1,020     | 352        | 83        |           |
| ISO 5                                | 100,000   | 23,700    | 10,200    | 3,520      | 832       | 29        |
| ISO 6                                | 1,000,000 | 237,000   | 102,000   | 35,200     | 8,320     | 293       |
| ISO 7                                |           |           |           | 352,000    | 83,200    | 2,930     |
| ISO 8                                |           |           |           | 3,520,000  | 832,000   | 29,300    |
| ISO 9                                |           |           |           | 35,200,000 | 8,320,000 | 293,000   |

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

International Standards Organization  
Web Site: [www.iso.ch](http://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](mailto:Publicationsales@iest.org) or [iest@iest.org](mailto:iest@iest.org)  
Web Site: [www.iest.org](http://www.iest.org)

## EU-GMP Standard

The EU-GMP standard is similar to the ISO-14644 standard. This standard is based on the document “EU Guide to Good Manufacturing Practice; Revision to Annex 1.”

As a derivative of the ISO standard, the EU-GMP standard uses many of the ISO rules. However, a comparison between the two standards show the differences in the sampling required as well as the particle concentrations.

- For Grade A the sample volume is a Minimum Total of 1 m<sup>3</sup>.
- For Grade C or Grade D the sample volume is the same as ISO.

**Simultaneous EU-GMP and ISO:** The EU-GMP & ISO mode allows the user to sample the cleanroom one time, then generate reports for **both** the EU-GMP and the ISO-14644 standards. Table 7-2 shows EU-GMP and corresponding ISO classes that can be calculated concurrently with the Lasair II particle counter.

**Table 8-1: EU-GMP Class Standards**

| Grade | Maximum Particles per M <sup>3</sup> |        |              |             |
|-------|--------------------------------------|--------|--------------|-------------|
|       | At Rest                              |        | In Operation |             |
|       | 0.5 µm                               | 5 µm   | 0.5 µm       | 5 µm        |
| A     | 3,520                                | 20     | 3,520        | 20          |
| B     | 3,520                                | 29     | 350,000      | 2,900       |
| C     | 350,200                              | 2,900  | 3,520,000    | 29,000      |
| D     | 3,520,000                            | 29,000 | not defined  | not defined |

**Table 8-2: ISO Classes Corresponding to EU-GMP Classes**

| EC-GMP Grade | At Rest | In Operation |
|--------------|---------|--------------|
| A            | ISO 5   | ISO 5        |
| B            | ISO 5   | ISO 7        |
| C            | ISO 7   | ISO 8        |
| D            | ISO 8   | N/A          |

**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 to a minimum of five samples. This may result in six or more samples being taken so that the Lasair II particle counter will accept the result.

**Table 8-3: FS-209 Class Standards**

| Maximum Particles Per Unit Volume |         |                |                  |                |                  |                |                  |                |                  |                |                  |
|-----------------------------------|---------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|
| Class                             |         | 0.1 $\mu$      |                  | 0.2 $\mu$      |                  | 0.3 $\mu$      |                  | 0.5 $\mu$      |                  | 5.0 $\mu$      |                  |
| SI                                | English | m <sup>3</sup> | ft. <sup>3</sup> | m <sup>3</sup> | ft. <sup>3</sup> | m <sup>3</sup> | ft. <sup>3</sup> | m <sup>3</sup> | ft. <sup>3</sup> | m <sup>3</sup> | ft. <sup>3</sup> |
| <b>M1</b>                         |         | 350            |                  | 75.7           |                  | 30.9           |                  | 10.0           |                  |                |                  |
| <b>M1.5</b>                       | 1       | 1,240          | 35.0             | 265            | 7.50             | 106            | 3.00             | 35.3           | 1.00             |                |                  |
| <b>M2</b>                         |         | 3,500          |                  | 757            |                  | 309            |                  | 100            |                  |                |                  |
| <b>M2.5</b>                       | 10      | 12,400         | 350              | 2,650          | 75.0             | 1,060          | 30.0             | 353            | 10.0             |                |                  |
| <b>M3</b>                         |         | 35,000         |                  | 7,570          |                  | 3,090          |                  | 1,000          |                  |                |                  |
| <b>M3.5</b>                       | 100     |                |                  | 26,500         | 750              | 10,600         | 300              | 3,530          | 100              |                |                  |
| <b>M4</b>                         |         |                |                  | 75,700         |                  | 30,900         |                  | 10,000         |                  |                |                  |
| <b>M4.5</b>                       | 1,000   |                |                  |                |                  |                |                  | 35,300         | 1,000            | 247            | 7.00             |
| <b>M5</b>                         |         |                |                  |                |                  |                |                  | 100,000        |                  | 618            |                  |
| <b>M5.5</b>                       | 10,000  |                |                  |                |                  |                |                  | 353,000        | 10,000           | 2,470          | 70.0             |
| <b>M6</b>                         |         |                |                  |                |                  |                |                  | 1,000,000      |                  | 6,180          |                  |
| <b>M6.5</b>                       | 100,000 |                |                  |                |                  |                |                  | 3,350,000      | 100,000          | 24,700         | 700              |
| <b>M7</b>                         |         |                |                  |                |                  |                |                  | 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

## 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. The Lasair II particle counter 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  $\pm 5\%$  (24 Liters per minute). The Lasair II particle counter 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 ( $.0274 \text{ m}^3$ ).

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.

**Table 8-4: BS 5295 Sample requirements**

| Maximum Particles Per $\text{M}^3$ |           |           |           |            |            |                       |         |
|------------------------------------|-----------|-----------|-----------|------------|------------|-----------------------|---------|
| Class                              | 0.3 $\mu$ | 0.5 $\mu$ | 5.0 $\mu$ | 10.0 $\mu$ | 25.0 $\mu$ | Area ( $\text{M}^2$ ) | 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:

BSI Standards  
 389 Chiswick High Road  
 London W44 AL  
 Tel: 0181 996 9000  
 Fax: 0180 996 7400  
 e-mail: [info@bsi.org.uk](mailto:info@bsi.org.uk)

## **Alarms in Statistical Mode**

When the statistics mode is enabled, global alarms are automatically disabled. They can, however, be manually enabled while in statistics mode.

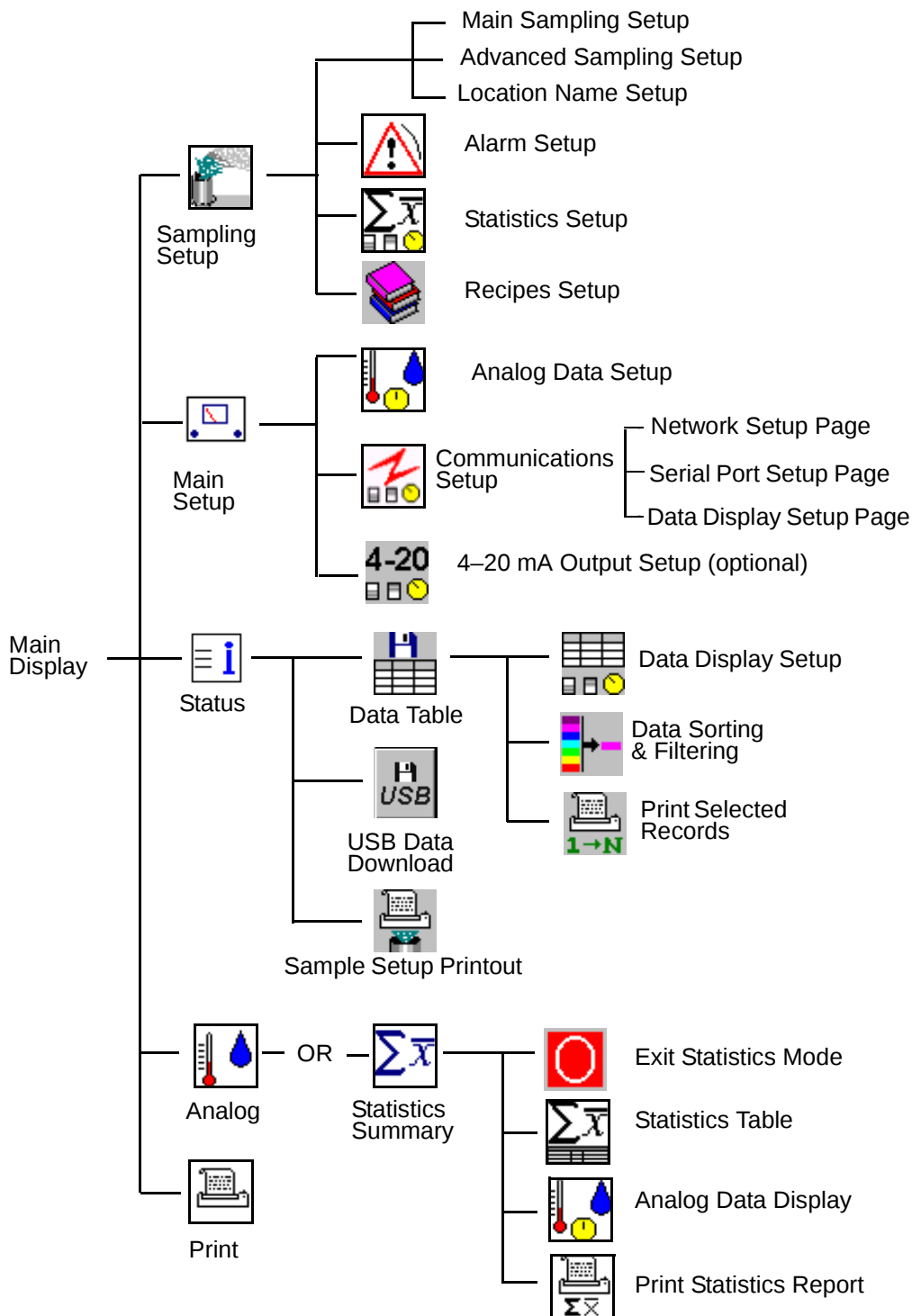
When the statistics mode is disabled, global alarms will not be automatically re-enabled. If the global alarms function is desired, it must be manually enabled.

## **Communications in Statistics Mode**

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

## Hierarchy of Screens in Statistical Mode

The Lasair II particle counter uses a hierarchy of setup screens and displays. When familiar with the hierarchy, you can navigate the screens and displays with greater ease. Take some time to access the different screens so that you can build a picture of the layout.



## Statistics Setup Screens

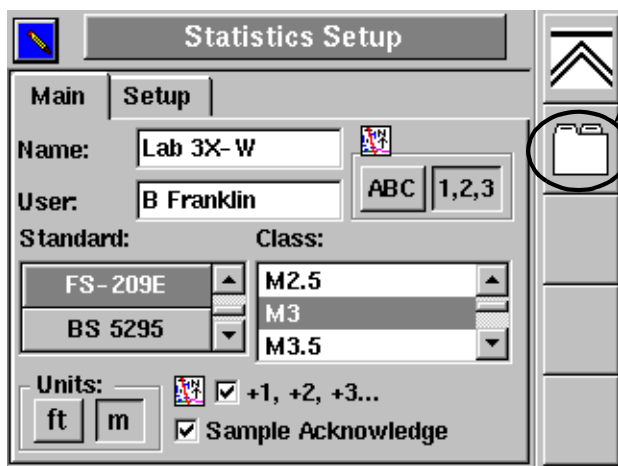
The *Statistics Setup* screen is where you will make the settings for the standard you will be using and the area you will be sampling. The *Statistics Setup* Screen has two pages, the *Main* page and the *Setup* page.

### 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* page.

### Statistics Setup Main Screen

Before the edit mode is activated, this icon's softkey will toggle between the *Main* and *Setup* pages.



**Figure 8-1: Statistics Setup Screen - Main Page**

**Name:** Enter the name of the area that will be certified. Example: *Cleanroom B*. This name is included in the printed report CSV file output.

**User:** The name of the person who will be collecting the data. This is printed in the report.

**Standard:** Select one of the standards or the *Average* function.

**Class** Select the appropriate cleanroom class from the list.

**Units:** Determines the unit of measure and may be preset depending on the standard chosen. *FS-209E* or *Average* allow the choice of feet or meters. ISO-14644-1, EC-GMP, and BS-5295 standards force the use of meters.



+1, +2, +3... **Auto Increment.** When this check box is filled, the Lasair II particle counter automatically changes the location when sampling at one location is complete. This option can be changed while the statistics mode is enabled.

**Sample Acknowledge** When this check box is filled, the Lasair II particle counter prompts for an acknowledgement after each sample. This option can be changed while the statistics mode is enabled.

**ABC... or 1,2,3...** Select **ABC . . .** or **1, 2, 3 . . .** ABC will select either location names or location numbers. This option cannot be changed once statistics has been enabled.

## About Location Names or Numbers

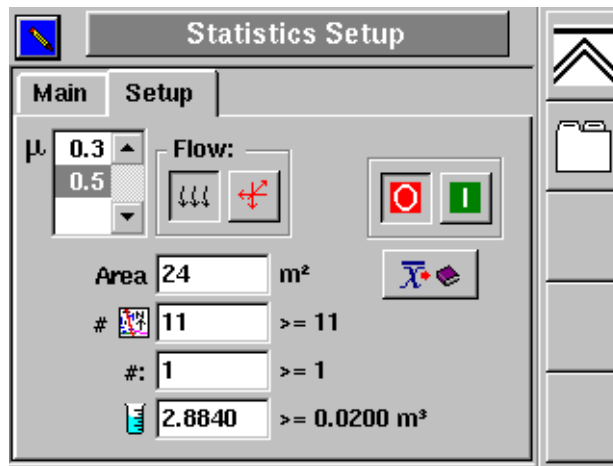
During the statistical certification process, you will move the unit to different locations for sampling. The particle counter allows you to choose one of the two following options for identifying those locations.

- 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* page.

**Highly Recommended:** If both *1,2,3* and *Auto increment* are selected, the Lasair II particle counter automatically assigns a sequence of 3-digit numbers to each new location sampled within this cleanroom.

## Statistics Setup-Setup Screen



**Figure 8-2: Statistics Setup Screen - Setup Page**

μ Select the particle size for the ISO-14644-1 standard, FS-209 standard, or the averaging function. This field is not selectable when either the BS-5295 or EC-GMP or EC-GMP & ISO standard is used.

**Note:** To evaluate results for multiple particle sizes, the largest particle of interest **must** be selected. Otherwise, the sample volume may be inadequate for large particles.

Flow   Used for the FS-209 standard only. Select the type of flow in the cleanroom being certified, uni-directional or multi-directional. This setting may influence the number of locations that must be sampled.

Area Input the size of the cleanroom you are certifying.

#  The minimum number of locations is calculated and displayed by Lasair II particle counter. Accept the minimum number of locations or increase it if allowed by the international standard.

#: Number of samples at each location. **Note:** The system is not designed to have a different number of samples at each location.

 The minimum sample volume collected 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.



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* or *Statistics Results* screen. Also, once the statistics mode is enabled, most parameters are locked out.



This button saves the Statistics Setup as a recipe. See Chapter 9, "Recipes".

## Statistics Mode Operation

Once you have set up the Lasair II particle counter for sampling, operation is a simple matter. Use the following steps to operate the particle counter.

### Collecting Sample Data

#### To collect sample data:

- 1 After setting the variables for the statistics function and enabling the statistics mode, take the Lasair II particle counter to the first sampling location.
- 2 If you are using wall power, plug in the unit.
- 3 If the particle counter 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 particle counter is in statistics



mode. The statistics mode icon will be visible on the main display.

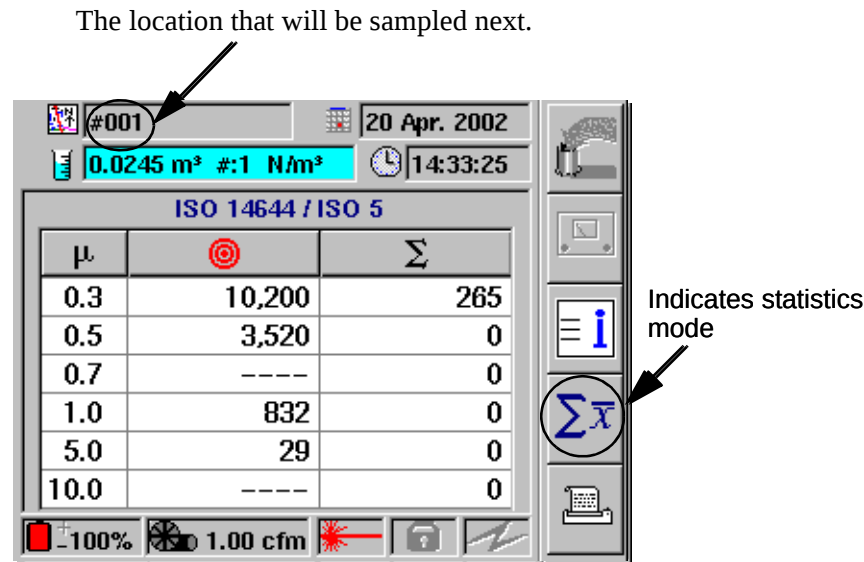
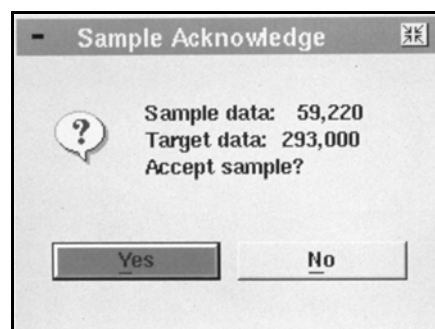


Figure 8-3: Main Display Screen when Statistics Mode is Enabled

- 5 Press the green Start button  on the control panel. The pump begin to circulate air through the unit. After an initial delay (to purge the sample path), 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 stops.

### When Sample Acknowledge is Activated

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



Press the *Enter* key to accept the sample or use the right arrow button to move to “No” and then press the *Enter* key to reject the sample. Rejected samples are labelled as invalid and are not used in calculations. However, they are still stored in memory and printed on the final report.

## Using Auto-incrementing

Use this instruction when using auto-incrementing of Lasair II particle counter Location Names/Numbers.

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 particle counter to the next location.
- 3 Acknowledge the dialog box by pressing the *Enter* button.

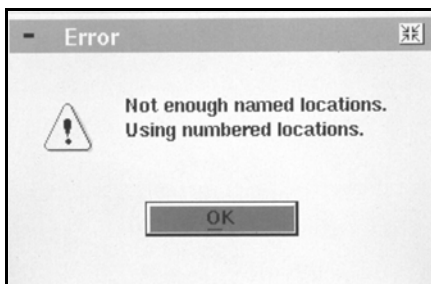
---

**NOTE:** On the *Main Display*, observe that Lasair II particle counter increments 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 particle counter indicates that all samples are complete.

**NOTE:** If auto-incrementing location names is not being used, ensure that there are enough locations names to enable each sample location to have its own unique name. If there are insufficient location names, the Lasair II particle counter will display an error message and default to *Auto-incrementing of Lasair II-generated location numbers*. See “Location Name Setup Screen” on page 5-10.



Ensure that the actual sampling location matches the location name. The Lasair II particle counter will increment the location names in the order that they are stored in the location name list *starting* with the location name highlighted in the *Sampling Setup Screen*. For example, if 10 location names exist, and sampling starts at the seventh name, sampling will proceed in the following order: 7, 8, 9, 10, 1, 2, 3, 4, 5, 6.

### 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 particle counter to the next location.
- 2 Acknowledge the dialog box by pressing the *Enter* button.



**NOTE:** On the *Main Display*, observe that Lasair II particle counter 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 particle counter notifies you that all samples are complete.

