Z zellweger analytics

MicroMax Pro

User & Maintenance Manual

MicroMAX Pro

| OX | LEL | CO | H2S |
| 20.9 | 0 | 0 | 0 |

P 01:16 B

ON
OFF
(SELECT)

MODE
(SCROLL)
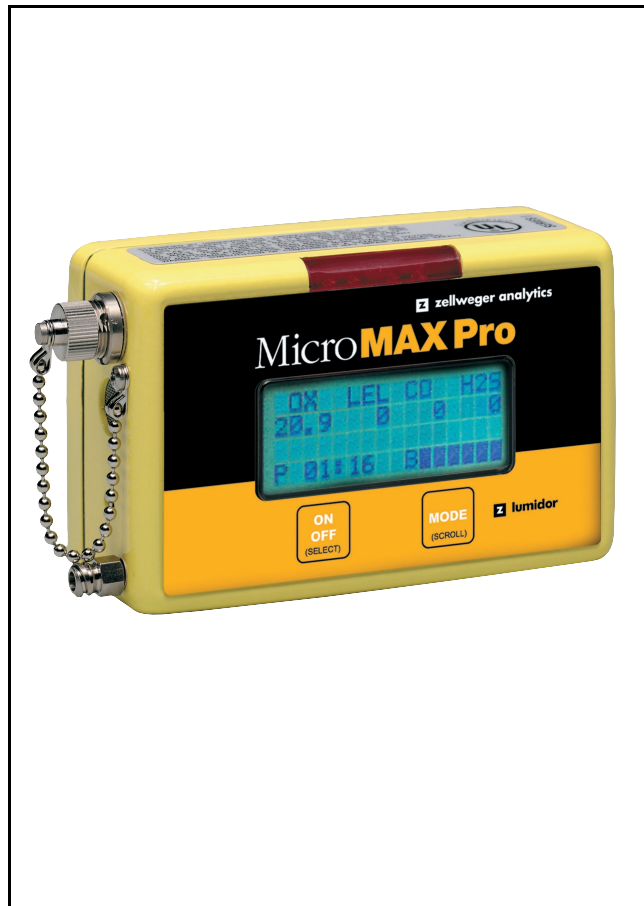
Z lumidor

Z lumidor

OTHER LUMIDOR PRODUCTS

Please visit our website at www.lumidor.com for other products that may be applicable to your needs.

DISCLAIMER

Notwithstanding any stated, written or implied warranty that may be associated with the sale, purchase, or use of its products, Lumidor, 11221 Interchange Circle South, Miramar, Florida, 33025, a subsidiary of Zellweger Analytics, will not be responsible for any damage or injury resulting to any person or property that may be construed as resulting from a malfunction of any of our products if said product has not been operated or maintained in accordance with our instructions as detailed in instruction sheets or printed manuals, or if the product has been tampered with, or serviced by, any other than our factory or other authorized service agent.

MAN-MAXPRO
REV: B.0

CAUTIONS AND WARNINGS

WARNING

DO NOT PROCEED BEFORE READING

To ensure proper functioning and use of this product, do not use this instrument until you read and completely understand this operating manual. It contains operating and maintenance procedures to ensure proper instrument function. For your safety, you are required to calibrate this instrument periodically. Please refer to the calibration section of this manual

Substitution of components may impair intrinsic safety.

Use only MPRO-BPR NiMH rechargeable battery pack, or MPRO-BPA alkaline battery holder with four each of the following alkaline cells only: Duracell Procell-2400, Duracell MN-2400, and Eveready E-92 or EN-92. Observe proper polarity when installing alkaline batteries.

CAUTION

Do not change or charge batteries in a hazardous location.

The LEL (Lower Explosive Level) range of this monitor is factory calibrated to methane. If monitoring a different combustible gas, calibrate the combustible gas range of the monitor to the appropriate gas.

This instrument has not been tested in atmospheres exceeding 21% oxygen.

Calibration is required when sensors are changed or added to the instrument.

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CAUTIONS AND WARNINGS

WARNING

Use only the approved accessories indicated in this manual.

Do not connect the instrument to a PC in a potentially hazardous environment.

AUSTRALIAN OR NEW ZEALAND CUSTOMERS:

Use only supplied type approved charger when charging from normal 240VAC outlet in Australia or New Zealand.

LIFETIME WARRANTY

This instrument is warranted, to the original end-user purchaser, against defects in materials and workmanship for the life of the product, excluding the battery and pump, which carry a two year limited warranty. During this period Lumidor will repair or replace defective parts on an exchange basis, F.O.B. the factory at Miramar, Florida. The end-user purchaser will pay freight charges to and from Lumidor. The decision to repair or replace parts shall be determined by Lumidor.

Sensor Warranties

(1) The oxygen sensor is guaranteed to operate satisfactorily for two years from the date of sale (i.e. the date of shipment) and will be replaced at no charge within that period only if it will not provide a correct reading after calibration by authorized service personnel. Physical or chemical damage, resulting from exposure to improper elements, is not covered.

(2) The combustible sensor is guaranteed to operate satisfactorily for two years from date of sale (i.e. from date of shipment). If It will not provide a correct reading after calibration by authorized service personnel, it will be replaced at no charge within that period. This guarantee is void if it has been contaminated by some unusual substance, including but not limited to, water and/or other liquids, oily compounds, corrosives, silicones, lead vapors, extremely high concentrations of combustible gases, and various particulates which may inhibit gas flow to the sensor element.

(3) The toxic sensors are guaranteed to operate satisfactorily for two years (18 months for CL2, CLO2 and HCN sensors, 12 months for the NH3 sensor) from the date of sale (i.e. the date of shipment). They will be replaced at no charge within that period only if they will not provide a correct reading after calibration by authorized service personnel, and only if the sensor membranes exhibit no physical or chemical damage resulting from exposure to improper substances.

