

Los Alamos

Environmental Restoration  
Records Processing Facility

**LOS ALAMOS NATIONAL LABORATORY  
ENVIRONMENTAL RESTORATION  
Records Processing Facility  
ER Records Index Form**

ER Record I.D.# 58951

*ER ID NO.* 58951    *Date Received:* 9/3/98    *Processor:* YCA    *Page Count:* 15

*Privileged: (Y/N)* N    *Record Category:* P    *Record Package No:* 0

*FileFolder:* N/A

*Correction: (Y/N)* N    *Corrected No.* 0    *Corrected By Number:* 0

*Administrative Record: (Y/N)* Y

*Refilmed: (Y/N)* N    *Old ER ID Number:* 0    *New ER ID Number:* 0

*Miscellaneous Comments:*

REFERENCE CITED



3022

15

ESH-5 58951  
EQUIPMENT ROOM



TA-59, OH-1  
Model DL-101 RM 120

# User's Guide



HNU Systems, Inc., 180 Charlemont Street, Newton, MA 02161-0007, USA  
Tel: (617) 664-6680 • Fax: (617) 558-6086 • Telex: 6617188

HNU Systems (Canada), Ltd., 3 Robert Speck Pkwy, Suite 900, Mississauga, Ontario, Canada L4Z 2G6  
Tel: (416) 949-0475 • Fax: (416) 277-1232 • Telex: 0633198

HNU Systems, Ltd., 254 Europa Boulevard, Gemini Business Park, Warrington, England WA5 5TN  
Tel: (0) 925 445941 • Fax: 0625 445940

HNU GmbH, Lindenstrasse 10, D-8034 Garmring, Germany  
Tel: 49-(0) 89 841 9009 • Fax: 089 840 2699

HNU-Nordfin Ltd Oy, Atomitie 5 A 3, P.O. Box 1, SF-00371, Helsinki, Finland  
Tel: + 358-0-562-6211 • Fax: + 358-0-562801

Received by ER-RPF  
SEP 03 1998  
*ms*



---

<b>1.0 INTRODUCTION</b> .....	2
<b>2.0 STARTUP</b> .....	4
2.1 UNPACKING.....	4
2.2 PROBE CONNECTION.....	4
2.3 POWER-UP.....	5
<b>3.0 SYSTEM DESCRIPTION</b> .....	6
3.1 LCD DISPLAY.....	6
3.2 FUNCTION KEYS AND KEYPAD.....	7
3.3 PROBE.....	8
3.4 THE SITE FUNCTION.....	9
3.5 LOGGING DATA.....	9
<b>4.0 SYSTEM OPERATION</b> .....	10
4.1 OVERVIEW.....	10
4.2 DL-101 OPERATION FLOW CHART.....	12
4.3 SETUP.....	14
4.3.1 ALARMS.....	14
4.3.2 TIME SET.....	14
4.3.3 DATE SET.....	14
4.3.4 SERIAL SETUP.....	14
4.3.5 BAR GRAPH SCALE.....	14
4.3.6 CLEAR MEMORY.....	15
4.3.7 CHANGE MODE.....	15
4.3.8 LAMP.....	15
4.4 CALIBRATION.....	15
4.4.1 CALIBRATE.....	16
4.4.2 RECALL CAL.....	17
4.4.3 SET SPAN.....	17
4.4.4 MULTIPOINT CALIBRATION.....	18
4.4.5 CHANGE GAIN.....	19
4.5 REPORT.....	20
4.5.1 LCD REPORT.....	20
4.5.2 MAX CONC. REPORT.....	20
4.5.3 PRINT/PC REPORT.....	20
<b>5.0 GENERAL MAINTENANCE</b> .....	21
5.1 CHARGING THE DL-101.....	21
5.2 CLEANING PROCEDURE FOR DL-101 LAMP AND ION CHAMBER.....	22
5.2.1 LAMP REMOVAL.....	22
5.2.2 LAMP CLEANING 10.2 and 9.5 eV.....	22
5.2.3 LAMP CLEANING 11.7.....	22
5.2.4 ION CHAMBER CLEANING.....	23
5.2.5 REASSEMBLY.....	23