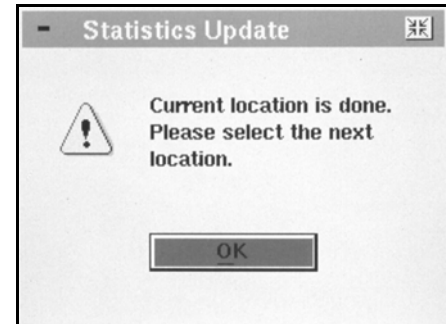
---

## 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:

**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 particle counter to the location that matches the location name you have selected.



---

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

---

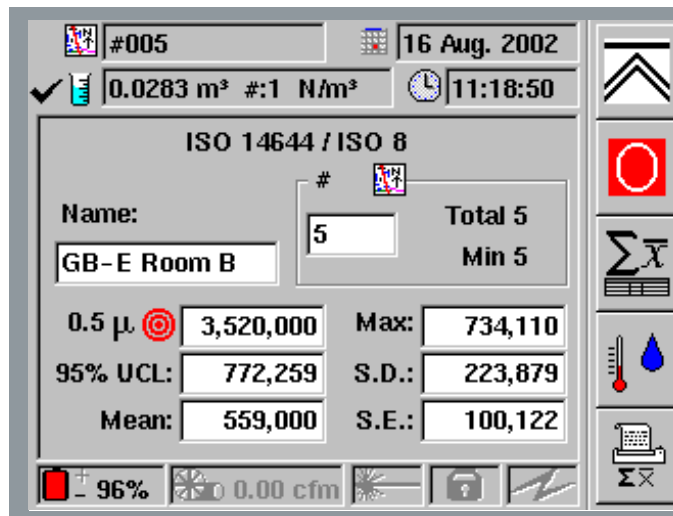
- 7 Ensure that the proper location appears on the display and then press the *Start* button to collect the next sample
- 8 Move the particle counter to the next sampling location and continue sampling until all locations are sampled or terminate sampling if you must.

## Observing Statistical Results

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.



**Figure 8-4: Statistics Summary Screen**

The following data is displayed on the Statistics Summary screen.

**Table 8-5: Statistics Summary Screen Data**

| Data                                                                                              | Definition                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ISO 14644/ISO 9</b>                                                                            | the name of the user-selected standard and class                                                                                                                                                                                                                                               |
| <b>Name:</b>                                                                                      | the user-assigned name of the room that is being sampled                                                                                                                                                                                                                                       |
| Sample locations completed, Total number of locations, and Minimum number of locations            | Example: 5 locations have been completed. The total number of locations planned to be sampled was five. The minimum number of locations requested is 5. If the BS-5295 standard is <i>not</i> being used, the user may set the total number of locations to a number greater than the minimum. |
| <b>0.5 µm</b>  | Target maximum particle concentration for particles of that size (i.e., 0.5 µm). Applicable to FS-209 and ISO-14644-1 only                                                                                                                                                                     |
| <b>95% UCL:</b>                                                                                   | 95% Upper Confidence Limit—applicable to ISO-14644-1 and FS-209                                                                                                                                                                                                                                |
| <b>Mean:</b>                                                                                      | Mean particle concentration for all sampled locations. This number will be displayed red if it is greater than the target maximum particle concentration.                                                                                                                                      |

**Table 8-5: Statistics Summary Screen Data (Continued)**

| <b>Data</b>  | <b>Definition</b>                              |
|--------------|------------------------------------------------|
| <b>Max:</b>  | Maximum concentration of all sampled locations |
| <b>S.D:</b>  | Standard Deviation                             |
| <b>S.E.:</b> | Standard Error.                                |

## Statistics Summary Screen Softkey Function



Stop statistical sampling and exit the statistical mode. A pop-up dialog box will ask for confirmation of this action.



Open the Statistical Sample Table Screen.



Open the Analog Data Screen.



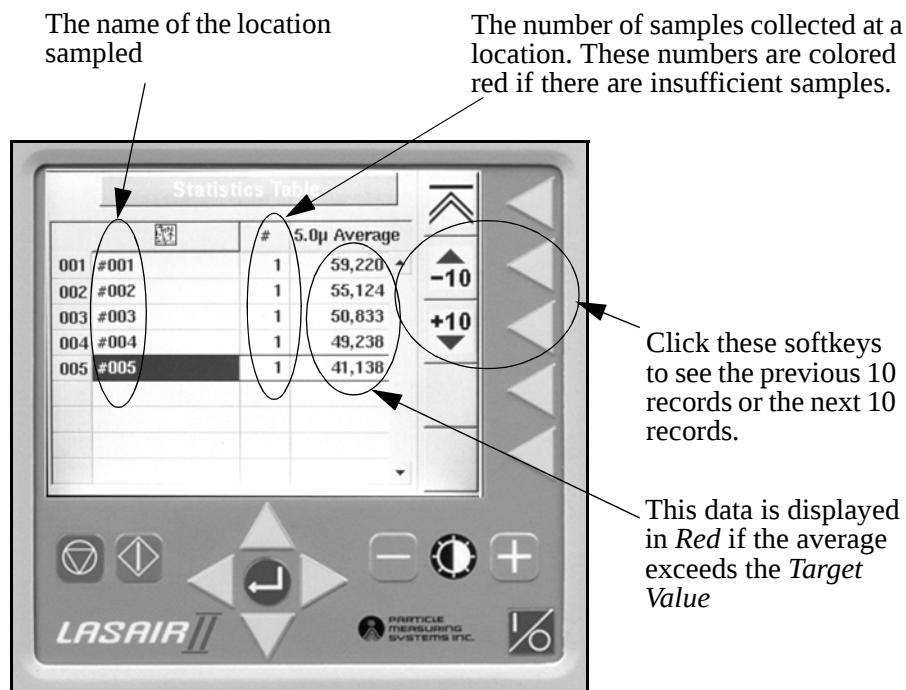
Print Statistical Data.

## Statistics Data Table Screen

This screen displays location status.

### To open the Statistics Table:

- 1 From the Main Display, press the Statistics icon  softkey to open the *Statistics Summary* screen.
- 2 Press the Statistics Data Table icon  softkey to open the *Statistics Data Table* screen.

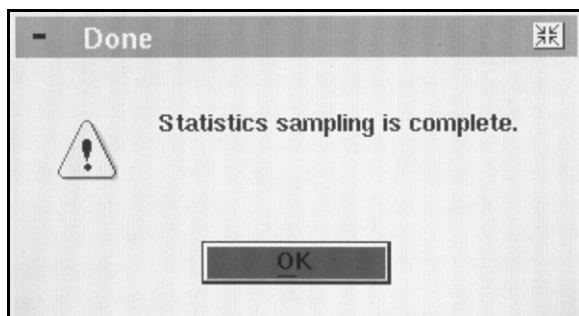


For BS-5295, only the smallest channel is shown

**Figure 8-5: Statistics Table Screen**

## When All Samples Are Complete

When all samples are complete, the following dialog box will appear:



Press the Enter button to acknowledge the dialog box.

---

## Interrupting a Sample

### To turn sampling OFF:

Press the red Pump Stop Button  on the left side of the control panel. Sampling may be stopped before the sampling sequence is completed. When stopped before completion, the sample data run will be marked *invalid* if the sample volume is less than the required minimum.

## Disabling the Statistics Mode

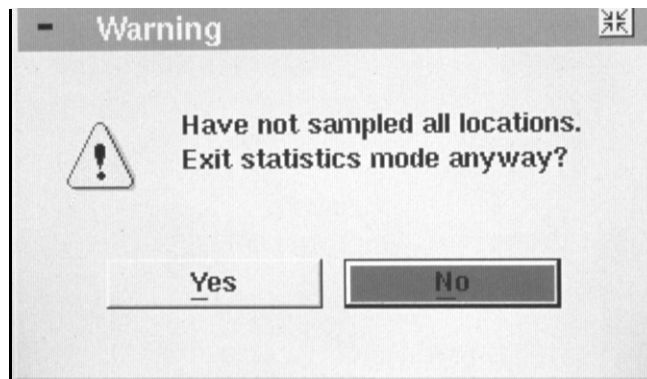
You may need to disable the statistics mode in the following circumstances:

- when the *Statistics Setup* parameters must be changed
- when the area being sampled for certification is found to be hopelessly out of specification
- when you are done sampling

| CAUTION                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Before disabling the statistics mode, ensure that all required reports have been printed. Once the statistics mode is disabled, reports cannot be printed. CSV data can still be downloaded by means of the web browser interface allowing statistical information to be generated by an experienced user. |

### 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* and highlight the *Off* icon and then press the *Enter* button. If all required samples have not been completed, the following warning will appear:



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

## Printing a Statistics Report

The Lasair II particle counter can print a report with details of the sampling results.

**To print a sampling report:**



Press the *Statistics Print* icon softkey.

The Supplemental Channels dialog box will open.

## Printing Supplemental Channel Data

The Supplemental Channels dialog box is displayed whenever you select Print Statistics.



**Figure 8-6: FS-209 Supplemental Channels Dialog Box**

This dialog box enables selection of particle size channels to print *in addition to* the size(s) used in the sample setup. The additional channels are not used for determining clean-room qualification and are not necessarily statistically valid. The report lists the supplemental data after the normal statistics printout.

## Printout and Legend

The following is an example of the Lasair II particle counter's Statistics Report generated when a room is certified to the ISO 14661-1 standard. The lines have been numbered to allow a more comprehensive description of the information provided below the printout.

### Sample Printout

|    |                                                                |      |           |         |
|----|----------------------------------------------------------------|------|-----------|---------|
| 1  | ISO 14644 / ISO 8 / 0.5μ                                       |      |           |         |
| 2  | 2003/11/11 14:08:24                                            |      |           |         |
| 3  | LASAIR II-310                                                  |      |           |         |
| 4  | S/N: 31129                                                     |      |           |         |
| 5  | Cal Date: 2003/06/14                                           |      |           |         |
| 6  | Room: ABCD                                                     |      |           |         |
| 7  | Area: 2 M <sup>2</sup>                                         |      |           |         |
| 8  | (Flow: (NOTE: This line is printed only for the FS-209 report) |      |           |         |
| 9  | # Locations: 2                                                 |      |           |         |
| 10 | Planned Samples/Location:                                      |      |           |         |
| 11 | Min Sample: 0.0283 cm                                          |      |           |         |
| 12 | Volume/Sample                                                  |      |           |         |
| 13 | Status: PASS                                                   |      |           |         |
| 14 | By: Matt Michaelis                                             |      |           |         |
| 15 | Target                                                         | 0.5μ | 3,520,000 |         |
| 16 | 95% U.C.L.                                                     | 0.5μ | 387,656   |         |
| 17 | Mean                                                           | 0.5μ | 271,014   |         |
| 18 | S.D.                                                           | 0.5μ | 26,192    |         |
| 19 | S.E.                                                           | 0.5μ | 18,458    |         |
| 20 | Location                                                       | #    | μ         | Σ(N/cf) |
| 21 | #001                                                           | 1    | 0.5μ      | 252,529 |
| 22 | #002                                                           | 1    | 0.5μ      | 289,499 |

| Printout Legend |                                             |                                                                                          |
|-----------------|---------------------------------------------|------------------------------------------------------------------------------------------|
| Line No         | Text or Data                                | Description                                                                              |
| 1a              | ISO 14644                                   | Type of statistical report                                                               |
| 1b              | ISO 8                                       | Cleanroom classification being tested                                                    |
| 1c              | 0.5μ                                        | Size of key particle                                                                     |
| 2a              | 2003/11/11                                  | The date the first statistics sample was taken (yyyy/mm/dd)                              |
| 2b              | 14:08:24                                    | Time the first sample was taken                                                          |
| 3               | LASAIR II-310                               | Lasair II particle counter's model number                                                |
| 4               | S/N: 31129                                  | Lasair II particle counter's serial number                                               |
| 5               | Cal Date: 2003/06/04                        | Date the particle counter was last calibrated                                            |
| 6               | Room: ABCD                                  | Room name                                                                                |
| 7               | Area: 2 m <sup>2</sup> )                    | Area of cleanroom being certified                                                        |
| 8               | Flow: NONUnidirectional (or Unidirectional) | Type of airflow. <i>Only printed on FS-209 reports.</i>                                  |
| 9               | # Locations: 2                              | Number of locations to be sampled                                                        |
| 10              | Planned Samples/Location: 2                 | Number of samples per location                                                           |
| 11              | Min Sample Volume: 0.0283 cm                | Minimum volume to be sampled                                                             |
| 12              | Volume/Sample                               | Volume taken per sample                                                                  |
| 13              | Status: PASS                                | Result of the sampling process, either PASS, FAIL, or INCOMPLETE.                        |
| 14              | By: Matt Michaelis                          | Name of the person conducting the sample                                                 |
|                 |                                             |                                                                                          |
| 15              | Target 0.5μ                                 | From chosen standard's table of target data. An average mode will show for all channels. |
| 16              | 95% U.C.L. 0.5μ                             | Statistical Upper Confidence Limit (for 2–9 locations only).                             |
| 17              | Mean 0.5μ                                   | Mean of all locations                                                                    |
| 18              | S.D. 0.5μ                                   | Standard Deviation of all location means                                                 |
| 19              | S.E. 0.5μ                                   | Standard Error of all location means                                                     |
|                 |                                             |                                                                                          |
| 20a             | Location                                    | Name or number of location sampled                                                       |
| 20b             | #                                           | Number of samples collected                                                              |
| 20c             | μm                                          | Size of key particle                                                                     |
| 20d             | Σ(N/cf)                                     | Number of particles detected, normalized by volume sampled                               |
| 21              | #001                                        | Location #001's values for variables 20a, b, c, & d                                      |
| 22              | #002                                        | Location #002's values for variables 20a, b, c, & d                                      |

---

## Invalid Sample Data

---

**NOTE:** Invalid data are not used in calculations. However, they are saved with the other sample records.

---

|            |                          |                                                                                                                                                                                                                                                                                                                              |
|------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>23a</b> | INVALID (or<br>VALID)    | The condition of the data: VALID, INVALID, or INCOMPLETE.<br>A sample is made invalid by one of the following conditions: <ul style="list-style-type: none"><li>• The user has marked the sample invalid in the Sample Acknowledge mode</li><li>• A pump error has occurred.</li><li>• A laser error has occurred.</li></ul> |
| <b>23b</b> | 2000/11/16               | The date of the last sample                                                                                                                                                                                                                                                                                                  |
| <b>23c</b> | 14:07:06                 | The time of the last sample (hour:minute:second)                                                                                                                                                                                                                                                                             |
| <b>24a</b> | #002                     | The name or number of the area that was being sampled when an error occurred                                                                                                                                                                                                                                                 |
| <b>24b</b> | Alarm:Pump<br>(or Laser) | The type of error detected by the Lasair II particle counter                                                                                                                                                                                                                                                                 |

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## Chapter 9

# Recipes

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A recipe is a set of sampling or statistics parameters which can be saved and recalled to aid in instrument setup. A recipe may be loaded either explicitly by name, or implicitly by attaching a recipe to a location name, and then setting the instrument to that location. Tying locations to recipes, allows configuration of the Lasair II particle counter for use by less experienced personnel. In addition, if password protection is employed, the user can still select from the list of locations by means of the Sampling Setup Screen, and load the recipe. However, the user will be unable to change any other settings.

Recipes are created by saving the current sampling or statistics setup information into battery backed-up RAM and then assigning the setup an associated recipe name. Recipes can be saved from the Recipe Setup Screen, or from the sampling or statistics setup screens.

Recipes can be saved or retrieved from a computer using the Web Server interface. This interface provides the same recipe load and save features as the front panel, but it has an extra screen solely for uploading and downloading.

## Recipe Database

The recipe database can hold any combination of fifty sample or statistics recipes. The location database can associate each location name with a recipe. One recipe can be associated with any number of locations.

## Sample Recipe Data

The following is a list of all the parameters saved in a sample recipe:

- Recipe Name
- Sample Type (volume or time)
- Sample Size (volume or time)
- Initial Purge Delay (seconds)
- Start by Time Of Day ON/Off (Overwrites Purge Delay if ON)
- Inter-Sample Delay (seconds)

- Number of Samples
- Continuous Sampling (ON/OFF)
- Group Repeat Mode (ON or OFF)
- Sample Units (CFM or cubic cm per minute)
- Data Display (raw or normalized)
- Auto-Print Sample
- Auto-Print Sample Average (for two or more samples).
- Temperature probe units (°C or °F)
- Alarms On/Off
- Alarm Buzzer On/Off
- Particle Alarm Type (Differential/Cumulative)
- For Each Particle Size:
  - Alarm Setting
  - Alarm On/Off
- For Each Analog Channel:

|                     |                     |
|---------------------|---------------------|
| ◆ Min Alarm Setting | ◆ Max Alarm Setting |
| ◆ Min Alarm On/Off  | ◆ Max Alarm On/Off  |

## Statistics Recipe Data

The following is the list of all parameters saved for a statistics recipe:

- Recipe Name
- Room Name
- Statistics Type:
  - ISO-14644-1
  - EU-GMP
  - EU-GMP and ISO
  - FS-209E
  - BS-5295
  - Average of locations
- Units (ft./m) Valid for FS-209E or Average only

- Class: (Except for Average)
- Auto-Increment Location (On/Off)
- Sample Acknowledge (On/Off)
- Sample Location Type (Names/Numbers)
- Particle Size (Except BS-5295)
- Flow: (Uni-directional/multi-directional) (FS-209E only)
- Room Area (Except Average)
- Number of Locations to Sample
- Volume per Sample
- Number of samples per location

### **Information not Saved for a Statistics Recipe**

- Statistics User Name
- Sampling Setup Screen parameters. The number of samples is automatically set when statistics are enabled, except for average mode. In average mode, the current sample count is used if possible.
- Alarm settings. By default alarms are disabled during statistics.

## **Recipe Setup Screen**

The recipe setup screen is located under the Sampling Setup Screen. From the main display screen, select the  button (1st button). Then select the  button (5th button).

The Recipe Setup Screen has the following two pages:

- The “Setup” page allows creating, deleting and printing recipes. Sampling recipes are displayed in cyan, and statistics recipes are shown in purple.
- The “Locations” page allows recipes to be attached to location names.

## Recipe Setup Screen - Setup Page

Use this screen to create, delete, and print recipes. See Figure 9-1, “Recipe Setup Screen, Setup Page,” on page 9-5.

Control buttons are as follows:



This button loads the highlighted recipe into the current settings for the Lasair II particle counter.



This button saves the current sampling parameters to a recipe. A prompt for the recipe name is displayed when this button is activated. The default name is whatever recipe is currently highlighted. If an existing recipe name is used, the recipe is replaced with the new parameters. A statistics recipe may be re-written with a sampling recipe, and vice-versa. A copy of this button is also on the Sampling Setup Screen for convenience in creating new sampling recipes.



This button saves the current statistics parameters to a recipe. It operates like the save sampling parameters. For convenience, a copy of this button is also on the statistics setup page.



This button deletes the currently highlighted recipe. A recipe cannot be erased if it is attached to one or more locations. The location attachments must be deleted first.