LIFETIME WARRANTY

Conditions and Exclusions

To maintain this warranty, purchaser must perform maintenance and calibration as prescribed in the instrument operation manual, including prompt replacement or repair of defective parts and such other necessary calibration, maintenance and repair as may be required, according to the use of the instrument, in the reasonable judgment of Lumidor. Normal wear and tear, and parts damaged by abuse, misuse, negligence or accidents are specifically excluded from the warranty.

Purchaser acknowledges that, notwithstanding any contrary term or provision in the purchaser's purchase order or otherwise, the only warranty extended by Lumidor is the express warranty contained herein. Purchaser further acknowledges that there are no other warranties expressed or implied, including without limitation, the warranty of merchantability or fitness for a particular purpose; that there are no warranties which extend beyond the description of the face hereof; that no oral warranties, representations, or guarantees of any kind have been made by Lumidor, its distributors or the agents of either of them, that in any way alter the terms of this warranty; that Lumidor and its distributors shall in no event be liable for any consequential or incidental damages, including but not limited to injury to the person or property of the purchaser or others, and from other losses or expenses incurred by the purchaser arising from the use, operation, storage or maintenance of the product covered by the warranty; that Lumidor's liability under this warranty is restricted to repair or replacement of defective parts at Lumidor sole option; and that Lumidor neither assumes nor authorizes any other person to assume for it any other warranty. The warranty shall be void if serial numbers affixed to the products are removed, obliterated or defaced.

Lumidor, Miramar, Florida

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1. PREPARATION FOR USE

1.1   UNPACKING

Check for these items:

- Packaging (retain for possible future use)

- Instrument with internal rechargeable battery pack

- Calibration certificate

- Standard accessories:

  - AC battery charger

  - Alkaline battery holder

  - Dust filter

  - 10-foot sampling hose with filter and water trap

  - Rubber boot with belt clip and neck strap

  - Instruction manual

1.2   CHARGING

CAUTION

Do not change or charge batteries in a hazardous location.

Do not try to turn on or otherwise operate this instrument until it is fully charged.

Use only the MPRO-1 A.C.charger, the MPRO-2 220 volt AC charger, or the MPRO-6 vehicular charger. Use of any other charger may cause permanent instrument damage and will void any warranties. The charge period is dependent on the condition of the batteries, but should not exceed about 4 hours for a completely depleted battery pack. Partially depleted packs will be charged in a much shorter period of time.

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1. PREPARATION FOR USE

To commence charging with the charger supplied with AC power, connect the charger plug to the instrument port (See **Figure 1**) and instrument display should read "CHARGING BATTERY". When charging is completed, "CHARGE COMPLETE" is displayed. The instrument is now fully charged and ready for use.

If charging is attempted without the rechargeable battery, or with alkaline batteries, "CHECK BATTERY" is displayed.
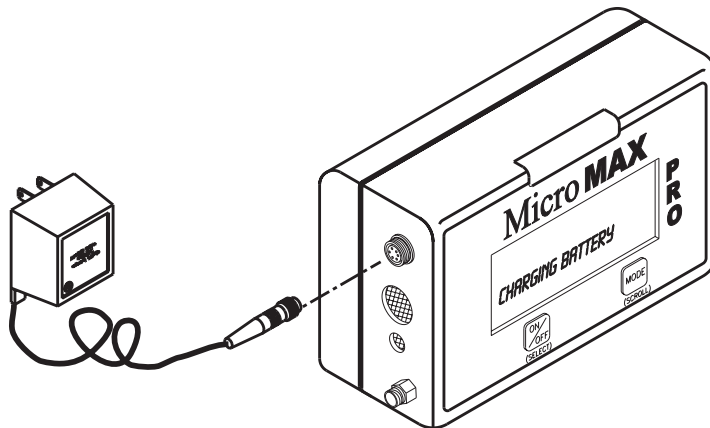
Figure 1 Charging the MicroMax Pro

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2. GENERAL DESCRIPTION

The MicroMax Pro is a programmable instrument that can monitor one, two, three, four, or with Combo-Tox sensor, up to five gases. It combines proven sensor performance and electronics in a small, lightweight, and easy to use monitor. It consists of the monitor, NiMH rechargeable battery pack, battery charger, alkaline battery holder, rubber boot with neck strap and belt clip, dust filter, 10-foot sampling hose with filter and water trap, calibration certificate and instruction manual.

Prior to shipment, the monitor was configured with default alarms and other settings, tested and calibrated. After charging, it is ready for use.

2. GENERAL DESCRIPTION

Port   Large Alarm LED Bar

Inlet   ON/OFF   MODE
                         Switch   Switch

Battery Compartment

Rear View
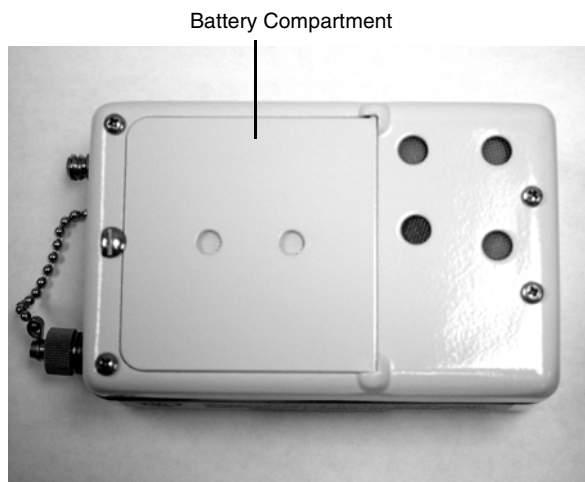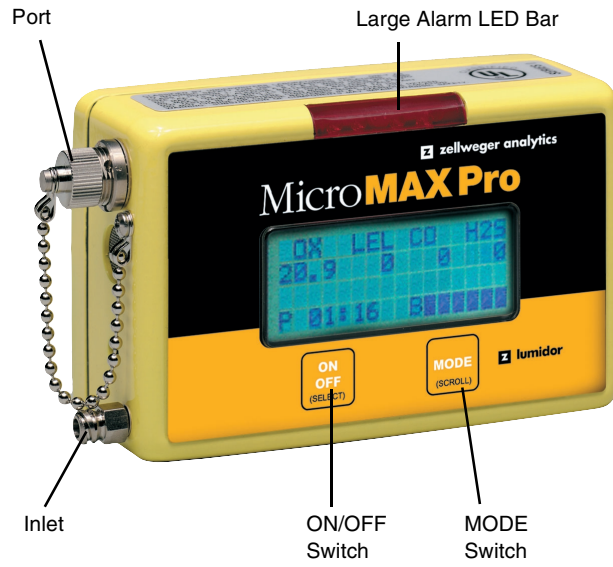
Figure 2 MicroMax Pro

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3. FEATURES

(1) **Liquid Crystal Display**
High contrast 4 lines by 16 character alphanumeric display that indicates gas concentration of up to four gases simultaneously.