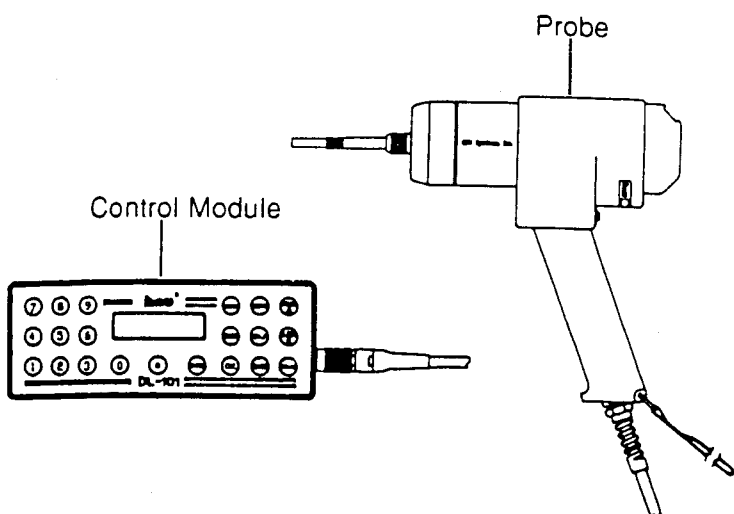
---

## **IMPORTANT NOTICE**

In order to maintain your instrument in compliance with the approving authorities' specifications and to incorporate any further modifications as needed, it is essential that your instrument is serviced only by HNU Service Department or by engineers trained and certified by HNU Systems, Inc.

Normal maintenance such as lamp and ion chamber cleaning is permissible by non-certified personnel if this is carried out following the procedures shown in the instruction manual. The control module, with the exception of the user replaceable battery pack, contains no parts which are user serviceable; any tampering by non-certified engineers invalidates any warranties and limits any liabilities of HNU Systems, Inc. in the event of failures.

## 1.0 INTRODUCTION



The microprocessor-based DL-101 detects and provides a direct reading of a variety of ionizable gases. Data is automatically stored in the field and later dumped to a printer/PC or recalled to the LCD display. The DL-101 features a unique ion chamber that provides electronic zero, eliminating the need for using zero gas, and the best low-end sensitivity. Advanced datalogging provides data storage for up to 255 sites. Calibration curves are stored for all available lamps, eliminating the need for individually calibrated probes. The sensor probe has a pistol grip design for easy handling, and features pushbuttons for logging site and concentration data. The base unit is equipped with rechargeable batteries to provide 8 hours of operation.

The DL-101-2 software has two modes of operation (Survey and Hazardous Waste), the DL-101-4 has four modes of operation (Survey, Hazardous Waste, Industrial Hygiene, Leak Detection).

**Survey Mode**-This is the default mode. This mode is shipped with a benzene calibration using an isobutylene reference (default calibration). Update this calibration using the isobutylene reference as frequently as is necessary; the last update is the "default calibration". This mode reads and logs concentration, date and time, calibration #, and the site/location.

**Hazardous Waste Mode**-This mode is similar to the Survey mode except that there are up to 12 calibrations that are accessed for a more specific application. Alarm levels are set and stored in memory for that mode.

**Industrial Hygiene Mode**-This mode functions like the Hazardous Waste Mode, and also provides you with a time weighted average (TWA). The TWA is a time weighted average of all concentrations logged at each site. When the site number is changed or logging within a site is interrupted, a new TWA begins and is stored for that site.

**Leak Detection Mode**-This mode detects leaks. A single reading is recorded when the log button on the probe or control module is depressed.