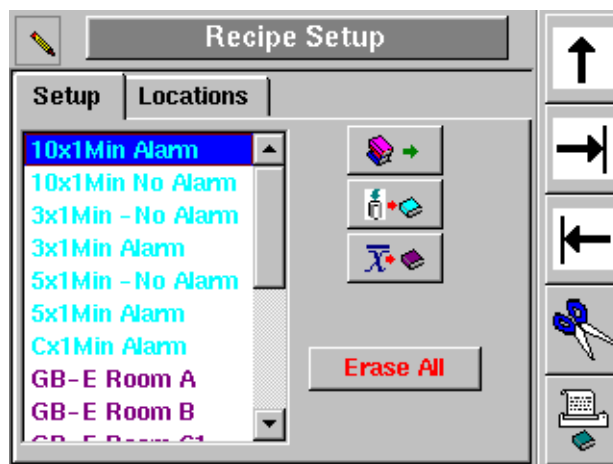
This button erases all recipes. A warning/confirmation prompt is displayed before the recipes are erased. If locations are attached to recipes, then either the attachments must be deleted, or the locations must be deleted before the recipes can be deleted.



This button prints the highlighted recipe.

## Recipe Names

Recipe names may be up to 16 characters. The following characters are illegal in recipe names: \, /, \*, ?, ", <, >, :, and |.



**Figure 9-1: Recipe Setup Screen, Setup Page**

Figure 9-2, “Setup Screen, Locations Page,” on page 9-7, shows the location association page of the Recipe Setup Screen. This display is a table of all the locations and recipe associations. Each recipe can be associated with multiple locations.

### To select a recipe to run at a location:

- 1 Open the Recipe Screen-Location Page
- 2 Press the blue enter key, to enter edit mode.
- 3 Use the tab or back-tab soft-keys to move the cursor into the recipe column.
- 4 Use the up and down arrows (or the +10, -10 soft-keys) to move to the desired location.
- 5 If you are unable to select a location, move the cursor to the recipe Sort radio button and press the Enter button. Repeat step 3.
- 6 Press the blue enter key. This displays the list of recipes that can be initiated by the chosen location.

---

**NOTE:** If the list of recipe names are in two colors, the cyan colored names are for sample recipes and the purple colored names are for statistical recipes.

---

- 7 Select the desired recipe, and hit the blue enter key. The recipe you have chosen will appear alone to the right of the associated location name.
- 8 Exit the edit mode.
- 9 When a sample is started, the recipe associated with the location will be performed.

**To disassociate a recipe and location:**

- 1 Ensure that the location name you want to disassociate is highlighted in blue.
- 2 Use the up-pointer to move to the blank entry at the top of the list.
- 3 Press the enter button. The recipe name alongside the location name will disappear. The recipe has not been deleted from the data base. It is only disassociated from the location name.

**To sort the list of location names or recipe names:**

- 1 The Sort buttons at the bottom of the page, allows the table to be sorted either by location name, or by recipe name, and then location name.

**Editing Recipes by means of the Web Server feature**

The Web Server feature also allows editing recipes. It has the additional capability of saving the recipe and recipe/location association data to a computer. Details are listed as follows.

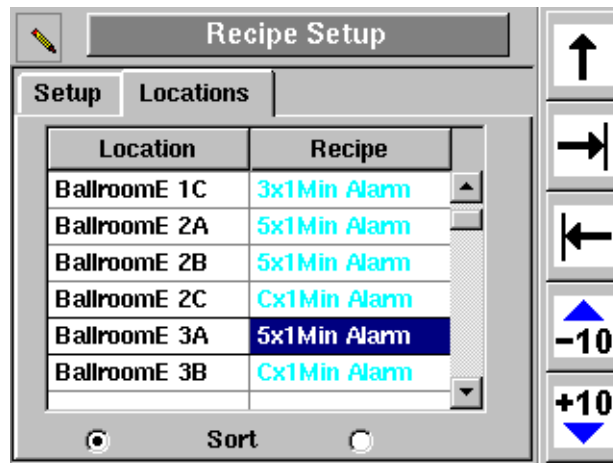
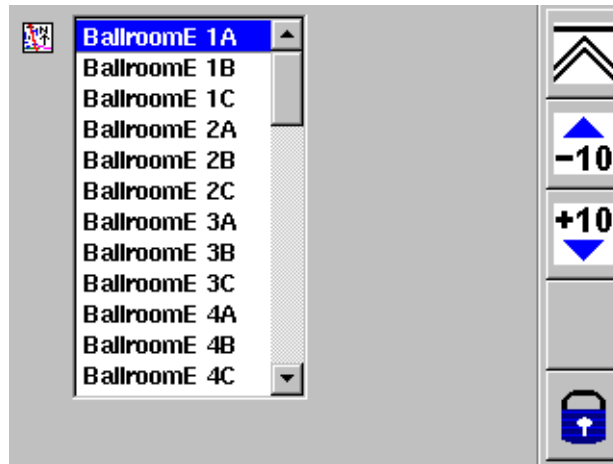


Figure 9-2: Setup Screen, Locations Page

## Loading and Using Recipes

Loading a recipe makes it the active set of sampling or statistical parameters. Recipes can either be loaded explicitly from the Recipe Setup Screen, or implicitly by selecting a location which has a recipe tied to it. To load the recipe on the setup screen, highlight the desired recipe and click the load button. If the recipe is a statistics recipe, a pop-up dialog box will appear after loading asking whether to enable the statistics mode.

When a recipe is tied to a location, selecting the location will automatically load the recipe. If password protection is disabled, a pop-up box will allow the user to choose not to load the recipe when the location is selected. Otherwise, if the password is enabled, the user is forced to load the recipe. Figure 9-3 shows the Sampling Setup Screen with password protection enabled. The user is limited to selecting a location, unless he has access to the password.



**Figure 9-3: Sample Setup Screen with Password Protection**

## Using Recipes with Different Lasair II Models

The Lasair II particle counter can load recipes which were initially created on instruments with different size channels. However, there are some issues to consider:

When loading a sample recipe from a different instrument, the Lasair II will attempt to set the particle alarms based on the original instrument. However, if alarms were set on sizes not on the new instrument, they cannot be set.

When loading a statistics recipe from a different instrument, if the new instrument doesn't have the particle size originally used to generate the recipe, the Lasair II particle counter will either select the smallest possible size, or else issue an error message, when attempting to load the recipe from the Web browser.

## Recipe Use with the Web Server (Using Internet Explorer)

Using the Web Server is similar to using the front panel for using and managing recipes. Figure 9-4 shows the Web page for recipe setup. This page combines both setup pages from the front panel. The page is accessed in a similar manner to the front panel control.

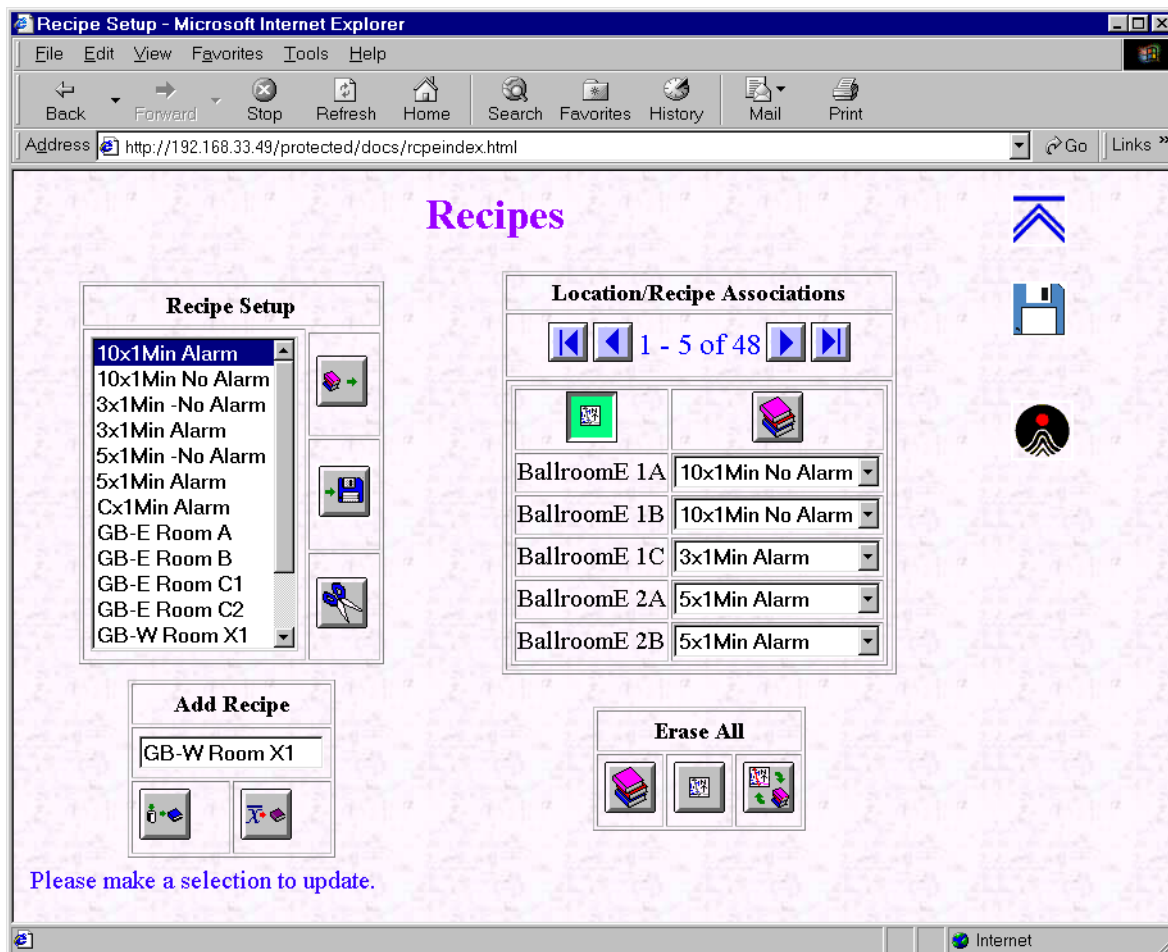


Figure 9-4: Recipe Setup Web Page

### Differences with the Web version:

- Sampling recipes are not shown in a different color than statistics recipes.
- The “Recipe Setup” window includes a button to save a recipe to the computer. (Note: all recipes can be saved using the “Transfer Files” page shown below.)
- The “Erase All” button erases all recipes, locations and recipe/location associations to speed up instrument configuration.

## Uploading and Downloading Files

A second recipe setup page, is devoted to uploading and downloading files. Figure 9-5, shows the “Transfer Files” page.

### To open the Unloading-Downloading page:

- 1 From the Recipes web page, click on the diskette icon.

The following three files can be uploaded and downloaded from this page:

**Location name files:** The location file is a text file with each line containing a single location name. The first line contains the number of location names in the file. The location names must start at the beginning of the line. The file can be edited with a text editor. **Recipe files:** The recipe file is a binary file that cannot be edited on the computer. The file has checksum protection to prevent corruption of the recipes. Recipe edits must be done on a Lasair II particle counter.

**Location/recipe associations:** This is a text file in CSV (comma separated values) format. Each line of the file contains a location name then a comma, then the recipe name. If the recipe name is blank, then when the file is loaded, any

associated recipe will be removed from the location. This file can be edited using a text editor or Excel, and then saved as a CSV file.

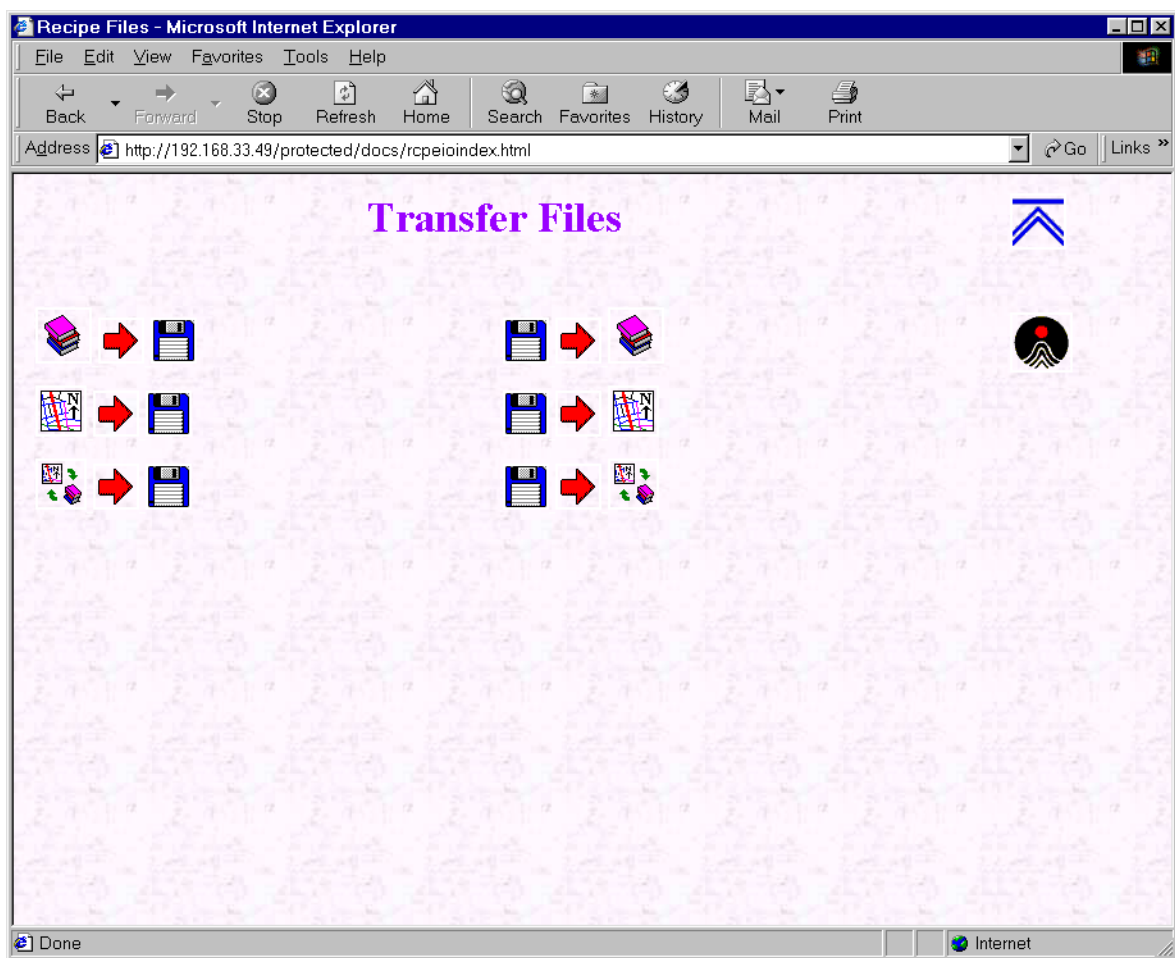


Figure 9-5: Recipe File-Transfer Web Page

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## Chapter 10

# Maintenance

---

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

- Cleaning and disinfecting the Lasair II particle counter
- Replacing the particle counter's printer paper roll
- Reconditioning the battery
- Other maintenance or operational problems

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**NOTE:** There are no user-serviceable parts inside the Lasair II particle counter case.

---

## Cleaning and Disinfecting

The Lasair II particle counter 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

### Tested Cleaning Chemicals

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

- PHENE-AHO Spray disinfectant, consisting of o-phenylphenol and ethyl alcohol
- STERI-PEROX, 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 particle counter 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 particle counter is resistant to liquids, it is not liquid proof. Do not submerge the particle counter in any liquid or apply large amounts of liquid. Always wipe away free standing liquid and wet wipe the particle counter after applying a cleaner. Never put liquids into the air intake port.

### WARNING

Always wear eye protection when working with cleaning chemicals.

#### To clean the Lasair II particle counter:

- 1 Turn the particle counter 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 particle counter and the isokinetic probe with the probe attached to the particle counter, 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 particle counter's connection for the Temperature/Relative Humidity sensor.
- 5 On the back of the Lasair II particle counter, 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 particle counter. 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 particle counter with the damp wipe. Finish by wiping the particle counter 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 particle counter.

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

---

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

---

## 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 the 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.

---

## Reconditioning the Battery

Over time, the battery charge level indicator will cease to accurately indicate the actual battery charge. In the worst case, the variance between the indicated charge level and the actual charge will be less than 10%.

To maintain the accuracy of the charge indicator, a full charge and drain cycle should be performed, with no intermediate cycles. This cycle, from full to empty, is known as reconditioning.

If it is important to maintain the maximum correlation between the battery charge indicator and the actual battery charge, you can also purchase and use the optional external battery charger (BC II). See Appendix K, "Accessories and Supplies". 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.

## Battery Disposal

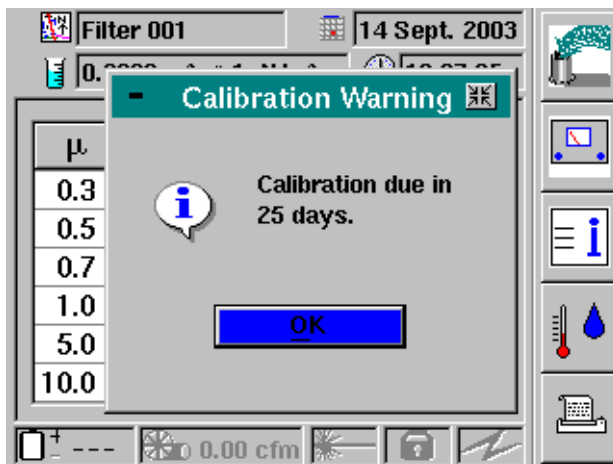
At end-of-life, batteries should be recycled or discarded safely. Discarding batteries in unsorted waste is improper disposal, and may be harmful to the environment and human health. Your local waste authority will have information on return and collection systems in your area.

For California consumers, contact Particle Measuring Systems, Customer Service Department at (877)-475-3317 for instructions on returning used, rechargeable batteries for reuse, recycling, or proper disposal at no cost.

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## Calibration

Calibration should be performed once each year. The Lasair II particle counter performs a calibration date check each time it is energized. If the current date is within 30 days or less of the anniversary of the last calibration, a warning message will be displayed.



**Figure 10-1: Calibration Warning Dialog Box**

The warning is displayed only on the main LCD display. It is not shown on the Web server. If the calibration date past due, (365 days since the last calibration date), the message will include the number of days the calibration is past due. The instrument also notifies the user if no calibration date is saved.

## Other Maintenance or Operational Problems

For other maintenance, call Particle Measuring Systems first for advice and technical information at 1-800-557-6363. There is nothing within the Lasair II particle counter case that requires user maintenance.

If you are experiencing operational problems that you are unable to solve, see Appendix A, "Troubleshooting".

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## Appendix A

### Troubleshooting

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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.

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

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#### **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 particle counter 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.

#### **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 particle counter is started.**

When starting the particle counter, the software generates an audible tone to indicate a successful startup check. The lack of a tone means the Lasair II particle counter startup was not successful. Press the OFF button and then try restarting the Lasair II particle counter 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 is nothing on the display.**

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

**E. The sample is invalid because the airflow is not 1 cubic foot per minute (1 CFM).**

**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 particle counter'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. Sampling is stopped because of pump flow error.**

This can be caused by the following conditions:

- pump over-current failure. If the pump draws too much current, it will shut down causing sampling to terminate.
- flow controller cannot control the flow to 1 CFM for 60 seconds or longer. This may be caused by a blocked inlet port or a damaged pump. In a manifold system, the displayed value is typically less than 1 CFM, but the software uses an internal value. More information about Lasair II particle counter flow with a manifold can be found in the *AM-II Operator's Manual*.
- a hardware error on the circuit board while attempting to read pressure and flow data

**Try the following:**

- 1 Rebooting the instrument.
- 2 If rebooting the instrument fails to correct the problem, call Particle Measuring Systems Service.