(2) **Display Backlighting**
Automatic fiber-optic backlight provides display readability in dim or dark environments.

(3) **Automatic Toxic Sensor Recognition**
Microprocessor automatically recognizes toxic sensors when plugged in. Monitor displays corresponding gas, sets gain, corrects alarm levels and initializes temperature compensation.

(4) **User Selectable Power Source**
User has an option of powering instrument either with the supplied NiMH rechargeable battery pack or with four "AAA" alkaline cells (use only the cells that are approved for use), mounted in the supplied battery holder.

(5) **User Friendly Interface**
User friendly interface is intuitive for ease of use and simplicity of operation.

(6) **Extensive Programming Options**
There are many programming options to custom-configure the instrument.

(7) **Programmable Gas Alarms**
High and low alarm levels, TWA mode for toxics, latching or non-latching, are all user programmable.

(8) **Fully Automatic Calibration**
Fast, easy, accurate calibration that requires no user adjustments or tools.

(9) **Confidence Beep**
User selectable confidence beep provides a visible flash and audible beep about every 20 seconds to confirm instrument operation.

3. FEATURES

(10) **Voice and Display Messaging**
User may select English, Spanish, French or German for voice and display messaging.

(11) **Battery Gauge B▮▮▮▮▮▮**
This consists of B (for battery) and a maximum of 6 bars, as illustrated. Six bars represent full charge, while fewer bars indicate various stages of charge. When all bars are depleted, the instrument will run for more than an hour, after which time a low battery alarm is indicated by two beeps every 15 seconds. Low battery alarm will continue for at least half an hour, after which instrument will beep continuously and shut down. If alkaline batteries power instrument, battery condition is indicated on the display, not by bars, but by battery voltage. A fresh alkaline pack will read about 5.8 volts, and low battery warning commence anywhere from 4.0 to 4.2 volts, model dependent, while shut-off occurs between 3.68 and 3.95 volts, model dependent.

(12) **Pump or Diffusion Mode of Operation**
User may choose between pump and diffusion mode of operation. If pump is selected, 'P' is displayed in the lower left corner of display and all the benefits of internal pump operation are available. In diffusion mode, 'D' is displayed. If pump mode is selected and pump fails, instrument automatically switches to diffusion mode for continuous operation and protection.

(13) **Real Time Clock**
User adjustable real time clock provides continuous time display. If daylight savings time is selected, the time will be automatically updated.

(14) **User Selectable Calibration Gas Concentration**
This feature allows the user to select the desired calibration gas concentration, within specified limits, for all sensors except oxygen.

3. FEATURES

(15) **User Selectable LEL Conversion Factors**
This feature allows instrument to accurately indicate the LEL level for a wide range of hydrocarbons after calibrating with the methane gas.

(16) **Multiple Gas Alarm Indicators**
Audible and visual alarms alert user of unsafe gas levels.

(17) **Low Flow Alarm**
In pump mode, a steady audible alarm is accompanied by a visual alarm and the display indicates "LOW FLOW". If alarm persists, instrument will indicate "PUMP FAIL" and switch to diffusion mode of operation.

(18) **RFI Resistant Design**
High resistance to RFI (radio frequency interference) minimizes false alarms.

(19) **Charge Status Recognition**
The instrument automatically shuts off if charger is connected while monitor is on. This prevents the charger from being used as a power source, which is not intrinsically safe. Soon after charger is connected, display indicates "CHARGING BATTERY".

(20) **Calibration Record**
The date the instrument is last calibrated and the date that the instrument is due for the next calibration can be displayed on the start-up under "LAST CALIBRATED" and "CALIBRATION DUE".

(21) **Peak, STEL and TWA**
The **MODE** button enables display of peak reading (highest toxic or combustible and lowest oxygen levels), STEL (15-minute accumulated short-term exposure level), and TWA (8-hour time weighted average) since instrument was last turned on. The STEL and TWA will be indicated only if "ALARM TYPE" is set to "TWA ON".

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3. FEATURES

(22) **Low Battery Warning**
Low battery warning is indicated by dual beep every 15 seconds, 30 minutes prior to shutdown. With alkaline batteries, low battery warning occurs between 4.0 and 4.2 volts.

(23) **Data Logging**
The MicroMax Pro is supplied with data logging capabilities and all necessary hardware, cables and software. There are 2400 data points for storage of up to 200 hours of data.