## 2.0 STARTUP

### 2.1. UNPACKING

To set up the DL-101, follow this procedure.

1. Take the unit out of the box and unzip the lid of the carrying case to access the right side panel and probe receptacle.
2. Remove the red cap plug from the end of the nozzle on the probe.

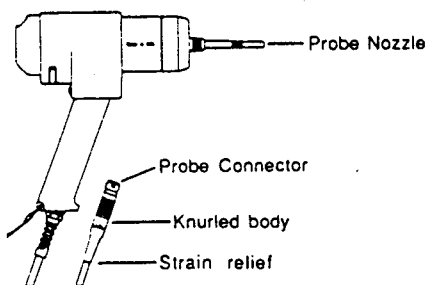
### 2.2. PROBE CONNECTION

1. Locate the probe receptacle on the right of the unit.
2. Line up the red dot on probe connector with the red dot on receptacle.

**NOTE:** Probe connectors are keyed and can only go in one way.

3. Push the connector straight in until it clicks and locks in place. To verify that connection is locked, pull on connector strain relief.

**NOTE:** Disconnect the probe by pulling out on knurled body of probe connector.



## 2.3 POWER-UP

1. Press and release the Power button.
2. The pump is activated and the LCD display shows:

HNU Systems, Inc.  
101 Datalogger

for five seconds.

3. The display then changes to the operating display:

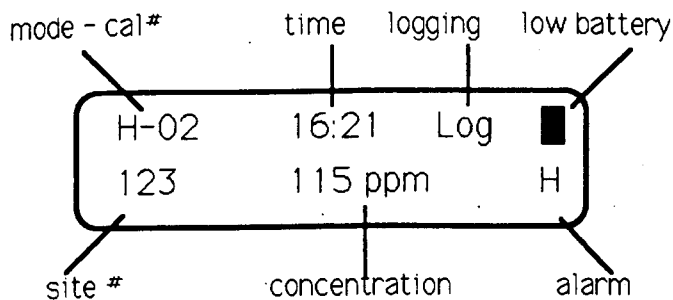
S-D            16:21  
123            0.5 ppm

4. At this point the instrument is reading concentrations in the Survey Mode using the default calibration.\*

**\*QUICK CHECK:** Place an opened permanent felt-tip marker at probe nozzle. Reading should increase.

## 3.0 SYSTEM DESCRIPTION

### 3.1 LCD DISPLAY



**MODE-S, H, I, L** (Survey, Hazardous Waste, Industrial Hygiene, Leak Detection).

**CAL #**-1 through 10, D (Default), or M (Multipoint).

**TIME**-Time in hh:mm (24 hour clock—16:21).

**LOGGING**- On or Off (Log = On).

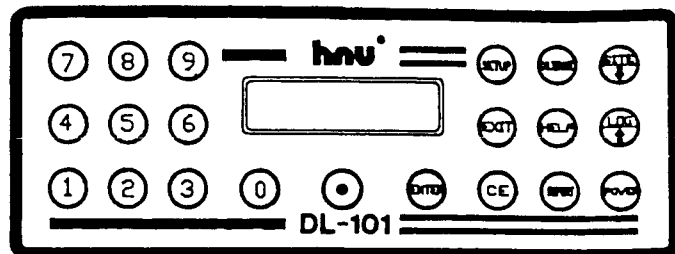
**SITE #**-Current site number.

**CONCENTRATION**-Shown in ppm (parts per million).

**HIGH OR LOW ALARM**-Shown if it exceeds the user programmed settings. **NOTE:** Not in Survey Mode.

**LOW BATTERY**-Visual indication that battery is low.

### 3.2 FUNCTION KEYS AND KEYPAD



**SITE** Use this key to assign a site number.

**LOG** Use this key to turn datalogging on/off.



Use these keys to scroll up/down through menus or to select preset options/settings.