---

### **G. The Lasair II particle counter does not work on AC power.**

Try the following steps:

- 3** Ensure that the power cable is firmly connected at the power source and at the Lasair II particle counter case.
- 4** Have an electrician test the power cable to ensure it is not damaged.
- 5** If you have bought the battery option, try running the Lasair II particle counter on battery power.
- 6** If the power cable is connected properly, the power cable is undamaged, and the Lasair II particle counter runs on battery power (if you bought the battery option), then open the fuse cover next to the particle counter's power supply module and remove the fuse.
- 7** Test the fuse for continuity. If the fuse has failed, replace it with the spare fuse provided with the Lasair II particle counter. Be sure the fuse is correct for the operating voltage.

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

### **H. The Lasair II particle counter will not run on battery power.**

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

---

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

### **If the Lasair II particle counter operates on AC power:**

- 1** With the particle counter connected to AC power, allow the Lasair II particle counter's battery to recharge for at least an hour.
- 2** Restart the Lasair II particle counter 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 three to five hours in the optional battery charger. A fully discharged battery in the particle counter will recharge to 100% in five to ten hours at room temperature.
- 3** If the battery is not recharging, disconnect the Lasair II particle counter from AC power and try the following steps:

- 4 Open the battery enclosure cover and remove the battery.
- 5 Look into the battery enclosure and remove any foreign material that is preventing a good battery connection.
- 6 Clean the battery contacts with isopropyl alcohol and cotton swabs.
- 7 If nothing is obstructing the battery connections, call Instrument Service and Support.

**I. The battery is not recharging.**

A fully discharged battery will recharge to 100% in three to five hours in the optional battery charger. A fully discharged battery in the Lasair II particle counter will recharge to 100% in five to ten hours at room temperature.

Due to heating of the NiMH battery cells, the charger may periodically enter a *thermal wait state* for one to three hours. This is normal and is designed to prevent damage to the cells

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 contamination. If you find contamination, clean the contacts and then try charging the battery.
- 2 If the battery is hot, remove it from the Lasair II particle counter and allow it to cool to room temperature before continuing to charge.
- 3 If the battery still does not take and hold a charge, call Instrument Service and Support.

**J. The laser is not operating at an adequate power level.**

When this condition occurs, the Lasair II particle counter will print “Alarm: Laser ...” on the sample printout. Try running the sample again. If the problem continues, call Instrument Service and Support.

**K. 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 particle counter to clear the error condition.
- 3 If the problem persists, call Instrument Service and Support.

**L. When running the Lasair II particle counter with Facility Net, you notice gaps in the data plots. In addition, the date on the front panel of the particle counter changes to Jan 1, 1970.**

---

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

- 1 Start Facility Net and connect to the particle counter.
- 2 Select “About” under the “Help” menu.
- 3 Look at the scroll-down list and find the “pdrvlpn.dll” file. If the listed version number (to the right of “Label”) is LESS than 2.9.10 (that is, 2.9.08 or 2.9.07), call your Particle Measuring Systems representative or distributor.

**M. When attempting to use the web browser-to-Lasair II particle counter interface, you are blocked by a request for a password even though the password has been disabled on the particle counter.**

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

**N. When using the web browser-to-Lasair II particle counter 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.*

**O. Troubleshooting Network Connections**

- 4 Verify the correct network address, gateway and mask on the Comm Setup Screen. Also ensure that TCP/IP and/or Web Server buttons are checked.

---

**NOTE:** TCP/IP is DISABLED when the statistics mode is on. If the statistics mode is on, turning it off, will re-enable the TCP/IP. The Web Server is not disabled when statistics is on. For TCP/IP remote mode, the “Enable TCP/IP” button must also be on.

---

- 5 Check for an active network link. On the RJ-45 network plug to the Lasair II particle counter, verify that the green LED is on. The yellow LED will blink when information is transmitted or received.
- 6 Try *pinging* the instrument. From an MS-DOS prompt type “ping aaa.bbb.ccc.ddd”, where aaa.bbb.ccc.ddd is the network address.

- 7 If using Internet Explorer, and web page won't load properly, press CTRL key while selecting "REFRESH" to force page reload over the network.

**P. Data Cannot be Erased**

- 8 Data cannot be erased while statistics mode is on.
- 9 Data cannot be erased from the Web Server in the following conditions:
- if the instrument is being run from front panel
  - if LCD screen is on one of the setup screens.

**Q. Facility Net will not connect to the particle counter.**

- 10 Ensure that "Enable Fac-Net" is checked on the Comm Setup Screen.
- 11 Ensure that the Lasair II particle counter display is set to Main Screen.

## Getting Technical Support

In the United States call Instrument Service and Support at Particle Measuring Systems at 1-800-557-6363. Outside of the United States, contact your sales representative.



## Appendix B

# Connecting to a Computer or Network

---

This appendix describes how to establish communications between the Lasair II particle counter and a computer. This involves setting up network parameters on the Lasair II particle counter and perhaps on the computer as well, if it is not already attached to the local network.

## Web Browser Interface

### Hardware Requirements

The connecting computer must meet the following requirements:

- The computer must have a network card. 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 Windows CE operating system.

### Software Requirements

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

- Internet Explorer, version 5.0 or higher
- Netscape Communicator, version 4.61 or higher

You can download browser software from the Microsoft® web site: [www.microsoft.com](http://www.microsoft.com) or Netscape's web site: [www.netscape.com](http://www.netscape.com).

### Cable Requirements

If you are connecting the Lasair II particle counter to a computer directly or indirectly, you will need the appropriate cabling.

- If you are connecting from the Lasair II particle counter directly to a computer, use a *crossover* cable or adapter.

- If you are connecting the unit to a hub or other device on an Ethernet network, use a *straight-through* Ethernet cable between the Lasair II particle counter and the hub as well as from the hub to the computer.

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

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

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| Cable                                                                                                           | Part No. |
|-----------------------------------------------------------------------------------------------------------------|----------|
| <b>Crossover Cable</b> for use when connecting directly to a computer without going through an Ethernet network | AE1938   |
| <b>Straight-through (Ethernet) Cable</b> for use when connecting to a computer by means of an Ethernet network  | CD22     |

---

## Setting Up for Direct Web Browser Interface

Use this instruction for setting up the particle counter for direct Web browser interface. A direct web browser interface means that the Lasair II particle counter is connected directly to a computer without passing through an Ethernet network.

### CAUTION

Before proceeding, you must inform your Network Administrator that you will be connecting to the network. The administrator will assign TCP/IP addresses and may assist you in the configuration.

The minimum setup is assigning network addresses to both the Lasair II particle counter and the computer to which it will be connected. It may also be necessary to specify other types of addresses, such as gateway and multicast. After changing TCP/IP addresses and exiting the Comm Setup Screen, you will be prompted to reboot the particle counter.

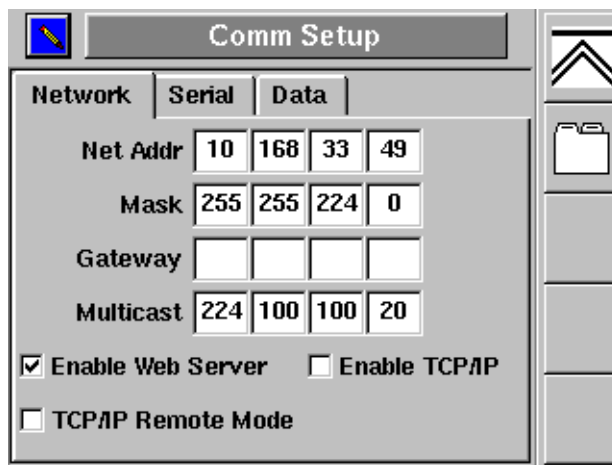
### Connecting the crossover cable:

- 1 Insert one end of a crossover cable into the port labeled NET on the back of the Lasair II particle counter.
- 2 Connect the other end of the cable into the Ethernet port of the computer.
- 3 Verify connection by means of the connectivity LEDs at the Lasair II particle counter “NET” connection and the computer’s Ethernet connection.

### Setting TCP/IP addresses for direct web browser interface:

- 1 Start the particle counter (if necessary).
- 2 From the Main Display Screen, navigate to the Comm Setup-Network screen.

by pressing the Main Setup softkey  and then the Comm Setup softkey

**Figure B-1: Comm Setup-Network Screen**

- 3 Press the Enter softkey to enable the edit mode. The first part of the Net Address will be highlighted.
- 4 Set the Net Address according to your network administrator's directions.
- 5 Navigate to the Mask address and set its address according to your network administrator's directions.
- 6 Navigate to the *Enable Web Server* check box and press the **Enter** softkey to place a check in the box.
- 7 Disable the edit mode and exit the Comm Setup Screen by pressing the Return Arrow softkey.
- 8 When the Network Changes dialog box appears, press the Enter softkey. The Lasair II particle counter will stop and restart.

**Net Addr (Net Address)** Sets the IP address in the form **aaa.bbb.ccc.ddd**. Each 3-digit series is a value of 0–255, separated by a period (.). This address is unique to each Lasair II particle counter. An example of a valid IP address is: 010.255.000.099.

**Mask** Sets the net mask address in a form of **aaa.bbb.ccc.ddd**. Each 3-digit series is a value of 0–255, separated by a period (.). The mask must be unique to the network it serves. For example: 255.0.0.0.

**Gateway** The gateway address is used when communicating across a different network. This field sets the gateway address in a form of **aaa.bbb.ccc.ddd**. Each 3-digit series is a value of 0–255, separated by a period(.). An example of a valid gateway address is: 10.255.0.60. If this field is blank, the instrument can only communicate to addresses in the same network.

**Multicast** The multicast address must be assigned if you are using Facility Net. This field sets the multicast address in a form of **aaa.bbb.ccc.ddd**. Each 3-digit series is a value of 0–255, separated by a period (.). An example of a valid multicast address is: 224.100.100.1.

**Enable Web Server** The default setting for this field is Enable; note the check-mark in the box. It allows access to the Lasair II particle counter 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 check mark in the box. It allows a user to connect to Facility Net. Disabling this function on the unit removes the ability to use these applications.

**TCP/IP Remote Mode** Enable this check box to cause Facility Net to treat this instrument as a “Remote Instrument”. When connected to Facility Net, stored data will be downloaded, and Facility Net will then disconnect. **Enable TCP/IP** must also be checked.

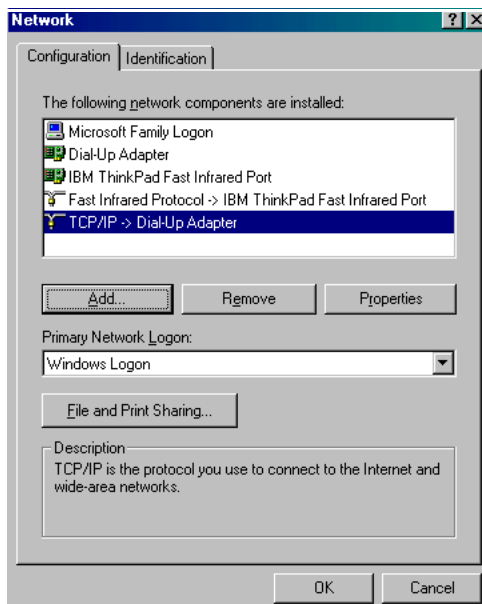
### Setting up for Direct Web Browser Interface

Use this instruction to set the computer’s TCP/IP addresses (Windows 95 and Windows 98) to directly interface the Lasair II with a web browser.

You must assign an IP address and netmask to the computer making a TCP/IP connection. After entering or changing the computer’s network address, you must reboot the computer or the address will not be recognized.

**1** Click Start > Settings > Control Panel.

**2** Double-click the Network icon.  The Network dialog box will open:



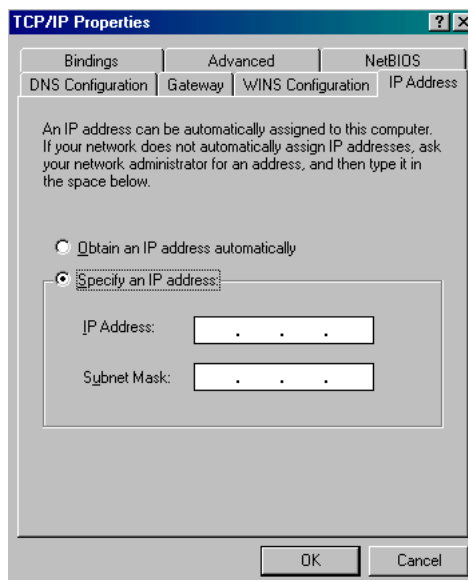
- 3 In the Configuration Tab, highlight the TCP/IP network component.

---

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

---

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



- 5 Select the Specify an *IP Address* option. The dialog box will become active.
- 6 Type in the correct IP address.
- 7 Type in the Subnet Mask.

---

**NOTE:** The IP address and netmask is required. 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 required when interfacing Lasair II particle counter with Facility Net.

---

---

**NOTE:** After entering or changing the computer's network address, you must reboot the computer or the address will not be recognized.

---

- 8 Click **OK**. When reboot is completed, the IP address will be set for the computer.

## Setting up for Web Browser Interface over an Ethernet Network

This section explains how to connect to the Lasair II particle counter over an Ethernet network and configure the TCP/IP. The steps are the same except for the two following items:

- Instead of a crossover cable connecting directly to a computer, you will use an Ethernet cable and connect to an Ethernet hub.

### To connect a computer to the particle counter (Ethernet network):

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

### To Set the TCP/IP address on the particle counter:

- 1 Complete steps 1-8 "Setting TCP/IP addresses for direct web browser interface:" on page B-3.

If you have difficulty establishing communications between the computer and the Lasair II particle counter, see Appendix A, "Troubleshooting".



## Appendix C

# Downloading Data to Facility Net

---

### Overview

Data on a Lasair II particle counter can be downloaded into Facility Net by means of either a Real-Time-Station or a Network Station. The following are the two types of downloading:

- Case A: The Lasair II particle counter is used as a mobile monitor; data may come from multiple locations.
- Case B: The Lasair II particle counter is in a fixed monitoring position; all data comes from the same location.

### Preparations for Setup

- Ensure the unit identifier (on the Lasair II particle counter Main Display Screen) is unique among all your Lasair II particle counters.
- Ensure that each location name is unique across all your Lasair II particle counters.
- Obtain a unique, static IP address, Subnet Mask, and Gateway from your IT Dept.
- Ensure that you are using Facility Net Ver 2.9.4 or later.
- Ensure that the following drivers are loaded in Facility Net:
  - pdrvlpn Ver 2.9.23 or later
  - pms\_util.dll Ver 2.9.22 or later
  - pdrvlpn.hlp 2/20/2001 or later.

## Configuring to Communicate with Facility Net

- Ensure that the Lasair II particle counter is not already connected to Facility Net (or to any other communications or control network).
- Set the Lasair II particle counter to the unique IP address (i.e., Net Address and Mask) provided by your IT Dept.
- Verify that the Lasair II particle counter is set to the standard Multicast #: 224.100.100.1.
- Enable the following fields in the Lasair II particle counter's "Comm Setup - Network" screen:
  - Case A: For mobile monitoring: 1) "Enable TCP/IP"  
2) "TCP/IP Remote Mode"
  - Case B: For fixed monitoring: 1) "Enable TCP/IP" ONLY.
- Reboot the particle counter.

## Downloading the Data

### Case A: **Mobile Collection of Sample Data from Multiple Locations**

- 1 Manually collect sample data with Lasair II particle counter.
- 2 Connect the Lasair II particle counter to Facility Net via Ethernet ports on the particle counter and the computer.
- 3 Configure Facility Net for Lasair II particle counter.
- 4 Sampling points are automatically created for all Lasair II particle counter location names, and data are automatically downloaded to Facility Net.

The user is offered the option of automatically or manually erasing all historical data in the Lasair II particle counter.

Facility Net automatically disconnects from the particle counter.

### Case B: **Fixed Collection of Sample Data from Single Location**

- 1 Connect the particle counter to Facility Net via Ethernet ports on the particle counter and the computer.
- 2 Configure Facility Net for the Lasair II particle counter.

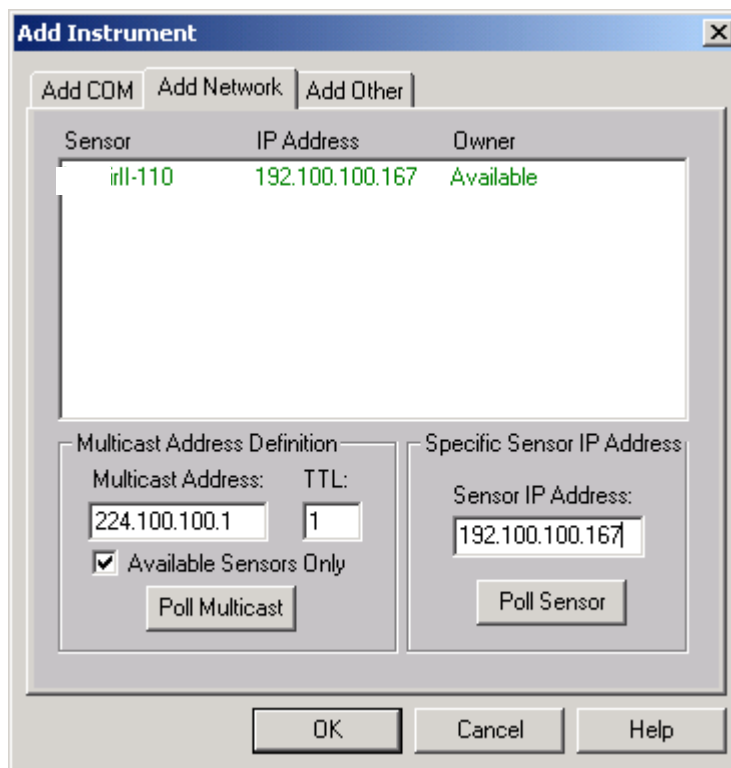
Facility Net directs and controls periodic/continuous sampling by the Lasair II particle counter, and data are automatically downloaded to Facility Net in real time.

Historical data in the particle counter must be erased manually.

---

## Configuring for Facility Net

1. Select **Configure > Instruments**.
2. Select **Add**, then select the **Add Network** tab.
- 3-a Enter the specific IP address in the **Sensor IP Address** field.
- 3-b Alternatively, click the **Poll Multicast** button; a list of available instruments will appear.
4. Double-click the desired sensor name to accept it.



5. See Case A or B below.

### Case A: Downloading Data Collected from Multiple Locations:

#### 5A-1 Configure Facility Net:

- Set Sensor to “Lasair II”
- Set Text “All Data”

- Determine whether or not to check “Remote Data: Auto Delete When Complete” (see Miscellaneous Notes below).
- Enter the particle counter's serial number. The unique serial number of a Lasair II particle counter can be found its main setup display screen.

**5A-2** Select OK - OK and accept all changes

Immediately, Facility Net will do the following:

- Retrieve the Lasair II particle counter's Location Name file and automatically configure each name as a sample point.
- Download the complete historical data file.
- If previously commanded to do so, it will then erase the Lasair II particle counter data file.

---

**NOTE:** User also has the option of erasing Lasair II particle counter's historical data file manually.

---

- Finally, it will disconnect the particle counter from the network.