(24) **Approvals**
Intrinsic Safety:
- MPRO (Standard MicroMax Pro)
  UL Classified 'Class I, Divisions 1 & 2, Groups A, B, C & D, Class II, Groups E, F & G'
- MPRO-A (Australian version)
  SAA Certified Ex ia s Zone 0 IIB T3
- MPRO-M (MSHA version)
  MSHA approved for intrinsic safety (Methane-Air mixtures only)
- China 'PATTERN APPROVAL CERTIFICATE'
EMC Standards: (Third Party Certified)
- EN 50270:1999
- EN 55011:1998

4. OPERATING INSTRUCTIONS

MICROMAX PRO			
VER 5.0			
ON			
TESTING			
PLEASE WAIT			
ZEROING			
PLEASE WAIT			
OX	**LEL**	**CO**	**H2S**
19.5	**10**	**25**	**10**
LOW ALARM			
OX	**LEL**	**CO**	**H2S**
23.5	**20**	**35**	**20**
HIGH ALARM			
VOICE ON			
READY			
OX	**LEL**	**CO**	**H2S**
20.9	**0**	**0**	**0**
P 11:52			**B▐▌▌▌▌**

Figure 3 Default Turn-on Sequence

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4. OPERATING INSTRUCTIONS

4.1 TURN-ON

After charging the instrument, or installing fresh alkaline batteries, turn instrument on in clean air, by depressing the **ON/OFF** button until a confirming beep is heard. Release the **ON/OFF** button and instrument will display the firmware version number and "ON" before cycling through its turn-on sequence (See **Figure 3 Default Turn-on Sequence**). Then the instrument goes through "TESTING" and "ZEROING" cycles, displays low alarm levels and high alarm levels, indicates "VOICE ON" and "READY" and goes into normal operating mode. In normal operating mode, gas types and levels occupy the top two lines, the third line is blank and available for messaging, while on the fourth line is the letter "P" or "D", for pump or diffusion mode of operation respectively, the current time in 24-hour format and the battery gauge. If alkaline batteries power instrument, battery condition is indicated by display of battery voltage. With alkaline batteries, voltage should be about 5.8 volts with fresh batteries, with low battery warning occurring at between 4.0 and 4.2 volts, depending on sensor configuration.

4.2 STANDARD MODE SEQUENCE

OX	LEL	CO	H2S
20.1	0	16	9
PEAK READING			

	LEL	CO	H2S
USER SETUP			
		NO	

OX	LEL	CO	H2S
20.9	0	0	0
P 08:49		B▊▊▊▊▊	

Figure 4 Default Standard Mode Sequence

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4. OPERATING INSTRUCTIONS

Each standard mode option is available by depressing the **MODE** button sequentially.

PEAK READING. The highest toxic and combustible gas levels and the lowest oxygen levels. Depressing the **ON/OFF** button while in this mode clears peak values.

USER SETUP. User setup mode allows pump, voice and confidence beep to be turned on or off as desired. It is also here that calibration is usually done, and memory cleared (See Section 4.7 *Clearing Memory*). To enter the user setup mode, keep depressing the **MODE** button until line 3 of display indicates "USER SETUP". Press the **ON/OFF** button to enter user setup mode, to bypass each setting depress the **MODE** button. To change any setting, depress the **ON/OFF** button. For example, to change pump, voice, or confidence beep from "ON" to "OFF" or vice versa, depress the **ON/OFF** button when the appropriate menu item is displayed. To enter calibration mode, depress the **ON/OFF** button when "CALIBRATE?" is displayed (See Section 5 *Calibration*).

4.3 TESTING SENSORS AND ALARMS

It is recommended that proper alarm function be verified prior to use by applying calibration or alarm check gas. Alarm check gas (Test 1A) should be used only for instruments that contain one or more of the 4 standard sensors (O2, LEL, CO or H2S). For other configurations, use calibration gas with instrument in normal operating mode. After testing, remember to clear the peak values, or if "ALARM TYPE" is set to "TWA ON", clear memory. Test low flow alarm by placing finger over inlet when in pump mode. If instrument does not go into low flow alarm when inlet is blocked, instrument should be operated in diffusion mode after entering the "USER SETUP" mode and changing the pump status configuration to "PUMP OFF". Instrument should be serviced as soon as possible to fix the problem.

4. OPERATING INSTRUCTIONS

Instructions for using alarm check gas (part number Test 1A)

- Turn monitor on in fresh air and allow it to go into normal operating mode.

- Break shipping tab off canister.

- Attach blue balloon on to black disk on alarm check gas hose. (See **Figure 5**)

- Insert red end of hose into hole in canister nozzle.

- Pinch hose (or place finger over the end of the hose) and pulse trigger so that gas fills the balloon to its natural shape. Do not over-inflate balloon.

- Insert other end of hose into air intake.

- All channels should be in alarm for a few seconds while gas passes over sensors. Check display to confirm proper operation of visual alarms for each gas. Confirm proper operation of audible alarms.

- Remove hose from monitor and allow alarm check gas to be purged from monitor with fresh air.

- Clear Peaks or, if "ALARM TYPE" is set to "TWA ON", clear memory (Please see Section 4.7 *Clearing Memory*).

CAUTION

Gas/Bump test should be performed in a well-ventilated area.

4. OPERATING INSTRUCTIONS
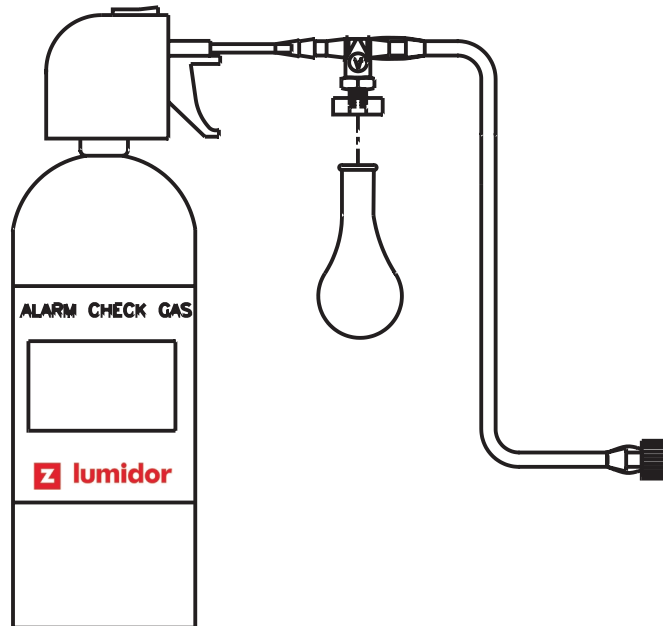
Figure 5 Alarm Check Gas

4.4 CONTINUOUS MONITORING

Lumidor recommends that the supplied dust filter (part number 16PFC) be attached at all times in pump mode if the instrument is being used in a dusty environment. Keeping dust out increases instrument life and lowers maintenance costs.