**SETUP** Use this key to set the unit's parameters.

**HELP** Use this key for on-line help (where available).

**POWER** Use this key to turn the unit on and off.

**REPORT** Use this key to generate reports to the LCD display, PC, or a printer.

**CALIBRATE** Use this key to perform, save, and recall calibrations.

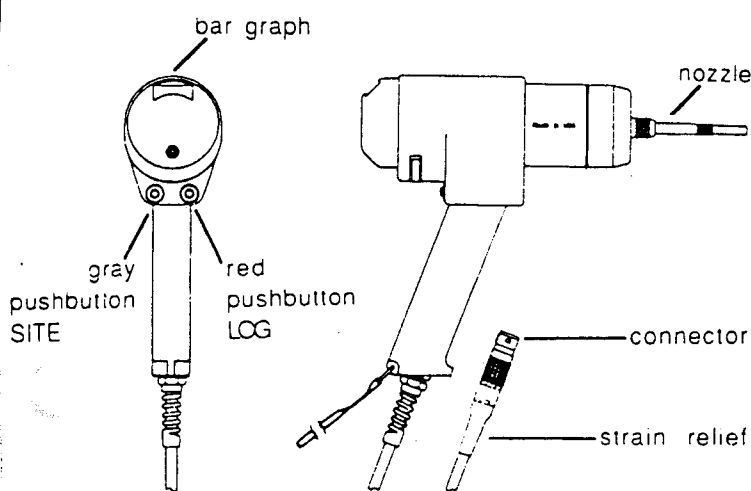
**EXIT** Use this key to exit current menu.

**ENTER** Use this key to acknowledge input or function selection.

**CE** Use this key to clear a numerical field entry.

**0-9 and (.)** The numerical keys and decimal point key input numerical entries.

### 3.3 PROBE



The DL-101 probe has a pistol-grip design for easy use. It houses HNU Systems' patented ion chamber and either a 9.5, 10.2, or 11.5 eV lamp. There are two pushbuttons on the back of the probe. The red button on the right turns the log function on when pressed once and turns the log function off when pressed again. The gray button on the left increments a site number when pressed. An LED bar graph is located at the top rear of the probe; this displays the intensity of the sample. The bar graph can be set for three different ranges: 0-20, 0-200, or 0-2000 ppm, using the Setup function. The default on power up is 0-20 ppm.

### 3.4 THE SITE FUNCTION

The Site function assigns a number to a site that is being analyzed. Press the Site key on the front panel to enter a specific site number, or press the gray button on the rear of the probe to increment a site number.

### 3.5 LOGGING DATA

The Log function stores data in memory. To log data, press the Log key on the front panel or the Log button on the back of the probe. "Log" appears in the upper right corner of the display when activated and disappears when not activated. In Survey, Hazardous Waste, and Industrial Hygiene Modes, a running average of all concentrations reported by the unit is stored at 15 second intervals. If logging time is shorter than 15 seconds, the unit stores the running average. In Leak Detection Mode, a single reading is stored each time the log button is activated. To turn logging off, press either the Log key on the control module or the red Log button on the rear of the probe.



## 4.0 SYSTEM OPERATION

### 4.1 OVERVIEW

To operate the DL-101, use the function keys on the front panel. The LCD screen prompts you with a bottom line showing a selection or data entry option, and a top line displaying the active function keys.

Example:



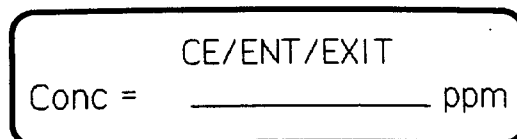
The selection option is "Alarms".

**ENT:** Press ENT to go into the alarms area of Setup and enter alarm values.

**↑↓:** Up and down arrows bypass the alarms and scroll through the Setup menu.

**EXIT:** Exit leaves the Setup menu and returns to the operating display.

Example:



The display prompts for a numerical input for calibration gas concentration.