LasairII Configuration: 192.100.100.167

Parameters | Channel Configuration | Analog Sensors

Units: cf

Name: Lasair II

Text: All Data

☐ Remote Data Auto Delete When Complete

Serial Number: Unique Unit ID

OK Cancel Help

---

**Case B: Real Time, Continuous Data Collection from A Single Location**

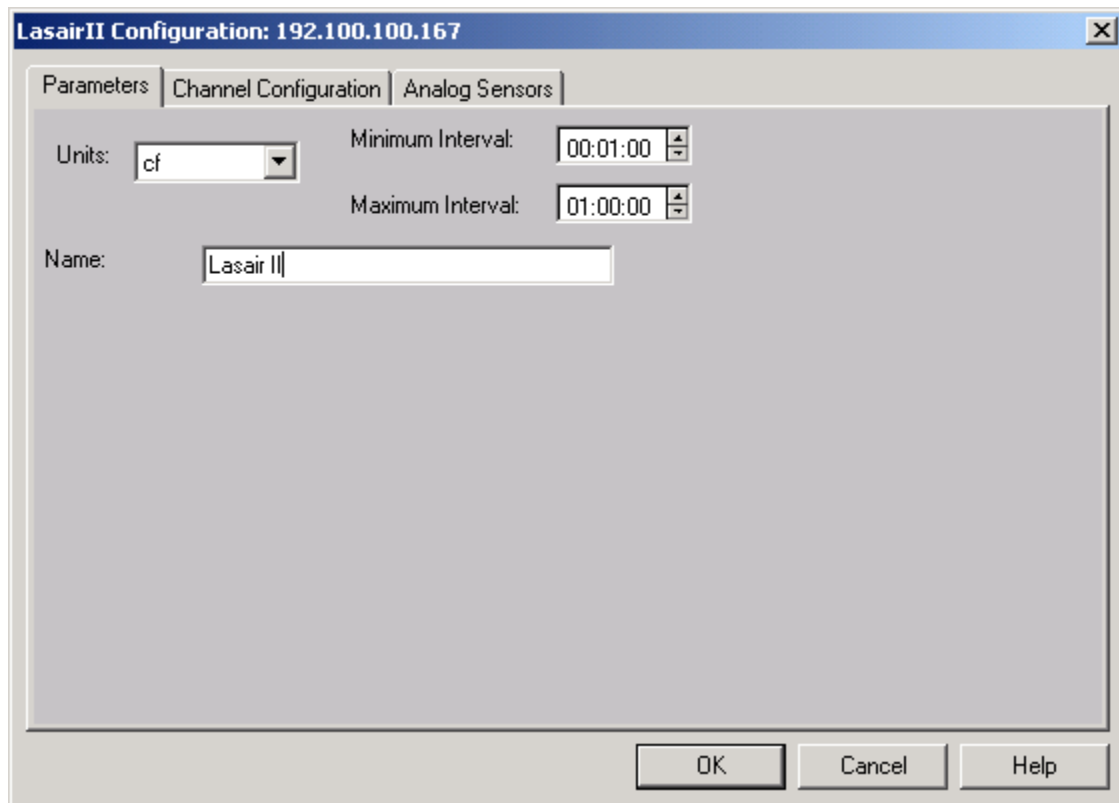
**5B-1** Set the sensor's name to "Lasair II."

**5B-2** Select OK - OK and accept all changes

**5B-3** Immediately, the Facility Net software will take control of the Lasair II particle counter and do the following:

- Sample according to the current Facility Net settings (NOT the Lasair II particle counter settings).
- Continue to sample if so directed.
- Download the sample data to Facility Net in real time.

**5B-4** The historical data file in the particle counter can be erased manually.



---

**NOTE:** If you have already configured Facility Net to download one Lasair II particle counter's data in one mode (say Case A), and you now need to use another Lasair II particle counter in the other mode (say Case B), then you will need to clear off selected settings before Facility Net will give you the right configuration box.

---

You will notice this when you open the Configuration Page pictured on page C-4, but you want the page pictured above (or vice versa).

Previous settings are cleared by entering "Cancel," and then reloading the Configuration Page.

## Miscellaneous

### Downloading at Network Stations

Usually, PMS instruments can be downloaded at any Real-Time-Stations (RTS). The Lasair II particle counter also can be downloaded from a Network Station.

### Mobile-Collected Data (Case A): Erase Regularly

Facility Net is unable to interleave data (arrange data in a non-contiguous way to increase performance) from overlapping chronological periods. Once data have been entered from a location, the next data must be more recent than the most recent data points from that location that are already in Facility Net.

When Facility Net receives a data sample that is older than the newest recorded data from that location, it discards that data sample. This can become an issue when multiple units remotely sample from the same location name, either:

- When multiple units sample from the same location at overlapping times,
- When recently collected data is downloaded before older data,
- When the same data are loaded multiple times.

The best practices procedure is to do the following:

- Carefully develop sampling and downloading schedules, in addition to location naming conventions.
- Erase data in the Lasair II particle counter as soon as you have downloaded it.

## Data Buffering

If the computer system goes down while data are being downloaded from the Lasair II particle counter, it would be quite easy to lose these data. As protection, the particle counter automatically retransmits up to 3000 recent data samples when it is configured to Facility Net, IF:

- The Lasair II particle counter was connected when the computer system went down, AND
- The Lasair II particle counter is not powered off before Facility Net comes back up.

These data are stored in a separate buffer and are not affected by emptying the historical data file.

## Assigning Location Names

Some forethought is required when designing a Facility Net system. Each instrument's address may be associated with up to 256 locations. For smaller systems it may be adequate to use a single address for all Lasair II particle counters. For larger systems, multiple addresses may be required. The TCP/IP protocol uses both the location name and the instrument address as key fields when saving the data.

The TCP/IP remote download function in Facility Net can substitute the user-defined instrument name instead of using the TCP/IP address. This allows different addresses for each Lasair II particle counter, which is good networking practice. If the instrument name matches the name previously configured, pop-up dialog queries the user to move the configuration from the previous TCP/IP address to the new one.

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## Appendix D

# TCP/IP Protocol: A Brief Overview

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

---

On small networks (such as those 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. A more complex protocol such as TCP/IP becomes necessary when multiple networks are interconnected to form an “internet.”

## TCP/IP's Network Layer

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).

---

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

- provide the basic unit for data transfer
- addressing
- routing
- fragmentation of datagrams

## 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 the computer's LAN communications).

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

For more information on TCP/IP and networking fundamentals, please see the *PMS Serial Communications & Networking Manual*.

## Appendix E

### Comma Separated Value (CSV) Format

With this 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.

CSV Value Format and Description

| Ref. No | Data Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | <b>Sample Date:</b> Formatted YYYY/MM/DD                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 3       | <b>Sample Time:</b> Formatted HH:MM:SS {End of Sample}                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4       | <b>Sensor Name:</b> User entered name. Up to 16 characters. Name is delimited by quotation (") marks.                                                                                                                                                                                                                                                                                                                                                                                                 |
| 5       | <b>Sensor Type:</b> Hard coded value. Example: "LasairII-310"                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 6       | <b>Sensor S/N:</b> This value programmed during initial calibration.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 7       | <b>Statistics:</b> 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, EC-GMP, EC-GMP and ISO, BS-5295, or AVERAGE. The room name is added before 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. |
| 8       | <b>Loc Chg:</b> 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 ".".                                                                                                                                                                                                                                                                                                                           |
| 9       | <b>Location:</b> User location name. Up to 16 characters. The name will be delimited by " marks. If the first character of 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.                                                                                                                                                                                                                                  |
| 10      | <b>Manifold:</b> The manifold position. The value will be 0 (zer)0 if no manifold exists. With a manifold, lowest number will be 1.                                                                                                                                                                                                                                                                                                                                                                   |
| 11      | <b>Laser OK:</b> 1 = OK, 0 = bad. (Language independent)                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 12      | <b>Flow OK:</b> 1 = OK, 0 = bad. (Language independent)                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**CSV Value Format and Description (Continued)**

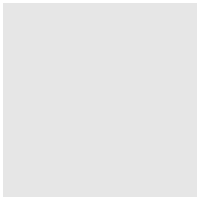
| <b>Ref. No</b> | <b>Data Description</b>                                                                                                                                                                                                                                                                                                                                     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>13</b>      | <b>Sample Valid:</b> 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).                                                                                                                  |
| <b>14</b>      | <b>Sample Interval:</b> In time. Format is HH:MM:SS                                                                                                                                                                                                                                                                                                         |
| <b>15</b>      | <b>Volume Units:</b> CF or CM                                                                                                                                                                                                                                                                                                                               |
| <b>16</b>      | <b>Sample Volume:</b> Floating point value. In "Volume Units" given above.                                                                                                                                                                                                                                                                                  |
| <b>17</b>      | <b>Number Channels:</b> Currently 6.                                                                                                                                                                                                                                                                                                                        |
| <b>18</b>      | <b>Size 1:</b> This is fixed for the instrument                                                                                                                                                                                                                                                                                                             |
| <b>19</b>      | <b>Counts 1:</b> The total differential raw count value.                                                                                                                                                                                                                                                                                                    |
| <b>20</b>      | <b>Size 2:</b> This is fixed for the instrument                                                                                                                                                                                                                                                                                                             |
| <b>21</b>      | <b>Counts 2:</b> ditto                                                                                                                                                                                                                                                                                                                                      |
| <b>22</b>      | <b>Size 3:</b> This is fixed for the instrument                                                                                                                                                                                                                                                                                                             |
| <b>23</b>      | <b>Counts 3:</b> ditto                                                                                                                                                                                                                                                                                                                                      |
| <b>24</b>      | <b>Size 4:</b> This is fixed for the instrument                                                                                                                                                                                                                                                                                                             |
| <b>25</b>      | <b>Counts 4:</b> ditto                                                                                                                                                                                                                                                                                                                                      |
| <b>26</b>      | <b>Size 5:</b> This is fixed for the instrument                                                                                                                                                                                                                                                                                                             |
| <b>27</b>      | <b>Counts 5:</b> ditto                                                                                                                                                                                                                                                                                                                                      |
| <b>28</b>      | <b>Size 6:</b> This is fixed for the instrument                                                                                                                                                                                                                                                                                                             |
| <b>29</b>      | <b>Counts 6:</b> ditto                                                                                                                                                                                                                                                                                                                                      |
| <b>30</b>      | <b>Number Analog:</b> 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. |
| <b>31</b>      | <b>Name 1:</b> 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 sample was saved. (The data sample only has an index to the name.)                                                                             |
| <b>32</b>      | <b>Units 1:</b> 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.)                                                                                   |

---

**CSV Value Format and Description (Continued)**

| <b>Ref. No</b> | <b>Data Description</b>                                                                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>33</b>      | <b>Avg 1:</b> 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. |
| <b>34</b>      | <b>Min 1:</b> Minimum value for channel. Stored internally as a 10 bit integer.                                                                                |
| <b>35</b>      | <b>Max 1:</b> Max value for channel. Stored internally as a 10 bit integer                                                                                     |
| <b>36</b>      | <b>Name 2:</b> Dedicated relative humidity probe. Name of probe is "rh".                                                                                       |
| <b>37</b>      | <b>Units 2:</b> See above.                                                                                                                                     |
| <b>38</b>      | <b>Avg 2:</b> See above.                                                                                                                                       |
| <b>39</b>      | <b>Min 2:</b> See above.                                                                                                                                       |
| <b>40</b>      | <b>Max 2:</b> See above.                                                                                                                                       |
| <b>41</b>      | <b>Name 3:</b> Analog channel name. Channel 3 is the first of four user channels.                                                                              |
| <b>42</b>      | <b>Units 3:</b> See above.                                                                                                                                     |
| <b>43</b>      | <b>Avg 3:</b> See above.                                                                                                                                       |
| <b>44</b>      | <b>Min 3:</b> See above.                                                                                                                                       |
| <b>45</b>      | <b>Max 3:</b> See above.                                                                                                                                       |
| <b>46</b>      | <b>Name 4:</b> See above.                                                                                                                                      |
| <b>47</b>      | <b>Units 4:</b> See above.                                                                                                                                     |
| <b>48</b>      | <b>Avg 4:</b> See above.                                                                                                                                       |
| <b>49</b>      | <b>Min 4:</b> See above.                                                                                                                                       |
| <b>50</b>      | <b>Max 4:</b> See above.                                                                                                                                       |
| <b>51</b>      | <b>Name 5:</b> See above.                                                                                                                                      |
| <b>52</b>      | <b>Units 5:</b> See above.                                                                                                                                     |
| <b>53</b>      | <b>Avg 5:</b> See above.                                                                                                                                       |
| <b>54</b>      | <b>Min 5:</b> See above.                                                                                                                                       |
| <b>55</b>      | <b>Max 5:</b> See above.                                                                                                                                       |
| <b>56</b>      | <b>Name 6:</b> See above.                                                                                                                                      |
| <b>57</b>      | <b>Units 6:</b> See above.                                                                                                                                     |
| <b>58</b>      | <b>Avg 6:</b> See above.                                                                                                                                       |
| <b>59</b>      | <b>Min 6:</b> See above.                                                                                                                                       |
| <b>60</b>      | <b>Max 6:</b> See above.                                                                                                                                       |

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## Appendix F

### PMS Multi-Drop Protocol (MiniLaz Emulation)

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This protocol is designed to be used on an RS-485 based system, with multiple individually addressable instruments. All communications are polled with a sensor address. The host program must take care of querying the unit for data.

RS-485 communications require an external RS-232 to RS-485 converter. The converter must support automatic send data control. Older converters which require CTS control (hardware flow control) will not work properly.

### Tested RS-232/RS-485 converters

Both of these models have been tested with the Lasair II particle counter in MiniLaz emulation mode connected to Facility Net.

---

**NOTE:** A null modem is required to connect between these models and the Lasair II particle counter.

---

- RS-232 to RS-485 converter with automatic send-data control and opto-isolation: P/N 485OT9L
- RS-232 to RS-485 Converter with automatic send-data control and quick-disconnect terminal block: P/N 485PTBR

Both of the preceding models are available from:

B & B Electronics  
707 Dayton Rd.  
P. O. Box 1040  
Ottawa, IL 61350

Phone: (815) 433-5100  
Web: <http://www.bb-elec.com>

Both models require external 12 VDC power @100 mA. One solution is the 120 VAC to 12 VDC supply P/N 485PS2.

The Lasair II particle counter provides an extended version of the command set used in the obsolete MiniLaz instrument, and offers backward compatibility. This protocol allows a Lasair II particle counter to be a drop-in replacement for a MiniLaz on a Facility-View installation.

## Multi-Drop Command Coding Overview

Commands in the PMS protocol are formatted in the following manner. For users wishing to write their own drivers, basic communication routines are available from Particle Measuring Systems.

### Formatting Command Codes

**To properly format a command code:**

- 1 Add the address of the instrument to the beginning of the command string. The address is an unsigned 16 bit integer between 0 and 99.
- 2 Add a 16 bit checksum of the data and address to the end of the packet. The checksum is an unsigned sum of every address and data byte.

At this point the packet should look like this:

```
ADDR_HIGH_BYTE | ADDR_LOW_BYTE | DATA_1 | DATA_2 | ... | DATA_N |
CHECKSUM_HIGH_BYTE | CHECKSUM_LOW_BYTE
```

- 3 ASCII characters not in the range of 0x20 to 0x7E must be converted to a 2-byte sequence using the following table:

| ORIGINAL BYTE       | TRANSMITTED BYTES |
|---------------------|-------------------|
| byte < 0x20         | 0x7B, byte+0x20   |
| 0x7B <= byte < 0x80 | 0x7C, byte-0x5B   |
| 0x80 <= byte < 0xC0 | 0x7D, byte-0x60   |
| 0xC0 <= byte        | 0x7E, byte-0xA0   |

- 4 Pre-append an ASCII <STX> character (0x02) to the data stream, and post-append an ASCII <ETX> character (0x03) to the data stream.
- 5 Data is ready to transmit.

## Multi-Drop Commands

**CCAL**

Response: **"RCAL yyyy/mm/dd"**

Returns the last calibration date. (A Lasair II particle counter should be calibrated at least once a year).

**CCONT n**

Response: **"RCONT m"**

**CDELAY sec**

Response: **"RDELAY sec"**

This is a backward compatible command. Delay is specified as start of first sample to start of next sample. Sample volume or sample time must be set first for this command to work properly. Times are approximate if sample volume is set rather than sample time.

Set continuous sampling on/off (1/0). If turned off, then number of samples is set to one. Use CNOS to set number of samples.

**CDT yy mm dd hh mm ss**

Set date and time. Either two digit or four digit year is ok.

Response: **"RDT"**

**CES**

End Sampling.

Response: **"RES 1"** (success) or **"RES 0"** (failure)

**CFQ**

Response: **"RPQ 1"** or **"RPQ 0"**

Flush data queue--erase all data. Note: The particle counter can un-erase data from this command if no samples are taken, and locations are not erased.

**CID name**

Response: **"RID name"**

Set sample ID (location) to given string. This command translates all characters to upper case. The only legal characters in this command are **A-Z**, **a-z**, and **0-9**. Other characters which are legal for the Lasair II particle counter location names are not legal here.

**CISDELAY sec**

Response: **"RISDELAY sec"**

Set inter-sample delay in seconds. Delay is from end-to-start.

**CKB n**

Response: **"RKB m"**

Lock/unlock the keyboard (1/0). If the keyboard is not locked, the instrument can be stopped or controlled from front panel.

CNOS *nnn*

Response: "RNOS *mmm*"

Set total number of samples. Setting to -1 causes continuous sampling.

If the operation is successful, *nnn* = *mmm*.

CPDELAY *sec*

Response: "RPDELAY *sec*"

Set purge delay in seconds.

CPQ

Response: "RPQ 1" or "RPQ 0"

Pop oldest sample off of data queue. This command will un-erase the oldest sample data if no samples are taken, and locations are not erased.

CQC

Response: "RQC *nnn m*"

Get number of samples in queue, and 0/1 for sampling (1) or not sampling (0).

CSN

Response: "CSN *s\_n*"

Returns the Lasair II particle counter serial number.

CSR

Response: "RSR"

Causes instrument to reboot about 1.5 seconds after receiving the command. It takes several seconds to recover communications.

CSS

Start Sampling

Response: "RSS 1" (success) or "RSS 0" (failure)

CTD

Response: "RTD *data\_packet*".

Transmit data in MiniLaz compatible format. Only 5 particle channels are sent. The extra channel is merged in as well as possible. Only temp/rh analog channels sent. Additional Lasair II particle counter analog channels are not reported. The time stamp in the data packet is at the sample's start. The normal Lasair II particle counter time stamp is at the end of the sample.

CTD2

Response: "RTD2 *data\_packet*" or "RND2" if no data available.

Transmit Lasair II particle counter CSV packet. The packet is broken into several lines. The time stamp is at the end of the sample.

**CTIM secs**

Response: "**RTIM secs**"

Set sample time in seconds. Sets sampling to "by time". Does not change sample units.

Maximum value = 86399

Minimum value = 6

**CVER**

Response: "**RVER LasairII-model firmware\_version**"

Get Lasair II model and firmware version.

**CVOL nnnn.n**

Response: "**RVOL**"

Set sample volume to **nnnn.n** in feet<sup>3</sup> (CF). (Causes the Lasair II particle counter to sample by CF and to sample by volume.)