4.5 REMOTE SAMPLING (PRETESTING)

Remote areas and confined spaces may be sampled in pump mode prior to entry by connecting the supplied 10-foot or longer sampling hose to the inlet fitting. The sampling hose is usually used for pretesting only. Continuous monitoring with the sampling hose attached reduces the number of hours of run time available.

4. OPERATING INSTRUCTIONS

The following procedure is recommended:

- Turn instrument on and allow to enter normal operating mode.

- Be sure you are in pump mode. ("P" indicated in line 4 of display).

- Test alarm function with gas as indicated in Section 4.3 *Testing Sensors and Alarms*..

- Test low flow alarm as indicated in Section 4.3 *Testing Sensors and Alarms*.

- Connect sampling hose to instrument. Place hose in area to be sampled.

- Wait two minutes for full response.

- Take readings.

- Retrieve hose and disconnect from instrument.

Hose lengths up to 100 feet may be used for pretesting. Add one second per foot to the two-minute wait for full response.

4.6   ALARMS
In the event of a gas alarm, evacuate the area immediately. Investigate the cause of the alarm only when you are safely out of the potentially hazardous area. Accessing the "Peak" mode will display the gas and level that generated the alarm.

- A "warning" low gas alarm indicates a gas concentration above the low alarm set point and is indicated by 3 beeps from the horn, flashing LED, flashing gas range of the sensor in alarm, and display of the word "WARNING." Voice will also say "WARNING" except for O2, in which case it will say "DANGER."

- A "danger" high gas alarm is indicative of a gas concentration above the high alarm set point and is indicated by 3 beeps from the horn, flashing LED, flashing

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4. OPERATING INSTRUCTIONS

gas range of the sensor in alarm, and display of the word "DANGER." Voice will also say "DANGER".

- Low flow or pump fail alarm is indicated by a continuous audible alarm, flashing LED, and the words "LOW FLOW" or "PUMP FAIL" displayed.

- Low battery alarm is indicated by 2 short beeps from the horn every 15 to 20 seconds, together with the words "LOW BATTERY' on the display. It first occurs approximately 30 minutes prior to battery depleted alarm and shutdown.

- Battery depleted alarm is indicated by 5 audible beeps, display of "BATTERY DEPLETED" and shutdown.

4.7   CLEARING MEMORY

Memory is automatically cleared after each calibration.

To clear memory manually:

- Depress the **MODE** button repeatedly until "USER SETUP" is displayed.

- Depress the **ON/OFF** button to enter the user setup mode.

- Depress the **MODE** button 4 times until "CLEAR MEMORY" is displayed.

- Depress the **ON/OFF** button once to simultaneously clear memory and return to normal operating mode.

4.8   TURN-OFF

To turn the MicroMax Pro off, depress and hold the **ON/OFF** button, and instrument will beep 4 times. After the fourth beep, release the button, and instrument will indicate "POWER OFF" and automatically turn itself off.

If **ON/OFF** button is released during countdown, instrument will resume normal operation.

5. CALIBRATION

5.1 CALIBRATION FREQUENCY

It is important to verify accuracy on a regular basis to guard against any unexpected loss of sensitivity due to mechanical damage, immersion, aging, or exposure of the sensors to poison (such as high concentration of combustible gas, tetra-ethel-lead, sulfides or silicone containing lubricants) present in the atmosphere being monitored.

The safest possible course of action is to expose the sensors to a known concentration test gas before each day's use. This "bump" test takes only a few seconds to accomplish. It is not necessary to make a calibration adjustment unless readings are off by more than 15% of the applied gas concentration. If this procedure is followed, the calibration interval can be up to 90 days.

If your calibration procedures do not permit daily checking of the sensors, Lumidor recommends the following procedure to establish a safe and prudent check schedule. Initially, over a period of a few days, check the response daily to be sure there is nothing in your atmosphere that is poisoning the sensors. If the instrument displays correct concentration levels after 2 weeks on this schedule, the calibration interval may be extended to two weeks. If the instrument does not require calibration, after 2 months on this schedule, the calibration interval may be extended to 30 days.

> ## WARNING
>
> This does not preclude testing with gas on a regular basis.

Always observe your employer's calibration and testing schedules.

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5. CALIBRATION

5.2 CALIBRATION PROCEDURE (WHEN ALL CALIBRATION GASES ARE IN A SINGLE CANISTER)

> **CAUTION**
>
> Calibration should be carried out only in a clean air environment, known to be free of contaminants.
>
> Be sure the calibration gas is within the expiration date indicated.

- Use **MODE** button to scroll through mode functions to "USER SETUP".

- Depress **ON/OFF** button to enter "USER SETUP".

- Use **MODE** button to scroll to "CALIBRATE?"

- Depress **ON/OFF** button to enter the calibration mode.

- Instrument will count down to 0.

- Apply calibration gas when "APPLY GAS" is displayed. (See **Figure 6**).

- Instrument will display "CALIBRATING" and count down to 0.

- When "CAL COMPLETE" is displayed, **observe that all sensors calibrated are displayed below "CAL COMPLETE". Any sensor not displayed is not calibrated**. Remove gas and turn off gas flow.

- Instrument will go into a "PURGING" countdown to 0.

- After purging, instrument automatically clears memory.

- This calibration process is now complete.

5. CALIBRATION

Figure 6 Calibrating the MicroMax Pro

5.3 CALIBRATION PROCEDURE (WHEN NOT ALL CALIBRATION GASES ARE IN A SINGLE CANISTER)

CAUTION

Calibration should be carried out only in a clean air environment, known to be free of contaminants.

Be sure the calibration gas is within the expiration date indicated.

5. CALIBRATION

CAUTION

Please refer to Appendices K and L for important additional information.

- Use **MODE** button to scroll through mode functions to "USER SETUP".

- Depress **ON/OFF** button to enter "USER SETUP".