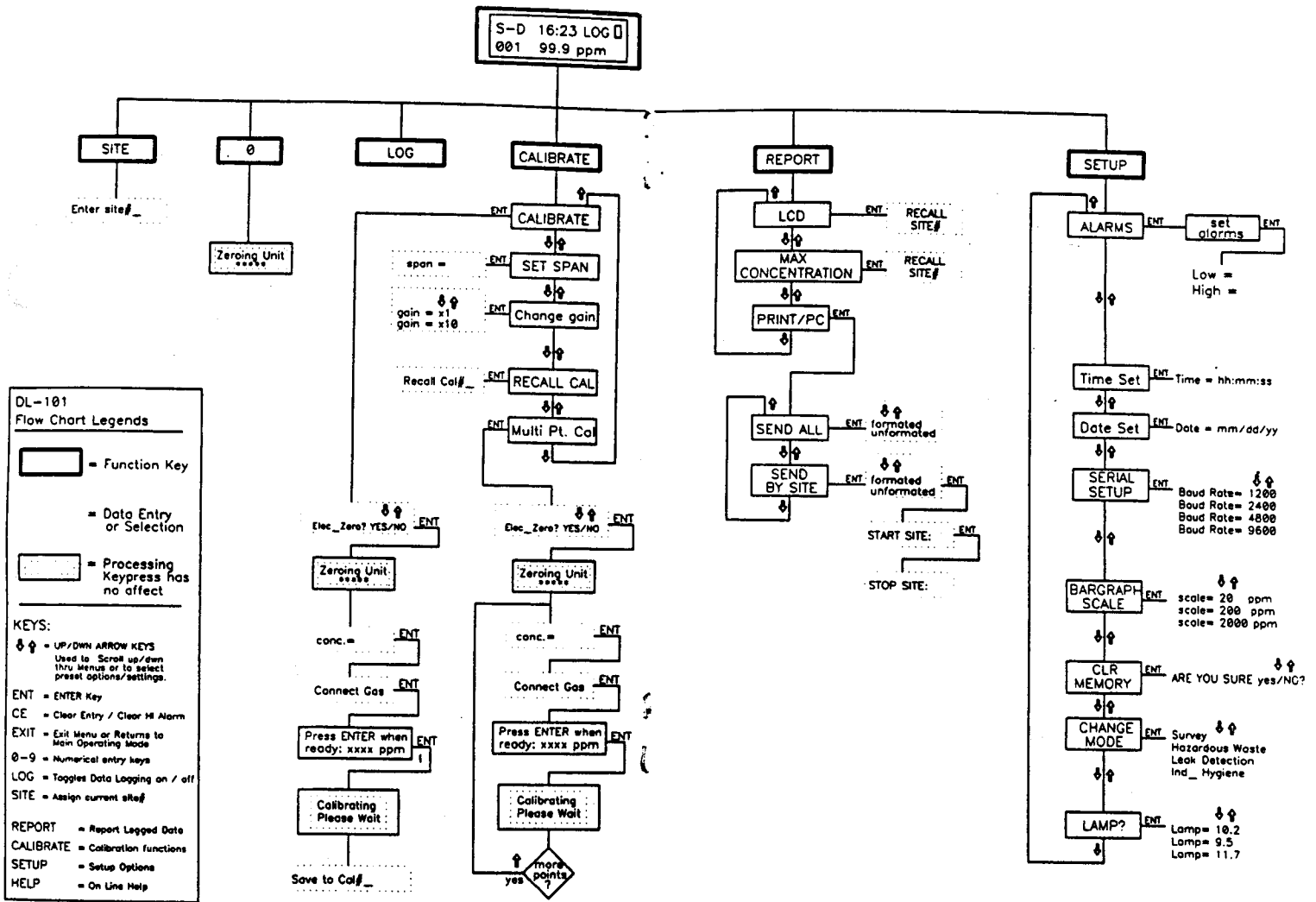
**CE:** CE clears an erroneous numerical input.