Maximum value = 1439 CF

Minimum value = 0.1 CF

## Multi-Drop CTD Command Data Format

This data format is identical to the MiniLaz output. The six Lasair II particle counter channels are converted to five channels for this report. See the "CTD" command description for additional details.

| RTD                |                                   |
|--------------------|-----------------------------------|
| <b>TI hh:mm:ss</b> | Time (Start of sample)            |
| <b>DA yy/mm/dd</b> | Date (Start of sample)            |
| <b>ID Loc_str</b>  | Sample Location                   |
| <b>SN s/n</b>      | Sensor Serial Number              |
| <b>LS #</b>        | Laser Status (1 = good / 0 = bad) |
| <b>FR ###.##</b>   | Flow Rate (cfm)                   |
| <b>VL ###.##</b>   | Sample Volume (cfm)               |
| <b>C1 #####</b>    | Channel 1 Raw Differential Counts |
| <b>C2 #####</b>    | Channel 2 Raw Differential Counts |
| <b>C3 #####</b>    | Channel 3 Raw Differential Counts |
| <b>C4 #####</b>    | Channel 4 Raw Differential Counts |

|           |                                   |
|-----------|-----------------------------------|
| C5 #####  | Channel 5 Raw Differential Counts |
| TM ###.## | Temperature (Degrees F)           |
| RH ###.## | Relative Humidity (percent)       |

## Multi-Drop CTD2 Command Data Format

The data format for the CTD2 command is essentially the CSV format with several <CR><LF> characters inserted. All analog data channels are printed regardless of how many are enabled. Unused analog channels will print "Nan". See Appendix E, "Comma Separated Value (CSV) Format".

```
RTD2
Date, Time, Sensor_Name, Sensor_Type, Sensor_S/N,
Statistics, Loc_chg, Location, Manifold_Index,
Laser_OK, Flow_OK, Sample_Valid, Sample_time, Volume_Units, Volume,
Num_Particle_Channels, Size_1, Counts_1, S2, C2, S3, C3, S4, C4, S5, C5, S6, C6,
Num_Analog_Channels,
A_Name1, A_Units1, A_Avg1, A_Min1, A_Max1,
A_Name2, A_Units2, A_Avg2, A_Min2, A_Max2,
A_Name3, A_Units3, A_Avg3, A_Min3, A_Max3,
A_Name4, A_Units4, A_Avg4, A_Min4, A_Max4,
A_Name5, A_Units5, A_Avg5, A_Min5, A_Max5,
A_Name6, A_Units6, A_Avg6, A_Min6, A_Max6
```

## Appendix G

# Native Serial (RS-232) Communications

---

The Lasair II particle counter native communications mode is a simple, RS-232 point-to-point protocol, with no addressing or checksum overhead. It can be used with a simple terminal emulator program, or be used as a basis for instrument control. It is an upgrade path for users with older Lasair instruments.

**Table G-1: RS-232 Connector Pinout**

| Pin | Pin Function |
|-----|--------------|
| 2   | TX           |
| 3   | RX           |
| 5   | GND          |

## Native Serial Protocol Fundamentals

- All characters are echoed.
- Software flow control (**CTRL-Q/CTRL-S**) is used.
- A command prompt of “>” is output between commands and data packets.
- Automatic data output is generated.
- All commands return either an “OK” or an error response followed by a <CR>.
- All commands except Lasair “C” commands return current parameter values. This can be used for sanity checking.
- Many commands are similar to older Lasair serial commands.

## Native Serial Protocol Error Messages

**Error --No C Command** The “C” command is given with no arguments.

**Error --Not Supported** An invalid or unsupported “C” command was sent.

**Error --Parameter** A command was sent with an insufficient number of parameters.

**Error** A command failed due to other circumstances. The most likely cause is that the serial interface did not execute the “**KB 1**” command to lock-out keyboard control, and someone is using the front panel controls. This message can also be caused by a parameter out of range.

**Error --Range** The following commands have a parameter out-of- range:

- TN
- ANID
- AUTOSTART
- C 10

## Lasair Upgrade Information

The original Lasair had a somewhat terse interface, hence users who want to upgrade their own software must handle the fundamental interface changes. The following is a quick list of supported commands from the Lasair, with notes about any differences.

| Commands Supported from the Lasair |                                                                   |
|------------------------------------|-------------------------------------------------------------------|
| <b>SS</b>                          | Start Sampling                                                    |
| <b>ES</b>                          | End Sampling                                                      |
| <b>SN</b>                          | Set to continuous sampling                                        |
| <b>C</b>                           | Change/setup command (see additional information below).          |
| <b>KB</b>                          | Keyboard lockout command. This is retained through a power cycle. |
| <b>KG</b>                          | Keyboard lockout until power cycle.                               |
| <b>TI</b>                          | Set sample interval                                               |
| <b>TD</b>                          | Set time/date                                                     |
| <b>ID</b>                          | Set instrument ID.                                                |

The following command is not supported:

**R** Retransmit sample in last group.

## C Commands

### Supported C Commands

C 0 yy Set Date-Year. Two digit year

C 1 mm Set Date-Month

C 2 dd Set Date-Day

C 3 hh Set Time-Hour. Use 24 hour format.

C 4 mm Set Time-Minute

C 5 sec Set Time--Second

C 6 id\_string Set Instrument ID

C 7 num Set Number of Samples

C 8 hh Set Sample Time-Hour. Set sample time in order of hours, minutes and seconds to avoid problems.

C 9 min Set Sample Time-Minutes. Set sample time in order of hours, minutes and seconds to avoid problems.

C 10 sec Set Sample Time-Seconds. Set sample time in order of hours, minutes and seconds to avoid problems. This command returns a Range Error if sec < 6, and min = 0, and hours = 0.

C 11 [1/0] Set Sample Print on/off

C 12 hh Set Delay Time--Hours. Set delay between samples.

C 13 min Set Delay Time--Minutes. Set delay between samples.

C 14 sec Set Delay Time--Seconds. Set delay between samples.

C 16 [1/0] Set continuous (repeat) mode on/off. When turned off, the number of samples is set to 1.

C 21 chan name Set Analog ID Label. Set name for user analog channel 1-4

C 22 chan min Set Analog 4 mA value. Set user analog channel minimum engineering unit value.

C 23 chan max Set Analog 20 mA value. Set user analog channel maximum engineering unit value.

C 24 chan units Set Analog Units. Set name for analog channel units.

C 25 chan [1/0] Enable/disable analog channel

C 32 hh Set Purge Delay Time Hours

C 33 min Set Purge Delay Time Minutes

C 34 sec Set Purge Delay Time Seconds

C 38 [1/0] Start sampling on Power Up

## Unsupported C Commands

C commands dealing with alarms and manifold control are not supported. (Manifold control with the Lasair II particle counter requires an AM-II and Ethernet control.)

```
15 Group print
17 Count Alarm Enable
18 Count Alarm Print Enable
19 Count Alarm Size
20 Count Alarm Value
27 Manifold Sequence
28 Mixed-air alarm value
29 Search Alarm Value
30 Search Length Minutes
31 Search Length Seconds
37 Audible Alarm On/Off
39 Power Interrupt print
41 Count Alarm Diff/Accum
43 Count Alarm Conc
44 Analog Avg on/off
45 Analog Alarm Enable
46 Analog Alarm Max Value
47 Analog Alarm Min Value
48 Analog Alarm Print on/off
50 Laser Warning Print
52 Flow Error Print
```

---

```

54 Time Series Channel
56 Manifold Sequence Enable
57 Manifold Sequence Length
58 Alarm Count Port Num.
59 Search Length Hours
60 Mixed Air Alarm Enable
61 Mixed Air Alarm Print
63 Search Alarm Print On/Off

```

## C Command Table Format

These commands are from the C command above. All of these commands are redundant, and are provided for users of existing Lasair II particle counters who want to simplify their upgrade path. Some of these commands split internal variables into several pieces. For instance “C 0” through “C 6” are used to set date and time. Because of the variable split, unexpected results can be obtained if the user is not careful with software coding. For instance, setting the date and time in multiple parts has the possibility of time-rollover in-between settings. In other words, if the Lasair II particle counter seconds rolls over from 59 to 0, then at a minimum the minutes will also change, and if this occurs right after setting the minutes, then the expected time will be wrong.

### Command Format

---

**C nn sssssssssss**

**where:**

**C nn** = command # (0-38)

**ssssssssss** = any alphanumeric entry appropriate to the parameter being defined.

## Command List

All commands are case insensitive. Text variables in commands do retain capital and lowercase letters.

**AALARM** **[T,R,n],min,[1/0],max,[1/0]**

Set analog alarm for specified channel. Channel is 1–4 for user analog inputs, or **T** for temperature, or **R** for rh. **min** is a floating point value for alarm minimum, and **max** is a floating point value for the alarm maximum. The min and max alarms are enabled or disabled individually.

**ANID** **n,name\_string** Set name for user analog channel **n**. Channel is 1–4, **name\_string** is maximum of 16 characters.

**ANENABLE** **n,[1/0]** Enable or disable data collection for analog channel. Channel is 1–4.

**ANLIMITS** **n,min,max** Set calibration parameters for 4–20 mA analog input channel.

Minimum value = engineering units value at 4 mA.

Maximum value = engineering units at 20 mA.

**ANSCALE** **n,scale** Set 4–20 mA scale for analog input channel.

**ANOFFSET** **n,offset** Set 4–20 mA offset for analog input channel.

**ANUNITS** **n, units\_string** Set units title for analog channel. Channel is 1–4, units string is maximum of 8 characters.

**AUTOSTART** **[1/0]** Enable or disable autostart feature. When enabled, the instrument will begin sampling when it powers up.

**BUZZER** **[1/0]** Enable/disable buzzer during alarms.

**C nn . . . . .** Change setup parameter. See separate table below for details.

**CLEARALL** Deletes all sample data and all location names. This command should be used with caution. If the command is executed while the instrument is running, it will return an error. This command may be used to facilitate an interface to a barcode reader.

**DS** Get number of data samples.

**ERASEDATA** Erase all data samples in instrument.

**ES** End sampling.

---

**GALARM [1/0]** Enable or disable global alarm setting. When disabled, all alarms are off. When enabled, individual alarm settings are in effect.

**ID cccccccccc** Set instrument identification using maximum of 16 characters.

**ISAVAIL** Check if instrument control is available. The Lasair II particle counter has multiple methods of communications, as well as the front panel control. To prevent confusion, only one user is allowed to control the instrument at a time. This command will return a 0 if the serial communications is unable to take control of the instrument. This can be used as a check if an error occurs while executing another command. Using the **KB** or **KG** commands ensures that the serial communications will have control of the instrument.

**ISDELAY secs** Set inter-sample delay. This is the delay between the end of one sample, and the start of the next. The maximum value is 86399 seconds (23:59:59).

**ISON** Return the sampling state of the box (1/0).

**ITYPE** Return the instrument model.

**IVER** Return the instrument firmware version.

**KB [1/0]** Keypad lockout enable/disable. Lockout is retained through a power cycle. If this lockout is disabled with the “**KG 0**” command, it will be re-enabled when the power is cycled.

**KG [1/0]** Keypad lockout enable/disable. Lockout lasts until “**KG 0**”, “**KB 0**”, or a power cycle

**LOCID name** If needed, creates and sets the current location ID to name. If name already exists, the front panel screen will change the ID. If the name does not exist, and there are less than 200 names currently defined, then the new name will be created, and the current location will be set to this string. If the instrument is taking a sample, this command will return an error. This command is used to facilitate an interface to a barcode reader.

**NORMDATA [1/0]**

Set normalized/raw particle display. If particle display is set to 0, then data is shown in raw counts on the display. In addition, if particle alarms are used, the alarms automatically change with sample time changes.

**PALARM chan,value,[1/0]** Set particle alarm for specified channel. Channel is 1–6. Alarm value is any number greater than or equal to 0. Note: if value is set to 0, channel must be disabled. An error will be returned if setting is to enable a channel with 0 as the value.

Particle alarms are internally modified depending on sampling parameters. If the box displays data in a normalized output, then this is not an issue. Otherwise, changing the sample size (either by time or volume) will ratio-metrically change the alarm setting.

**PALARMTYPE** [C/D] Select particle alarm type. This is either cumulative or differential.

**PDELAY secs** Set the purge delay. This is the time to wait before the beginning of the first sample. The maximum value is 86399 seconds (23:59:59). (Even if this is set to 0, there will be some delay before a sample for the pump to spin up.

**POP** This command erases the oldest sample in the data buffer. The command may be used in conjunction with the TF command to send the complete data buffer, sample by sample.

**PRALARM** [1/0] Enable or disable print on alarm feature. When enabled, the following conditions will cause an immediate printout: analog alarm, particle alarm, pump error, laser failure. The printout lists the alarm condition, the location, and date/time.

**SS** Start sampling.

**SN** Set to continuous sampling, with group size = 1.

**SPRINT** [1/0] Enable/disable the print at end of sample feature.

**SVOL cf\_volume** Set sample volume in feet<sup>3</sup>. This command does not change the display units from cm, if they are set that way.

Smallest sample volume = 0.1.

Largest sample volume = 1439.98.

**TI secs** Set sample interval to **nnn** seconds.

Maximum interval = 86399 seconds (23:59:59).

Smallest interval = 6 seconds.

**TIME** Print the current date and time. Output format is “YYYY/MM/DD hh:mm:ss.”

**TD yy/mm/dd hh:mm:ss** Set the date and time. Any non-digit is considered a delimiter. Years can be entered as either two digit or four digit. The seconds may be omitted, and will default to 0.

**TF** Transmit first data sample (i.e. earliest time). The data is transmitted in standard CSV format. This command may be used with the POP command to systematically transmit all the stored data on a Lasair II particle counter.

**TL** Transmit the last data sample (i.e. latest time). Data is sent in standard CSV format.

**TN n** Transmit data sample n. Sample n must be a valid sample. The variant “**TN 1**” is equivalent to **TF**. Data is sent in standard CSV format.

**UNITS [F/M]** Set particle volume units to either feet<sup>3</sup> (**F**) or meters<sup>3</sup> (**M**). This affects displaying normalized data on the LCD, and setting alarms in normalized data mode. This command is independent of the **SVOL** command which always sets volume in feet<sup>3</sup>.

## Serial (RS-232) Output Format

The data output via the serial port are identical in content and order to those output in CSV format. See Appendix E for details.

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## Appendix H

# Pharmaceutical (Two-channel) Output Mode

---

To support some pharmaceutical applications, the Lasair II particle counter can be configured to display and print 0.5  $\mu\text{m}$  and 5.0  $\mu\text{m}$  channels only.

## LCD Screen Output

While the Pharmaceutical Two-channel mode is enabled, the *Data Table Screen* will display only 0.5 $\mu\text{m}$  and 5.0 $\mu\text{m}$  channel cumulative count data. Further, if “0.5 and 5.0 TCP/IP” is enabled, the data transmitted will only include these two channels. Otherwise, all six channels of data will be transmitted.

## Alarms

Alarms for all six channels are still available. It is advisable, however, to ensure that only cumulative alarms are used, and that the alarms be only for the 0.5  $\mu\text{m}$  and 5.0  $\mu\text{m}$  channels. Differential alarms will not be valid for the derived two-channel data.

## Enabling the Pharmaceutical Two-Channel Output Mode

This option is enabled from the *Comm Setup Screen*.

**To enable the pharmaceutical two-channel output mode:**

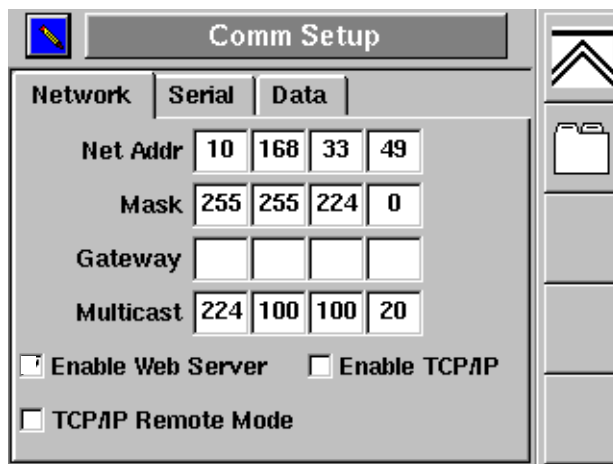
- 1 From the *Main Display Screen*, click the *Main Setup* icon softkey. The Main Setup Screen will open.



- 2 Click the *Comm Setup* icon  softkey. The *Comm Setup Screen* will open.



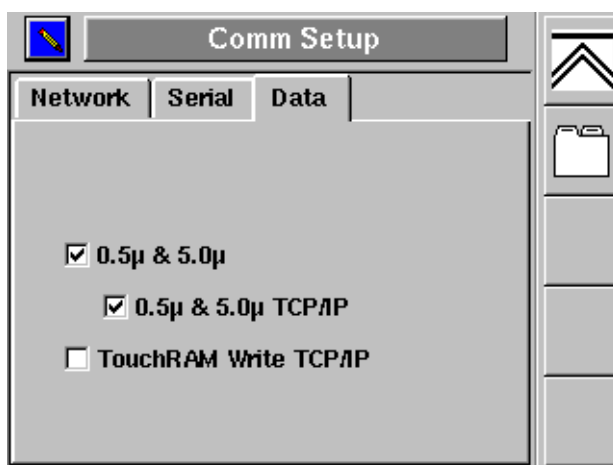
- 3 Enable the edit mode and place a check mark in the *Enable TCP/IP* check box.



**Figure H-1: Comm Setup, Network Dialog Box**

- 4 Click on the *Screen Select* icon softkey  until the *Comm Setup-Data* dialog box opens.

**To allow only 2-channel data to be output to Pharmaceutical Net:**



**Figure H-2: Comm Setup, Data Dialog Box**

- 1 Press the *Enter* key to enable the Edit mode. The 0.5  $\mu$ m & 5.0  $\mu$ m check box will be highlighted.
- 2 Press the *Enter* key again to place a check mark in the check box.
- 3 Advance to the 0.5 $\mu$ m & 5.0 $\mu$ m TCP/IP check box and place a check mark in it.

- 
- 4 Press the *Return Arrow* icon softkey to save the check box status and exit the *Edit* mode. All applicable output will include 0.5µm and 5.0µm data only.




---

**NOTE:** If the TCP/IP setting is not selected, the LCD will display two channels but it will also report all six channels to Pharmaceutical Net.

---

## Serial Number Output to Pharmaceutical Net

The Lasair II particle counter serial number is sent to Pharmaceutical Net during initial communications over TCP/IP. It is not, however, stored.

## Print Output

This special pharmaceutical mode output applies to standard printouts and statistics average data printouts.

It does **not** apply to the following statistical outputs:

- FS-209
- ISO
- BS-5295

It also does **not** apply to the following other outputs:

- TCP/IP protocol data transfer (unless enabled as described in “Enabling the Pharmaceutical Two-Channel Output Mode” on page H-1.)
- CSV data output
- HTML data output

The following illustrates the format and content of the two-channel (0.5 and 5.0 µm) print output:

Final Sample Normalized

LASAIR II

006 Invalid

2001/04/13 12:40:48#1

|     |        |         |
|-----|--------|---------|
| µ   | Δ      | Σ       |
| 0.5 | 713777 | 1011512 |
| 5.0 | 30024  | 46108   |

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## Appendix I

### USB Host Port

---

The USB host port may be used to either:

- a) save sample data to a FLASH key device in CSV file format **OR**
- b) support a USB keyboard.

### Supported USB Devices

The USB host port supports either of the following devices:

- A USB keyboard OR
- Compatible USB Flash key devices.

#### USB Keyboard

A USB keyboard can facilitate set up and operation. The keyboard's F1 key is used for the top-most softkey. The F5 key is used for the bottom-most softkey.