- Use **MODE** button to scroll to "CALIBRATE?".

- Depress **ON/OFF** button to enter the calibration mode.

- Instrument will count down to 0.

- Apply the first calibration gas, or gases, when "APPLY GAS" is displayed. (See **Figure 6**)

- Instrument will display "CALIBRATING" and count down to 0.

- When "CAL COMPLETE" is displayed, **observe which sensors are calibrated and displayed below "CAL COMPLETE".** Remove gas and turn off gas flow.

- Depress the **ON/OFF** switch and instrument will display "APPLY GAS".

- Apply the second calibration gas.

- Instrument will display "CALIBRATING" and count down to 0.

- When instrument displays "CAL COMPLETE", **observe whether all sensors are calibrated and displayed below "CAL COMPLETE".** Remove gas and turn off gas flow.

- If all sensors were displayed below "CAL COMPLETE", instrument is fully calibrated and will display "PURGING", count down to 0 and clear memory. The calibration process is complete.

5. CALIBRATION

- If a third calibration gas needs to be applied, after instrument displays "CAL COMPLETE", depress the **ON/ OFF** button and follow the instructions on the display.

- When "CAL COMPLETE" is displayed, remove gas and turn off gas flow.

- Instrument will purge itself while counting down to 0, and clear memory.

- The calibration process is now complete.

5.4 ZEROING

CAUTION

Zeroing should be carried out only in a clean air environment, known to be free of contaminants.

There are three ways to zero the instrument:

- Zeroing is done, automatically, each time the instrument is calibrated.

- Zeroing is done, automatically, each time the instrument is turned on if the "AUTO ZERO" feature is selected in the supervisory mode. Please refer to Section 6.6 *Auto-zeroing*.

- Zeroing may be done manually without doing a full calibration by entering the calibration mode (please refer to Section 5.2 *Calibration Procedure (when all calibration gases are in a single canister)*) and, anytime while the instrument is zeroing and counting down from 30 seconds to 0, depress and hold down the **MODE** button for at least 3 seconds. Instrument will not immediately exit, but will complete the zeroing cycle, count down to 0, and then exit the calibration mode.

6. PROGRAMMING

6.1 PROGRAMMING OPTIONS

Powerful programming options allow user to customize the MicroMax Pro. Some options are available in the user set-up mode (See Appendix D *Mode Sequence, User Set-up Mode*) but the majority of these options are available only in supervisory mode. ALL PROGRAMMING OPTIONS CAN ALSO BE ACCOMPLISHED THROUGH THE MAXPRO LOG SOFTWARE, USING THE UPLOAD FUNCTION. THIS IS BY FAR THE MOST CONVENIENT AND EFFICIENT METHOD AND IS STRONGLY RECOMMENDED. If a computer is not available, programming may be accomplished manually in supervisory mode, using the **MODE** and **ON/OFF** buttons. To enter the supervisory mode, depress and hold the **MODE** button for 5 seconds, during the "TESTING" phase of the start-up sequence. The general structure of the supervisory mode is to depress the **MODE** button to bypass an option, or use the **ON/OFF** button to enter the option's menu and make a change. Where a menu has two options only for example, "ON" or "OFF", depressing the **ON/OFF** switch once simultaneously accomplishes three functions; entering the menu, changing the option and exiting the menu.

The following are all programmable:

- LEL gas type (**CAUTION: This option is not operative with the % by volume sensor.**)

- Date format, date/time, daylight savings time

- Datalog frequency

- Auto-zero during start-up sequence

- Last calibration date displayed or not during start-up sequence

- Latching or non-latching alarms

- Calibration gas level

- High alarm set points

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6. PROGRAMMING

- Low alarm set points/Low alarm disable (except O2)

- Calibration due date displayed or not during start-up sequence, calibration due frequency

- Language choice

- TWA alarm on or off

- Factory default settings

- Calibration

6.2 SELECTING LEL GAS TYPE

The LEL sensor is designed to provide its highest sensitivity to Methane, See Appendix A *Specifications* - Section (O) *General)*. For users detecting methane or natural gas, the standard calibration methods, using methane, with the "SEL LEL GAS TYPE" set to Methane, is acceptable. This is the standard default setting.

For users that need to monitor for a gas on the list, other than methane or natural gas, there are two options:

(1)   For the highest possible accuracy, it is always better to calibrate the instrument with the desired target gas (that is, the gas being monitored) i.e. Pentane. This is done by following the calibration procedure in Section 5.2 *Calibration Procedure (when all calibration gases are in a single canister)* and leaving the "SEL LEL GAS TYPE" setting at Methane.

(2)   If the target gas (let's use Pentane as an example) is not available, acceptable results may be obtained by entering the "SEL LEL GAS TYPE" function in the supervisory mode, selecting "Pentane", and using the procedure in Section 5.2 *Calibration Procedure (when all calibration gases are in a single canister)* to do a standard calibration with methane gas. This action enables the instrument to indicate the correct LEL reading when monitoring Pentane. See Appendix A

6. PROGRAMMING

Specifications of this manual, provides data on the relative span of detectable gases. The 5 gases listed in the "SEL LEL GAS TYPE" function, with their relative spans, are:

Methane   100
Propane   63
Pentane   50
Hexane   46
Xylene   31

From these five gases, select the one with a relative span value closest to the relative span of your target gas. For example, if your target gas is benzene (relative span 44 per Appendix A *Specifications* - Section (O) *General*) select hexane whose relative span of 46 is closest to that of benzene and calibrate with the supplied methane gas. To program the instrument for the desired LEL gas type, enter the supervisory mode (Section 6.1 *Programming Options*) and depress the **ON/OFF** button to enter the "SEL LEL GAS TYPE" menu. Use the **MODE** button to select the gas type and the **ON/OFF** button to exit this menu sequence.