**ENT:** ENT enters the numerical input.

**EXIT:** EXIT aborts the calibration and returns to the operating display.

The following flow chart outlines the system operation.

## 4.2 DL-101 OPERATION FLOW CHART



---

## 4.3 SETUP

The Setup function enables you to input or change the DL-101's setup parameters. The Setup menu is identical for all modes of operation except Survey, which does not have alarms. The Setup menu is described in more detail below.

### 4.3.1 ALARMS

Pressing ENTER enables you to input settings for high and low alarms.

**NOTE:** A high alarm is a constant tone and is latched; CE resets this. A low alarm is an intermittent chirping sound and automatically stops when the concentration falls below the set low alarm level.

### 4.3.2 TIME SET

Time Set (24 hour real time clock) is expressed as hh:mm:ss; this is only used if changes must be made.

### 4.3.3 DATE SET

Date Set is expressed as mm:dd:yy; this is only used if changes must be made.

### 4.3.4 SERIAL SETUP

Serial Setup sets the baud rate: 1200, 2400, 4800, or 9600. The default is 1200.

### 4.3.5 BAR GRAPH SCALE

Bar Graph Scale sets up the bar graph on the back of the probe: 0-20, 0-200, and 0-2000 full scale. The default is 0-20.

---

### 4.3.6 CLEAR MEMORY

Clear Memory clears all data stored in memory.

### 4.3.7 CHANGE MODE

Change Mode enables you to enter the Survey Mode, Hazardous Waste, Industrial Hygiene, or Leak Detection (if applicable). Up and down arrows toggle between them.

### 4.3.8 LAMP

Lamp values are 9.5, 10.2, and 11.7; if you change the lamp, enter a new value. The default is 10.2.

## 4.4 CALIBRATION

The DL-101 stores up to 12 calibrations, all of which are utilized in Hazardous Waste, Industrial Hygiene, or Leak Detection modes. The Survey Mode uses calibration #12, the default calibration only. This appears as "D" on the LCD display, and may be updated as you feel necessary.

In the Calibrate function, five options are available; Calibrate, Recall Cal, Set Span, Multipoint Cal, and Change Gain.

The following procedure shows you how to calibrate the DL-101.

#### 4.4.1 CALIBRATE

1. Press the Calibrate key on the front panel.

**"Calibrate"**

appears on the LCD.

2. Press ENTER.

Enter/Exit   
Elec\_Zero? Y

appears on the LCD.

The Up and Down arrows toggle between Yes and No. Answer YES to electronically zero the unit. This is the preferred method. Answer NO to calibrate using "Hydrocarbon-Free" air as a zero reference. In this case, negative readings are possible if the analyzer measures a cleaner sample when in service.

Press ENTER.

**"Zeroing Unit"**

\*\*\*\*

appears on the LCD.

3. Display then prompts:

CE/ENT/EXIT  
Conc = \_\_\_ ppm

Enter the concentration of the calibration gas.

4. **"Attach gas to probe and /ENTER/"**

appears on the LCD.

5. **"Press ENTER when Ready: xxxx ppm"**

appears on the screen. The unit reads ppm based on the most recent calibration. When readings stabilize, press ENTER to complete the calibration process.

6. **"Calibrating... Please Wait"**

appears on the screen.

In the Survey Mode the unit saves to the default calibration; the LCD reverts to the operation screen. In the other three modes, the display prompts:

**"1-10/ENT"**  
**"Save to Cal #"**

Assign a number to the calibration. The LCD reverts to the operation screen and begins analyzing.

#### 4.4.2 RECALL CAL

This function recalls one of 12 user stored calibrations. #11 is the multipoint calibration, #12 is the default calibration.

#### 4.4.3 SET SPAN

This function cross references one compound to another. For further information, see the *DL-101 Operator's Manual*.