#### USB FLASH Key Devices

Sample data can be copied to the following tested, Lasair II particle counter-compatible FLASH Keys:

**Table I-1: Tested USB FLASH Keys**

| Description                         | Manufacturer's Part No. |
|-------------------------------------|-------------------------|
| Lexar 64 MB JumpDrive               | PD064-231               |
| Lexar 128 MB JumpDrive              | PD128-231               |
| Lexar JumpDrive Sport               | JDSP128-00-540B         |
| Lexar JumpDrive 2.0 Pro (256 MB)    | JD256-231               |
| FMI (CompUSA) 64 MB USB FLASH DRIVE | 1100000977              |
| Memorex 64 MB ThumbDrive            | 32507064                |

---

**NOTE:** FLASH Keys not listed in the preceding table may not work.

---

## Unsupported USB Devices

- USB hub devices
- memory card readers

## Using a USB Keyboard

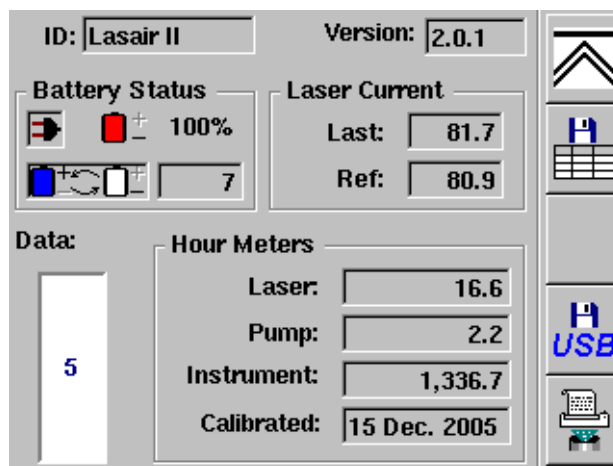
USB keyboards are plug-and-play. In other words, when connected to the USB port, the keyboard is immediately ready for use without any set up.

## Copying Sample Data to a USB FLASH Key

The FLASH data storage function is accessed on the Status Display Screen.

**To save data with the USB feature:**

- 1 Use the softkeys to navigate to the Status Display Screen.



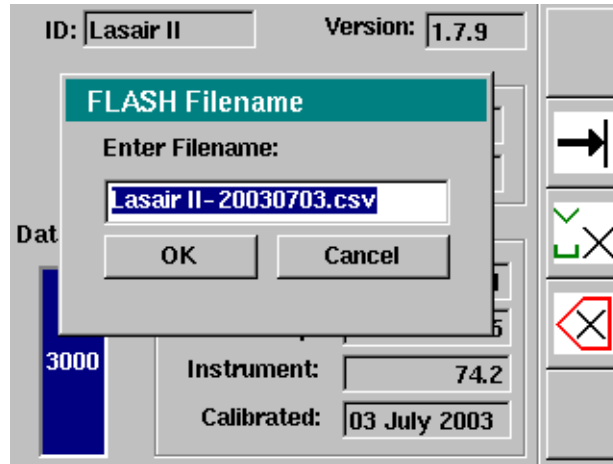
**Figure I-1: Status Screen with Valid USB FLASH Key Installed**

- 2 Insert the FLASH Key into the USB port.

If the key is compatible with the USB feature, the USB icon will appear. Otherwise, no USB icon will appear. See Table J-1 or call Particle Measuring Systems.

3 Press the USB icon  softkey.

Pressing the icon saves all the data into a CSV file on the FLASH Key. The user is prompted for a filename, as shown below.



**Figure I-2: USB Filename Pop-Up Dialog Box**

The default filename is: InstrumentName-YYYYMMDD.CSV, where YYYY = the current year, MM = the current month, and DD = the current day. The default extension, CSV, is convenient for importing data into Excel, but it may be changed as well. Data is formatted in the standard CSV format for the Lasair II particle counter.

The following points should be kept in mind when using a FLASH Key for file storage:

- There is no mechanism for deleting, copying or renaming files.
- If the Lasair II particle counter senses that there is insufficient space to save the file, it will display an error message.
- A full buffer of data will take several seconds to write. If the FLASH Key is removed during the write process, data on the key may be corrupted.
- If the filename already exists, a pop-up dialog box will be displayed. The data can either be overwritten, or a different name selected.

### CAUTION

**NEVER** remove the FLASH Key while data is being loaded into it. Wait until the Lasair II particle counter software informs you that the process is complete.

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## Appendix J

### 4-20 mA Input and Output

---

#### 4-20 mA Input

Up to four optional sensors can be connected to Lasair II particle counter's 4–20 mA connector (type DB15F) on the rear of the case. Use this appendix to find the following information:

#### Cable Pin-outs

| Standard PMS Cable        | Pin Number | Pin Use               |
|---------------------------|------------|-----------------------|
| Temperature               | 1          | Analog signal 1 input |
|                           | 2          | Analog signal 1 GND   |
|                           | 3          | 12–24 VDC             |
| Relative Humidity         | 4          | Analog signal 2 input |
|                           | 5          | Analog signal 2 GND   |
|                           | 6          | 12–24 VDC             |
| Differential Air Pressure | 7          | Analog signal 3 input |
|                           | 8          | Analog signal 3 GND   |
|                           | 9          | 12–24 VDC             |
| Air Velocity              | 10         | Analog signal 4 input |
|                           | 11         | Analog signal 4 GND   |
|                           | 12         | 12–24 VDC             |
|                           | 13         | GND                   |
|                           | 14         | GND                   |
|                           | 15         | GND                   |

## 4-20 mA Input Setup Values

Scale = Total range ÷ 16

Offset = Minimum value

Units = Unit of measure

## Examples of Setup for Each Accessory

- Temperature

|               | English | Metric     |
|---------------|---------|------------|
| <b>Range</b>  | 0–100°F | -5 to 55°C |
| <b>Scale</b>  | 6.25    | 3.75       |
| <b>Offset</b> | 0       | -5         |
| <b>Units</b>  | °F      | °C         |

- Relative Humidity (R/H)

|               |         |
|---------------|---------|
| <b>Range</b>  | 0–100 % |
| <b>Scale</b>  | 6.25    |
| <b>Offset</b> | 0       |
| <b>Units</b>  | %       |

- Differential Air Pressure (DAP)

|               | English                          | Metric              |
|---------------|----------------------------------|---------------------|
| <b>Range</b>  | 0–0.25 inches of water           | 0–6.35 mm of water  |
| <b>Scale</b>  | 15.625                           | 0.397               |
| <b>Offset</b> | 0                                | 0                   |
| <b>Units</b>  | MIN (mili-inch) H <sub>2</sub> O | mm H <sub>2</sub> O |

- Air Velocity

|               | English               | Metric                    |
|---------------|-----------------------|---------------------------|
| <b>Range</b>  | 0–200 Feet per Minute | 0–1.016 meters per second |
| <b>Scale</b>  | 12.5                  | .0635                     |
| <b>Offset</b> | 0                     | 0                         |
| <b>Units</b>  | Feet per Minute       | Meters per Second         |

---

## 4-20 mA Output

Lasair II particle counter (software version 1.4.0 or newer) supports 4-20 mA output. This feature is enabled and configured from the *4-20 mA Out Setup Screen*.

---

**NOTE:** Use of this feature requires that an optional 4-20 mA board be installed in the unit.

---

If a board is installed, but the 4-20 mA feature is disabled, all outputs will be set to 4 mA.

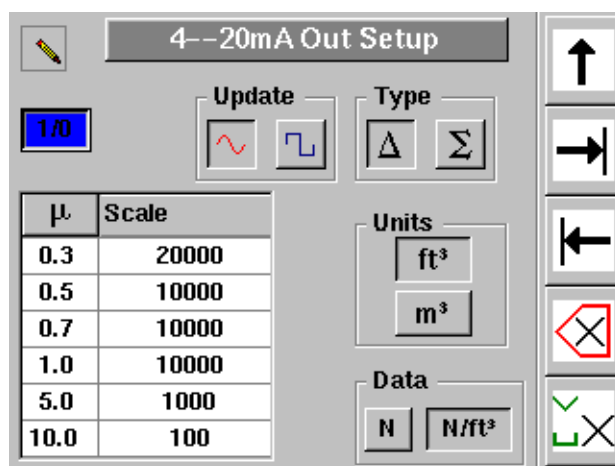


Figure J-1: 4-20 mA Output Setup Screen

## 4-20 mA Output: Setup Screen Parameters

Table J-1: Setup Screen Parameters

|        | Field or Icon                                                                     | Name and Function                                                                                                                        |
|--------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
|        |  | Enable/Disable                                                                                                                           |
|        | <b>Scale</b>                                                                      | Maximum output counts per channel                                                                                                        |
| Update |  | Update continuously                                                                                                                      |
|        |  | Update at end of sample                                                                                                                  |
| Type   | $\Delta$                                                                          | Display differential counts                                                                                                              |
|        | $\Sigma$                                                                          | Display cumulative counts                                                                                                                |
| Units  | <b>ft<sup>3</sup></b>                                                             | Display counts per cubic foot<br><br><b>NOTE:</b> The units selected here act independently of those selected in the Sample Setup Screen |
|        | <b>M<sup>3</sup></b>                                                              | Display counts per cubic meters                                                                                                          |
| Data   | <b>N</b>                                                                          | Display raw data                                                                                                                         |
|        | <b>N/ft<sup>3</sup> or N/m<sup>3</sup></b>                                        | Display normalized data                                                                                                                  |

### To configure for 4-20 mA output:

- 1 From the Main Setup Screen, open the 4-20 mA Out Setup Screen by pressing the 4-20 icon softkey. 
- 2 Enable the Edit Mode by pressing the Enter Button . The 1/0 button will be highlighted .
- 3 Press the Enter softkey to enable the 4-20 mA output feature. When enabled, the surface of the 1/0 button will appear to be below the LCD's surface.
- 4 Navigate to the first *Scale* field by pressing the Forward Tab softkey once. 
- 5 Use the Up  and Down  softkeys to move to the field you want to change.

- 
- 6 Press the Enter softkey again to activate the Field Edit Mode. The numbers in the field will turn blue and a blinking cursor will appear.
  - 7 Use the Up, Down, Right, Left, Delete , and Insert  softkeys to enter the value you want in the field.
  - 8 When the value is correct, press the Enter button again to save the value and disable the Field Edit Mode.

---

**NOTE:** The *Scale* value must be greater than zero.

---

- 9 Use the Up and Down softkeys again to navigate to the next Scale Field you want to edit.
- 10 Repeat steps 6–9 until all Scale fields have been correctly set.
- 11 Press the Enter button again to save the value and disable the Field Edit Mode.
- 12 Navigate to the Update button box by pressing the Forward Tab softkey.
- 13 Use the Right or Left softkeys to highlight *Continuous* or *End of Sample* output.
- 14 Press the Enter softkey to enable the option you want.
- 15 Repeat steps 12–14 to set each of the remaining buttons to the needed configuration.
- 16 When all settings are correct, press the Return Arrow softkey  to disable Edit Mode.

## 4-20 mA Output Connector Wiring and Channel Definitions

**Table J-2: 4-20 mA Output**

| Channel   | Output | Return | Definition                         |
|-----------|--------|--------|------------------------------------|
| Channel 1 | 1      | 2      | Status and alarm information       |
| Channel 2 | 3      | 4      | Manifold position                  |
| Channel 3 | 5      | 6      | Particle channel 1 (smallest size) |
| Channel 4 | 7      | 8      | Particle channel 2                 |
| Channel 5 | 9      | 10     | Particle channel 3                 |
| Channel 6 | 11     | 12     | Particle channel 4                 |
| Channel 7 | 13     | 14     | Particle channel 5                 |
| Channel 8 | 15     | 16     | Particle channel 6 (largest size)  |

The connector is labeled with pin 1 and pin 16.

|                                        |                           |
|----------------------------------------|---------------------------|
| Connector Type:                        | Molex® 43025-1600         |
| Terminal Pins:                         | Molex 43030-0007          |
| Wiring Gauge:                          | 20–24 AWG                 |
| Hand-held crimping tool <sup>a</sup> : | Molex Part No. 63811-2800 |

- a. For details about how to produce a good crimp with this tool, see [www.molex.tool](http://www.molex.tool).

### 4–20 mA Out Status Channel

Channel 1 can be used to monitor the following information:

- Power On/Off
- Sampling/Idle
- Laser Error
- Pump Error
- Particle Alarm

---

## 4-20 mA Out Particle Channel

The status channel can be examined either as a single level check, or as bit mapped error bits. In the simplest test, the output will be 18.25 mA if the box is on, no alarms are set, and sampling is taking place. If something is wrong, the output will be 17.5 mA or less.

A more complex decoding is a combination of level sensitive and bitmap. If the sensor is on, a base level of 7 mA is output. If it is off, the output current will be less than 7 mA.

The status parameters are bit-encoded with 0.75 mA per bit, and the bits are assigned as follows:

|                                                                      |                 |
|----------------------------------------------------------------------|-----------------|
| Sampling_on                                                          | bit 1 = 0.75 mA |
| PumpOK                                                               | bit 2 = 1.5 mA  |
| LaserOK                                                              | bit 3 = 3.0 mA  |
| Particle Not Alarmed bit 4 = 6.0 mA                                  |                 |
| When Lasair II particle counter is on, the base-level output is 7 mA |                 |

## Manifold Position

The manifold position is output at 4 mA if the AM-II is not being used. If it is used, then each channel is 0.25 mA. Thus channel 1 is 4.25 mA, and channel 32 is 12 mA.

Notes on Setting Particle Scale Factors

## Channel Particle Scale Considerations

The maximum counts that can be monitored is the same as the scale factor. In other words, if the scale for channel 1 is set to 100, then the output will be 20 mA, when the counts read 100. If the counts are 105, or 2000, the output will still be 20 mA.

The counts recorded at a given scale are a function of the accuracy and resolution of the instrument reading the channel, as well as the accuracy and resolution of the Lasair II particle counter output. Lasair II particle counter resolution is about 0.025 mA, and the accuracy is better than 1% of full scale. If the recording device is perfect, and only particle counter errors are seen, then the performance will be as follows:

- If a channel is set to 1000 for the scale, then the readings will be within 10 counts (i.e. 1%).
- The minimum detectable change is about 2 counts (i.e.,  $1000/(16 \text{ mA}/0.025 \text{ mA})$  or 1.56).

In summary, setting the scale factor is a balance between setting the scale large enough to cover the worst case expected count output, while at the same time setting it small enough to accurately show normal events.

**Example:** The user would like to differentiate between 99, 100, and 101 counts.

**Then:**

- 1 Range = 16 mA = 20-4
- 2 With min. detectable change of 0.025 mA, this means the range can be divided into a max of 640 channels =  $16 \text{ mA}/0.025 \text{ mA}$ .
- 3 Then by setting 4 mA = 0 counts and 20 mA = 640 counts
- 4 We derive:

$$99 \text{ Counts} = 6.475 \text{ mA}$$

---

$$100 \text{ Counts} = 6.500 \text{ mA}$$

---

$$101 \text{ Counts} = 6.525 \text{ mA}$$

## Appendix K

### Accessories and Supplies

| Replacement Part or Accessory                                                      | Part Number |
|------------------------------------------------------------------------------------|-------------|
| <b>Replacements for Standard Parts</b>                                             |             |
| Printer paper (3 rolls)                                                            | 1000000975  |
| Sampling probe, standard, horn only (1 CFM instruments only)                       | 1000000970  |
| Sample tubing, 3/8-inch ID, poly                                                   | MI153       |
| Zero count filter                                                                  | 90104019    |
| Spare fuse, 0.5 A 5 × 20 mm AT IEC SloBlo                                          | FS48        |
| Inlet cap                                                                          | 1000000957  |
| T/RH connector cap                                                                 | 1000000956  |
| Operator's Manual                                                                  | 1000000982  |
| MP, Sample Probe, Lasair II particle counter 350L/550L                             | 1000008908  |
| MP, Adapter, Probe to Lasair II particle counter 350L/550L                         | 1000008909  |
| MP, Adapter, probe-to-tubing, Lasair II particle counter 350L/550L                 | 1000008907  |
| MP, Adapter, 1/2-inch barbed, tubing-to-Lasair II particle counter                 | 1000008910  |
| <b>Accessories - Optional</b>                                                      |             |
| Tubing: WR, .5-inch ID × .687-inch OD, Polyurethane, Ether                         | 1000009341  |
| Battery pack See <i>"Battery Disposal"</i> on the following page.                  | 90101110    |
| External Battery Charger                                                           | 90101115    |
| External filter                                                                    | 90104016    |
| Sampling probe, isokinetic, with wall/hand/tripod adapter (1 CFM instruments only) | 90103070    |
| Adapter for tripod & hose for standard sampling probe (1 CFM instruments only)     | 1000000971  |
| Tripod, floor-mounted                                                              | MI008       |
| Tripod, table-top                                                                  | 1000000979  |
| Cable, 10', Ethernet 10 base T w/crossover                                         | AE1938      |
| TouchRAM wand (reader)**                                                           | 1000013035  |
| TouchRAM button**                                                                  | 1000013036  |

\*\* For Lasair II particle counters with software version 1.2.1 or higher.

| Replacement Part or Accessory                                | Part Number |
|--------------------------------------------------------------|-------------|
| <b>Environmental Sensors, etc. - Optional</b>                |             |
| TRH probe                                                    | 501014      |
| DAP-C: Differential Air Pressure Sensor (includes 10' cable) | 501515      |
| DAP-PS-C: Power supply for DAP-C                             | 501525-01   |
| TRH-C-W: TRH Sensor w/10' cable, wall mount (0–100°F)        | 501015      |

## Battery Disposal

At end-of-life, batteries should be recycled or discarded safely. Discarding batteries in unsorted waste is improper disposal, and may be harmful to the environment and human health. Your local waste authority will have information on return and collection systems in your area.

For California consumers, contact Particle Measuring Systems, Customer Service Department at (877)-475-3317 for instructions on returning used, rechargeable batteries for reuse, recycling, or proper disposal at no cost.

## Appendix L

### HHIPA

---

For users who prefer the beep mode to be controlled at the probe, the Hand-Held Isokinetic Probe (Audible) (HHIPA) is a sampling probe with an LED activity indicator and audible alarm.

The Lasair HHIPA model is:

| HHIPA Model      | Flow Rate |
|------------------|-----------|
| HHIPA-A-1.0-RJ11 | 1.0 CFM   |

The HHIPA has a thumbwheel selector switch which determines how many particles are required for each flash of the LED indicator and beep of the audible buzzer.

| Switch position | Particles per flash/beep |
|-----------------|--------------------------|
| 0               | 1                        |
| 1               | 10                       |
| 2               | 100                      |
| 3               | 1,000                    |
| 4               | 10,000                   |
| 5               | OFF                      |

#### To set the selector switch:

- 1 If your instrument is the Lasair II particle counter, plug the DB connector from the HHIPA into the Lasair II particle counter's HHIPA connector.
  - 2 If you are using any other instrument, plug the DB connector from the HHIPA into the AUX connector on the back panel of the counter.
  - 3 Connect the sample tube from the HHIPA to the particle counter's inlet jet.
- The HHIPA functions off the Lasair II particle counter's first channel accumulative counts.

- 4** Turn the instrument on and begin sampling with the HHIPA thumbwheel switch set to “0”.
- 5** When a leak is found, adjust the thumbwheel switch until you can count the number of flashes/beeps per second to get a rough idea of the severity of the leak. To get the exact number, read the data system display or print the information on the printer.