6.3   SETTING DATE FORMAT

This function enables user to choose the correct date format. The default date format is MM/DD/YYYY (MONTH/DAY/YEAR), as is customary in the USA. To determine to which date format the instrument is set, enter the supervisory mode (Section 6.1 *Programming Options*) and use the **MODE** button to scroll down to "DATE FORMAT". If set for USA, display will indicate:

<div align="center">

DATE FORMAT

MM/DD

</div>

If this format is acceptable, and there is no need to set the date and time, depress the **MODE** button to bypass the function. If, however, DD/MM/YYYY (DAY/MONTH/YEAR) format is

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desired, depress the **ON/OFF** button twice, (once to enter the menu, and again to change the date format) to:

DD/MM

15/06/2000-13:50 (These numbers represent current date & time)

If there is no reason to change the date or time, depress the **ON/OFF** button a further twelve times to exit.

6.4 SETTING DATE/TIME

To set date and time enter the supervisory mode (Section 6.1 *Programming Options*) and use the **MODE** button to scroll to "DATE FORMAT". Depress the **ON/OFF** button to enter the menu. Depress the **MODE** button. The first digit on the left will start to flash. Depress the **ON/OFF** switch to accept the flashing number and move one number to the right, or use the **MODE** button to change the flashing number to the desired value. If the date format is MM/DD, the first two digits on the left represent the current month and the first digit must be either a 0 or a 1. Let us set the date to September 2, 2002. We need 09 to represent the month of September. If 0 is flashing, depress the **ON/OFF** switch. This accepts the 0 on the left and we may now use the **MODE** switch to set the next number to 9. Depress the **ON/OFF** button to accept the 9 and the month is correctly set to 09. The next digit on the right is now flashing and the **MODE** button is used to select 0. Depress the **ON/OFF** button to accept the 0, the **MODE** button to select 2, and the **ON/OFF** button to accept 2. To set the year, use the **MODE** button to select 2, the **ON/OFF** button to accept the 2. Use the **MODE** button to select the 0 and depress the **ON/OFF** button to accept. Use the **MODE** button to select 0 again and depress the **ON/OFF** button to accept. Use the **MODE** button to select the 2 and the **ON/OFF b**utton to accept. This completes the date settings. To continue and set the correct time to 14:45 (2:45PM), use the **MODE** button to select 1 and the **ON/OFF** button to accept the 1. Use the **MODE** button to select 4 and depress the **ON/OFF** button to accept the 4. Use **MODE** switch

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to select 4 and depress the **ON/OFF** switch to accept the 4. Use **MODE** to select 5 and **ON/OFF** to accept and exit this menu.

The date and time are now correctly set. The "DAYLIGHT SAVING" time menu now appears.

DAYLIGHT SAVING
OFF

Default is "OFF". Depress the **MODE** button to accept this setting and exit, or depress the **ON/OFF** button to turn on daylight savings and exit.

6.5   SELECTING DATA LOG FREQUENCY

The data log frequency is the time interval between logged readings and may be set at 1, 2, 3, 4 or 5 minutes. The time internal does not affect the total number of data points. The total number of data points is fixed at 2400 so if a 1-minute interval is chosen, 40 hours of data may be logged. If a 5-minute interval is chosen, 200 hours of data may be logged. The default setting is 1-minute so no action need be taken if this interval is acceptable.

To change the data log frequency, access the supervisory mode (See Section 6.1 *Programming Options*) and use the **MODE** button to scroll down to "DATA LOG-FREQ". Depress the **ON/OFF** button to enter the menu sequence, then use the **MODE** button to select 1,2,3,4 or 5-minute interval. Depress the **ON/OFF** button to accept the selection and exit.

6.6   AUTO-ZEROING

The factory default setting is automatic zeroing during start-up, each time the instrument is turned on. If this is not acceptable, the auto-zero function during start-up may be turned off by entering the supervisory mode (Section 6.1 *Programming Options*) and using the **MODE** button to scroll down to:

AUTO ZERO
ON

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Use the **ON/OFF** button to enter the menu, change the setting to "OFF", and exit the menu. Since zeroing is always done during the calibration process, proper instrument operation will be maintained if calibration is always carried out in a clean air environment.

6.7   DISPLAYING LAST CALIBRATION DATE

The instrument may be programmed so that the last calibration date is displayed during the start-up routine. The factory default setting has this function turned on. If it is desired to have the last calibration date displayed each time the instrument is turned on, it is necessary to enter the supervisory mode (See Section 6.1 *Programming Options*) and use the **MODE** button to scroll down to:

> LAST CALIBRATED
> ON

Depress the **ON/OFF** button to enter the menu, turn the function on and exit.

6.8   SELECTING LATCHING/NON-LATCHING GAS ALARMS

The factory default setting is non-latching alarms (latching alarms "OFF"). This means that the instrument will cease alarming when gas levels fall below the alarm set points. If latching alarm (latching alarms "ON") is chosen, the instrument will continue to alarm when gas levels fall below alarm set points and may be turned off only when the user depresses the **ON/OFF** button. To turn on the latching, enter the supervisory mode (Section 6.1 *Programming Options*) and use the **MODE** button to scroll down to "LATCHING ALARMS":

> LATCHING ALARMS
> OFF

Depress the **ON/OFF** button once to make the change and exit the menu.

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6.9   SETTING CALIBRATION GAS LEVEL

The defaults, as well as the full range of programmable calibration gas levels, are set out in Appendix A *Specifications* - Section (K) *User Programmable Calibration Gas Levels*. If it is desired to change the default levels, enter the supervisory mode (See Section 6.1 *Programming Options*) and use the **MODE** button to scroll down to the "CAL GAS LEVEL" menu, which (depending on model) looks like:

	LEL	CO	H2S
	50	50	25
CAL	GAS	LEVEL	

If there is a good reason to change these factory default values, depress the **ON/OFF** button to select the LEL.

	LEL		
	50	50	25
CAL	GAS	LEVEL	

If the displayed calibration gas level (50% LEL in this example) is acceptable, depress the **ON/OFF** button to accept and move to the next gas. Otherwise, if a change is desired, use the **MODE** button to increase or decrease the level by 5% LEL increments within the range from 5% LEL to 60% LEL. To set the calibration gas level for carbon monoxide (or other gas sensor in Tox 1 position), depress the **ON/OFF** button and CO is selected.