#### 4.4.4 MULTIPOINT CALIBRATION

A multipoint calibration achieves a more accurate calibration for a compound; it works like a single point calibration. Enter up to six concentrations; begin with the highest concentration.

1. Enter Multipoint Calibration. The display reads:

Enter/Exit    ↑↓  
Elec\_Zero?    Y

appears on the LCD.

The Up and Down arrows toggle between Yes and No. Answer YES to electronically zero the unit. This is the preferred method. Answer NO to calibrate using "Hydrocarbon-Free" air as a zero reference. In this case, negative readings are possible if the analyzer measures a cleaner sample when in service.

Press ENTER.

"Zeroing Unit"  
\*\*\*\*

appears on the LCD.

2. "CE/ENT/ EXIT  
Conc. = \_\_\_ ppm"

appears on the LCD. Enter the concentration.

3. "Attach Gas to Probe and /ENTER/"

appears on the LCD.

4. "Callibrating...Please Wait"

appears on the LCD.

5.    ↑↓/ENT  
      "More Points? Yes"

appears on the LCD screen.

The Up and Down arrows toggle between Yes and No. Answer Yes to go on to the next point and repeat procedure. Answer No to change the display to the operating display. The multipoint calibration is stored under cal #11.

#### 4.4.5 CHANGE GAIN

The "Change Gain" function increases gain when calibrating for gases with low photoionization sensitivities. (See *Operator's Manual* for further information).

## 4.5 REPORT

The Report key reports stored data for the currently active mode. The three choices within Report are: LCD report, Prnt/PC report, or Max. Conc. report.

### 4.5.1 LCD REPORT

When you select LCD Report, you view stored data on the LCD. Enter the desired site number; a concentration displays along with the mode, calibration number, date, and time. Use the up and down arrows to scroll through the data. When you view the last piece of stored data, the message "Out of Data" appears on the screen.

### 4.5.2 MAX CONC. REPORT

The Max. Conc. report displays on the LCD. Enter the desired site number; the maximum concentration seen at that site displays along with the associated date and time.

### 4.5.3 PRNT/PC REPORT

When you select the Prnt/PC option, stored data is sent to a printer or PC. You can send all the data stored in that mode, or selectively send by site number. The data is sent either formatted (with columns and headings) or unformatted (raw data suitable for importing to a database). The maximum concentration seen at each site and the date and time of calibration updates is incorporated into the Prnt/PC Report.

The DL-101 is compatible with most serial printers and personal computers with an RS-232 interface. Attach the appropriate HNU cable to the RS232 port on the rear of the DL-101.

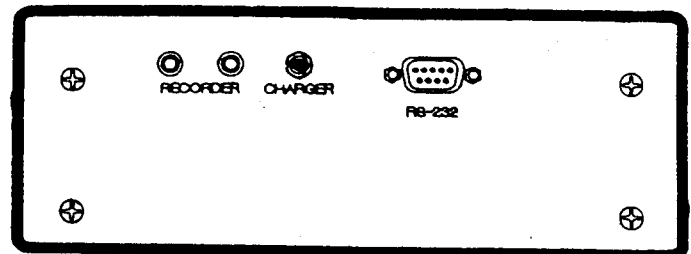
## 5.0 GENERAL MAINTENANCE

### 5.1 CHARGING THE DL-101

To charge the DL-101, follow this procedure.

1. Remove the battery charger from the zippered pouch clipped on the DL-101 and remove the DL-101 from the carrying case.
2. Place the output plug into the jack marked "CHG" located in the rear of the DL-101.
3. Plug the charger into AC line; the indicator light is on. (If the indicator light does not come on, recheck connections).

The instrument is fully charged in 8-10 hours.



---

## 5.2 CLEANING PROCEDURE FOR DL-101 LAMP AND ION CHAMBER

### 5.2.1 LAMP REMOVAL

Remove probe from unit. Hold probe upright with cable horizontal. Remove two cross headed screws holding black end cap. Remove two screws holding green ion chamber in place, and lift chamber off probe. Place your hand over the top of the probe and tilt. The lamp falls into your hand. Note eV number etched on lamp.