## Appendix M

### Touch RAM

---

Touch RAM buttons are a hardware alternative to sampling recipes. A small metal memory button is programmed with sampling parameters and a location name. This is done by setting the desired sampling plan in the Lasair II particle counter, then using the touch-wand to write this information to a memory chip in a data storage button. Touch RAM supports the use of most but not all Lasair II particle counter features. Statistical standards settings, for example, are not compatible with Touch RAM.

The button can be permanently attached to the wall near a sample point location. When the button is read with a special wand reader, the sampling parameters and location information are loaded into the Lasair II particle counter, eliminating the need to manually enter the data.

This eliminates operator error due to incorrectly setting the sampling parameters. Perhaps the greatest benefit is preventing an operator from mistakenly using a recipe for the wrong location.

The TouchRAM feature is controlled from the **Comm Setup-Serial** screen.



**Figure M-1: Comm Setup-Serial Dialog Box**

**TouchRAM Read** — Select this “radio button” to enable Lasair II particle counter to read Touch RAM buttons.

Touch RAM buttons are a hardware alternative to sampling recipes. A small metal memory button is programmed with sampling parameters and a location name. The button can be permanently attached to the wall near a sample point location. When the button is read with a special wand reader, the sampling parameters and location information are loaded into the Lasair II particle counter, eliminating the need to manually enter the data.

**TouchRAM Read/Write Communication Protocol Mode** — This is the communications mode necessary for the TouchRAM button Read or Write function. When this mode is enabled, you can write a sampling scheme to a Touch RAM button with the optional Touch RAM wand.

**Setup Communication Protocol Mode** — This mode is used for instrument service and is not intended for customer use.

**SIO Baud Menu** — This menu is selectable from 1200–38400. All communications use 8 data bits, one stop bit, and no parity. For Pharmaceutical Net, select 9600 baud. The setting has no effect on the TouchRAM feature.

## Touch RAM Button Formats

There are two Touch RAM button formats:

- A Lasair II particle counter-compatible format
- A MiniLaz compatible format

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

## Reading Touch RAM Buttons

**To configure the particle counter for TouchRAM Read:**

- 1 Navigate to the *Comm Setup -Serial* screen.
- 2 Press the Enter softkey to activate the edit mode. Edit mode will open in the “Mode” box.
- 3 Use the down arrow head softkey to advance to TouchRAM Read or TouchRAM Read/Write.
- 4 Press the Enter softkey to enable the selection and then press the Up Arrow softkey to exit the edit mode.

**To read a Touch RAM button:**

- 1 Attach the Touch RAM wand to the RS-232 connector.
- 2 Position and hold the Touch RAM wand over the button. The button should fit inside the receptacle on the wand.
- 3 If the Lasair II particle counter is running, it will stop sampling. A dialog box will appear on the screen indicating the name of the new location to load.
- 4 Accept or reject the location by pressing the Enter softkey when the proper choice is selected.

## Writing Touch RAM Buttons

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

**To write to a Touch RAM button:**

- 1 Navigate to the *Comm Setup -Serial* screen and use the appropriate *Arrow* keys and the *Enter* key to enable TouchRAM Read/Write.
- 2 Attach the Touch RAM wand to the RS-232 connector.
- 3 Navigate to the *Location Setup Screen*.

---

**NOTE:** The Location Setup Screen will already be in Edit mode. Also note that a TouchRAM icon appears on the screen when TouchRAM Read/Write function is enabled.

---

- 4 Select a location.
- 5 Navigate to the TouchRAM icon and press the Enter softkey. The Program TouchRAM dialog box will appear, directing you to write the first button.
- 6 Position and hold the TouchRAM wand over the button. The button should fit inside the receptacle on the wand.
- 7 If the Lasair II particle counter is running, it will stop sampling. A data dialog box will appear on the screen indicating the name of the location to write to the button.
- 8 Accept or reject the write function by highlighting your choice and pressing the Enter softkey. If you are writing to a button, a dialog box will appear indicating if the write was successful or unsuccessful.

## Compatibility With MiniLaz Buttons

The Lasair II particle counter is compatible with MiniLaz TouchRAM buttons, but there are some differences. In general, buttons written by the MiniLaz can be used by the Lasair II particle counter. When a Lasair II particle counter format button is scanned by a MiniLaz, it is ignored.

MiniLaz buttons have the following characteristics:

- MiniLaz buttons support the first five channels of particle alarms, but do not support particle alarms on the Lasair II particle counter's largest channel.
- Particle alarms in metric units written by the MiniLaz cannot be converted to meaningful particle counter alarms.
- MiniLaz buttons support temperature and rh alarms, but not user analog channel alarms.
- MiniLaz buttons can read the Particle Measuring System address.

## Comparison to MiniLaz Buttons

The Lasair II particle counter button format offers the following advantages over a MiniLaz button format:

- Location names may be 16 characters rather than 7 characters.
- 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.
- Supports *Print Sample Average* feature.
- Support for network parameters.

## TouchRAM Button Data Format

The following data is written on Lasair II particle counter buttons:

[ANALOG\_SETUP\_PARAMETERS] This group is not supported in recipes

T\_RH\_ENABLED

TRH\_UNITS

|                 |                 |
|-----------------|-----------------|
| Analog1_Enabled | Analog3_Enabled |
| Analog2_Enabled | Analog4_Enabled |

[SAMPLING\_SETUP]

|                                                          |                          |                   |
|----------------------------------------------------------|--------------------------|-------------------|
| InterSampleDelay                                         | SampleTime               | Number_Of_Samples |
| Sample_Normalized                                        | Continuous sampling mode | Location          |
| SampleVolumeCF or CM                                     | Enable_Sample_By_Time    | SamplePurgeTime   |
| Sample_Units                                             | Group Repeat Enabled     |                   |
| Print Average Flag (Older software will read: Default 0) |                          |                   |

[GLOBAL\_ALARMS]

|         |                |
|---------|----------------|
| Enabled | Buzzer_Enabled |
|---------|----------------|

[PARTICLE\_ALARMS]

|                  |             |             |
|------------------|-------------|-------------|
| Use_differential | CH3_Counts  | CH5_Counts  |
| CH1_Counts       | CH3_Enabled | CH5_Enabled |
| CH1_Enabled      | CH4_Counts  | CH6_Counts  |
| CH2_Counts       | CH4_Enabled | CH6_Enabled |
| CH2_Enabled      |             |             |

[ANALOG\_ALARMS]

|                  |                  |                  |
|------------------|------------------|------------------|
| ACH1_MIN         | ACH3_MIN         | ACH5_MIN         |
| ACH1_MIN_Enabled | ACH3_MIN_Enabled | ACH5_MIN_Enabled |
| ACH1_MAX         | ACH3_MAX         | ACH5_MAX         |
| ACH1_MAX_Enabled | ACH3_MAX_Enabled | ACH5_MAX_Enabled |
| ACH2_MIN         | ACH4_MIN         | ACH6_MIN         |
| ACH2_MIN_Enabled | ACH4_MIN_Enabled | ACH6_MIN_Enabled |
| ACH2_MAX         | ACH4_MAX         | ACH6_MAX         |
| ACH2_MAX_Enabled | ACH4_MAX_Enabled | ACH6_MAX_Enabled |

[NETWORK\_CONFIG] (optional)

|                |              |                           |
|----------------|--------------|---------------------------|
| TCP/IP_ADDRESS | NETWORK_MASK | TCP/<br>IP_REMOTE_MODE_ON |
|----------------|--------------|---------------------------|

PMS Multi-Drop Address (Older software will read: Default 0)

CHECK\_SUM

## Particle Alarms and Touch RAM Buttons

When reading a button with the Lasair II particle counter, ensure that the button was written with a Lasair II particle counter instead of another monitor. Particle alarms are written and read in the buttons for each channel. A Lasair II particle counter's reading alarm settings based on a Lasair II particle counter 510 will set the alarms on a channel by channel basis. That is, the first channel alarm on the Lasair-510 particle counter (0.5  $\mu\text{m}$ ) is read as the first channel alarm on the Lasair II-310 particle counter (i.e., 0.3  $\mu\text{m}$ ).

### Touch RAM Buttons Written on Other Instruments

Touch RAM buttons that are written and read on different types of instruments may not give the results expected. The Touch RAM buttons do not contain any information about the particle sizes and flow rate of the instrument:

- **Particle sizes** – Buttons do not contain any information about the particle sizes of the instrument. Particle alarm values are stored in a six-channel array. Reading back these values in an instrument with different size channels will give different alarm settings. This is true even if the instruments are in a two-channel pharmaceutical mode (0.5 and 5.0 channels only).
- **Flow rate** – Buttons do not contain any information about the flow rate of the instrument. The sample size is saved as a volume. Therefore, the volume read and written is preserved, but the time is not saved. For example, if a Touch RAM button is written using a Lasair II-310A particle counter and then read with a Lasair III-550L particle counter, a shorter sample time will result, but the sample volume will be the same. The particle alarm settings are then affected by these differences. The settings will also be affected by the use of raw data rather than normalized data.

### Touch RAM Buttons with TCP/IP Address

In facilities with Pharmaceutical Net software, data sampled at various locations can be conveniently downloaded to Pharmaceutical Net, and then analyzed and archived. In large facilities with several Pharmaceutical Net installations, it may be beneficial to be able to automatically change the TCP/IP address of the Lasair II particle counter when it is moved from one Pharmaceutical Net area to another. Touch RAM buttons can have a TCP/IP address programmed in them, which facilitates this capability.

## Setting the TCP/IP Address in a Touch RAM Button

Figure M-2, below, shows the Lasair II Particle Counter Comm Setup Screen. The “Serial” page shown in the left side sets the function of the serial port. To read and write Touch RAM buttons, “TouchRAM Read/Write” must be selected. Buttons can be written with or without the TCP/IP address. In order to write the TCP/IP address, the “TouchRAM Write TCP/IP” button must be selected on the “Data” screen. If this setting is disabled, a 0.0.0.0 is written for the TCP/IP address. The 0.0.0.0 is ignored when the button is read.

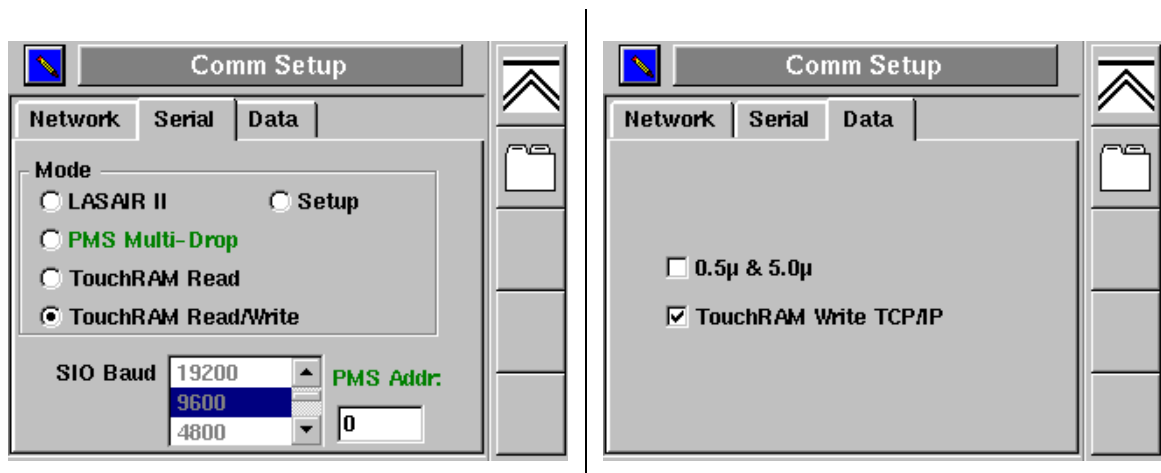


Figure M-2: Comm Setup Screens for Configuring TouchRAM

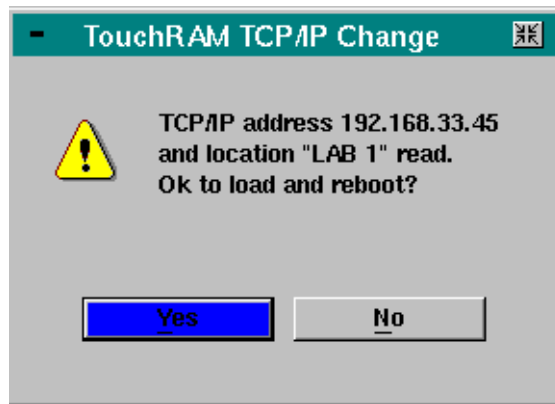
## Rules for Reading Touch RAM Buttons

To read a button, the serial setup must be either “TouchRAM Read” or “TouchRAM Read/Write”. The Data page setting of “TouchRAM Write TCP/IP” has no effect when reading buttons. In other words, even if this setting is disabled, the TCP/IP address will be read and processed from a button.

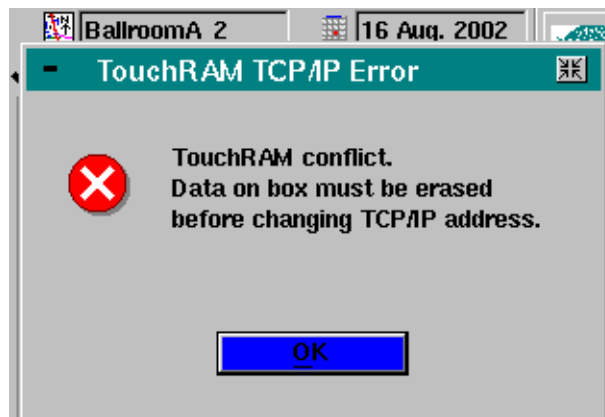
The following processing occurs when a button is read:

- If the TCP/IP address is read as 0.0.0.0, no additional processing occurs.
- If the TCP/IP address is the same as the one on the particle counter, then no additional processing occurs.
- If the TCP/IP address is different, a message is displayed showing the new TCP/IP address and the new location. The user is allowed to select **OK** or **Cancel**. See Figure M-3, “Notification Allowing New TCP/IP Address,” on page M-8.
- If user selects **Cancel**, nothing is loaded.
- If user selects **OK**, processing continues as follows:

- If old data is in the particle counter, then an error message says: “TouchRAM conflict. Data on box must be erased before loading new TCP/IP address”. TouchRAM information is not loaded. See Figure M-4, “Notification to Delay TCP/IP Change,” on page M-8.
- If no data is stored in the Lasair II particle counter’s database, all old location names in the database will be erased. The Lasair II particle counter will then:
  - Load the new location name and sampling parameters
  - Set the new TCP/IP address
  - Reboot the box to load the addresses. When the Lasair II particle counter reboots, it is ready to take a sample.



**Figure M-3: Notification Allowing New TCP/IP Address**



**Figure M-4: Notification to Delay TCP/IP Change**

## Setting TCP/IP Address with a Touch RAM Button

Touch RAM buttons with TCP/IP address do not contain all network parameters used by the Lasair II particle counter. In particular the feature has the following limitations:

- It does not set a Gateway.
- It does not set a Multicast Address.

These parameters must be set manually. When designing a network some consideration should be given to sub-netting each Pharmaceutical Net system, and keeping the Lasair II particle counter address in the same network. With this technique, a gateway is not needed and the same multicast address can be used, since each Pharmaceutical Net system will see only the local addresses.

| CAUTION                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Allowing the Lasair II particle counter to reset its TCP/IP address with the Touch RAM buttons introduces the possibility of multiple Lasair II particle counter units with the same address. Procedures must be adopted to ensure that multiple Lasair II particle counter instruments with the same TCP/IP address are not connected to the network at the same time. |

## Older Touch RAM Buttons

Older Touch RAM buttons may have a 0 (zero) in the TCP/IP address. That address will be ignored when read.

## Accessories

The following accessories can be used with the Lasair II particle counter.

- Touch RAM button (memory storage) – Part No. 1000013036

These small magnetic buttons are approximately the size of a coin, and can store information about the desired sampling parameters for the location where the button is posted (typically, on a wall).

- TouchRAM Wand (reader) – Part No. 1000013035

Passing the wand over the button to read the sampling parameters into the Lasair II particle counter. Each button can be programmed for a specific location by setting up the desired sample setting in the particle counter, and then writing these sampling parameters first to the wand and then to the button.

- TouchRAM Adaptors – A set of adaptors that allow the cable on the end of the wand to be plugged into the Lasair II particle counter's RS-232 outlet. The cable provides power to the TouchRAM wand and also carries data from the wand to the Lasair II particle counter (or vice versa).
- 9-pin Null Modem (Commonly available at electronic equipment stores.)
- 9-pin Gender Changer (Commonly available at electronic equipment stores.)
- Universal, 1-wire, comport adaptor (Purchase from third-party vendor.)

This adaptor is available from:

- Dallas Semiconductor – Part No. DS9097U-9
- Maxim/Dallas – Part No. DS9097U-S09
- Newark.Com



## **Appendix N**

### **International Precautions**

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#### **WARNING**

This instrument is a Class I laser product. Use of controls, or adjustment, or performance of procedures other than those specified here may result in hazardous radiation exposure.

#### **AVERTISSEMENT**

Cet instrument contient un laser de Classe 1. L'usage de moyens ou procédures, ou la pratique de certains réglages autres que ceux prévus dans ce manuel peuvent entraîner des risques d'exposition aux radiations laser.

#### **WARNUNG**

Das Gerät ist ein Laser der Klasse 1. Werden Einstellungen vorgenommen oder Verfahren eingesetzt, die nicht in dieser Bedienungsanleitung beschrieben sind, kann es zu gefährlicher Strahlung kommen.

#### **ATTENZIONE**

Questo strumento è nella classe 1 dei prodotti laser. Fare controlli o calibrazioni e seguire procedure diverse da quelle specificate in questo manuale, può provocare esposizione a radiazioni pericolose.

#### **PRECAUSION**

Este equipo es un producto laser de Clase I. La utilización de controles, ajustes o procesos diferentes de los especificados aquí, pueden dar lugar a exposiciones a radiaciones peligrosas.

## Hazard Symbols

The meaning of hazard symbols appearing on the equipment is as follows:

| Symbol                                                                            | Nature of Hazard                           |
|-----------------------------------------------------------------------------------|--------------------------------------------|
|  | Attention, consult accompanying documents. |
|  | Dangerous High Voltage                     |

## Symboles de risque

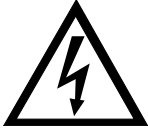
Des symboles représentant les risques sont placés sur l'appareil. Leur signification est la suivante:

| Symbole                                                                             | Nature du risque                                    |
|-------------------------------------------------------------------------------------|-----------------------------------------------------|
|  | Attention, consulter les documents d'accompagnement |
|  | Danger Electricite                                  |

---

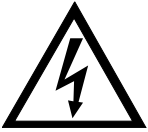
## Warnschilder

Die, an dem Gerät angebrachten Warnschilder haben folgende Bedeutungen:

| Symbol                                                                            | Gefahrenart                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------|
|  | Achtung! In den beiliegenden Unterlagen nachschlagen |
|  | Achtung Hochspannung                                 |

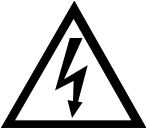
## Simboli di pericolo

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

| Simbolo                                                                             | Natura del pericolo                         |
|-------------------------------------------------------------------------------------|---------------------------------------------|
|  | Attenzione. Consultare i documenti allegati |
|  | Tensione Pericolosa                         |

## Simbolos de peligro

Los simbolos de peligro que aparecen en el equipo significan:

| Símbolo                                                                           | Naturaleza del Peligro                       |
|-----------------------------------------------------------------------------------|----------------------------------------------|
|  | Atención, consultar los documentos adjuntos. |
|  | Peligro alto voltaje.                        |