### 5.2.2 LAMP CLEANING 10.2 and 9.5 eV

1. Place a small drop of HNU cleaning compound (part #81-101-500) on lens of the lamp (small lens on metal end).
2. Using a nonlinting tissue, rub in a circular motion until all residue is removed.
3. Rinse with clean, hot tap water, and dry with nonlinting tissue.
4. If lens remains dirty, repeat steps 1-3.

### 5.2.3 LAMP CLEANING 11.7

1. Only clean lens with freon or any chlorinated organic solvent and a nonlinting tissue.
2. DO NOT use HNU cleaning compound or any water miscible solvent on these lamps.
3. If lens remains dirty, repeat step 1.

---

### 5.2.4 ION CHAMBER CLEANING

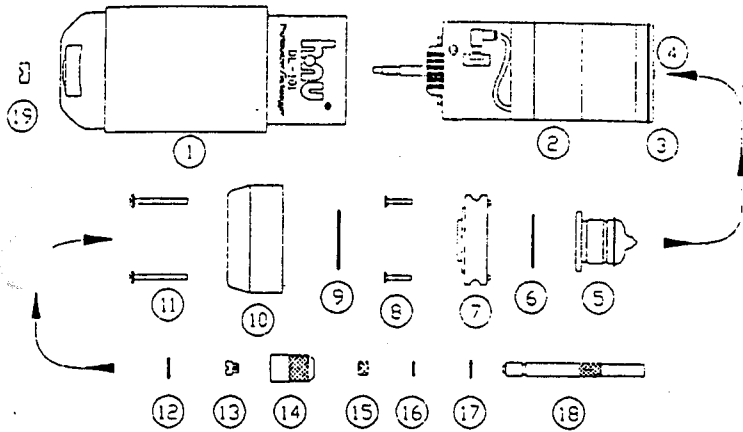
1. Remove the "O" ring from side opposite wire mesh and save.
2. Agitate the entire assembly in a beaker of methanol or acetone, or place the beaker and contents in an ultrasonic bath for 10 minutes.
3. Remove the chamber from the beaker and shake out excess solvent. Dry overnight at room temperature or bake for two hours in drying oven at 100° C. Do not dry at temperatures above 100° C. Allow chamber to cool completely before reinstalling.
4. In an emergency, careful use of a blowdryer is permissible.

### 5.2.5 REASSEMBLY

1. Hold probe upright with cable horizontal, and replace lamp with the lens uppermost.
2. Replace "O" ring in ion chamber groove (side opposite wire mesh).
3. Place ion chamber over lamp with the wire mesh side uppermost. Make certain all connection pins, screw holes, and ion chamber vent hole are correctly aligned. (The small vent hole in the ion chamber lines up with the vent hole in the probe, which has a small black "O" ring around it). Secure ion chamber with two screws.
4. Replace the probe endcap and note alignment of screw holes. Replace two screws and tighten evenly.

The unit is now ready for calibration prior to use.

## PROBE ASSEMBLY



ITEM	DESCRIPTION
1	Shell and Cable Assy
2	Lamp Housing Assy
3	O-ring (19-2-033S)
4	O-ring (19-005)
5	Lamp Assy
6	O-ring (19-568-025)
7	Ion Chamber Assy
8	4-40 Screws (S-PF04-040-10SSA)
9	O-ring (19-020)
10	End Cap and Cap Insert
11	6-32 Self-sealing screws (31-A6BES0640G)
12	O-ring (19-2-012)
13	Orifice (54-DA104131-1)
14	Orifice Adapter
15	Filter (27-1000-1/4-1/8)
16	O-ring (19-2-007)
17	O-ring (19-2-009-N674-70)
18	Probe Extension Exhaust Nut