	CO		
	50	50	25
CAL	GAS	LEVEL	

Either depress the **ON/OFF** button to accept calibration gas level displayed, or use the **MODE** button to increase or decrease the calibration gas level, by 5ppm increments, to the desired value in the range from 50ppm to 300ppm.

		H2S	
	50	50	25
CAL	GAS	LEVEL	

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Depress the **ON/OFF** button to select H2S (or other gas sensor in Tox 2 position). Depress the **ON/OFF** button to accept the level displayed or use the **MODE** button to increase or decrease the desired value, by 5ppm increments, in the range from 5ppm to 25ppm. To exit the menu, depress the **ON/OFF** button.

6.10   SETTING HIGH ALARM

The defaults, as well as the full range of programmable high alarm set points, are set out in Appendix A *Specifications -* Section (I) *User Programmable High and Low Alarm Set Points*. To change the default levels, use the **MODE** button to scroll down to:

```
OX         LEL      CO      H2S
HIGH ALARM SET
23.5       20       35      20
```

Depress the **ON/OFF** button to select the gas (i.e. oxygen) for which the alarm is being set.

```
OX
23.5       20       35      20
HIGH ALARM SET
```

If the alarm level displayed (23.5 in this example) is acceptable, depress the **ON/OFF** button to accept and select the next gas. If a change in value is desired, use the **MODE** button to change the high alarm setting to the desired value. Depress the **ON/OFF** button to select the next gas. Follow this same procedure for the other gases and depress the **ON/OFF** button to exit this menu.

6.11   SETTING LOW ALARM

The defaults, as well as the full range of programmable low alarm set points, are set out in Appendix A *Specifications -* Section (I) *User Programmable High and Low Alarm Set Points*. To change the default levels, use the **MODE** button to scroll down to:

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```
OX      LEL    CO     H2S
LOW ALARM SET
19.5    10     25     10
```

Depress the **ON/OFF** button select the gas for which the alarm is being set. The procedure for low alarm is identical to that for setting high alarm in Section 6.10 *Setting High Alarm*, to which reference may be made. A zero value disables corresponding low alarm, with the exception of O2.

6.12   DISPLAYING CALIBRATION DUE DATE

The instrument is capable of displaying the calibration due date in start-up sequence. The default setting is "OFF". If it is desired that instrument displays "CALIBRATION DUE" during the start-up sequence, enter the supervisory mode (See Section 6.1 *Programming Options*) and use the **MODE** button to scroll down to:

```
CAL     DUE     AUTO
OFF
```

To turn on this function, depress the **ON/OFF** button, and instrument will display:

```
CAL     DUE     FREQ
                  30
```

The "30" is the factory default calibration frequency of 30 days. If this frequency is acceptable, depress the **MODE** button to accept and exit the menu. To change the calibration frequency, depress the **ON/OFF** button and use the **MODE** button to increment the left digit to the desired value in the range 0 to 9, depress the **ON/OFF** button to select the second digit, and use the **MODE** button to set the desired number in the range 0 to 9. The maximum calibration frequency allowed is 90 days. Depress the **ON/OFF** button to exit the menu. It is now required to calibrate the instrument to make these changes effective. This is very important for the instrument to initialize the process. Use the **MODE** button to scroll down to

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"CALIBRATE?" and calibrate the instrument. (See Section 5 *Calibration*)

6.13 CHOOSING A LANGUAGE

The default language is English. If a change to another language is desired, enter supervisory mode (See Section 6.1 *Programming Options*) and use the **MODE** button to scroll down to:

<div align="center">

LANGUAGE SET

ENGLISH

</div>

To enter the menu, depress the **ON/OFF** button and use the **MODE** button to select English, Spanish, French or German. Depress **ON/OFF** to accept the selection and exit the menu.

6.14 SELECTING IMMEDIATE ALARM MODE/ TWA ALARM MODE

There are two types of alarm modes to choose from: immediate alarm mode and TWA alarm mode.

- In the immediate alarm mode, two types of alarms are available: immediate low and immediate high alarms. The default values for these alarms are pre-set (See Appendix A *Specifications* - Section (I) *User Programmable High and Low Alarm Set Points*) at the factory but are user programmable.

- In the TWA alarm mode, three types of alarms are available: TWA, STEL, and instantaneous alarms. TWA is a time-weighted average over an 8-hour period. STEL is the short-term exposure limit over a 15-minute period. The instantaneous alarm represents an exposure level that generates an alarm instantly. The values for these alarms are pre-set (See Appendix A *Specifications* - Section (J) *Time Weighted Averages (Only if "TWA ON" is selected) (Toxic sensors only)*) at the factory and cannot be changed.

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6.15   RESTORING FACTORY DEFAULTS

This supervisory option restores the instrument to all factory default settings.

<div align="center">

DEFAULT?

</div>

A user who modified one or more settings in supervisory mode may depress the **MODE** button to bypass this function for the changes to take effect, or depress the **ON/OFF** button to abandon his changes and revert to the factory default settings.

6.16   CALIBRATION IN SUPERVISORY MODE

This option allows calibration in the supervisory mode. To bypass, depress the **MODE** button. To calibrate depress the **ON/OFF** button and follow the calibration procedure in Section 5.2 *Calibration Procedure (when all calibration gases are in a single canister)*.

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WARNING

Do not connect the instrument to a PC in a potentially hazardous environment.

7.1 SYSTEM REQUIREMENTS

- PC or IBM-compatible system

- 166 MHz or higher

- 16 MB of RAM or more

- 30 MB of free disk space

- Windows 98 SE, Windows Me, Windows NT4.0 (with Service Pack 6a installed), Windows 2000, or Windows XP

- CD-ROM drive

- RS-232 serial port

- VGA monitor (with the screen resolution set to 800x600 or higher)

7.2 GENERAL INFORMATION

The MaxPro Log software program for Windows is on a single CD and provides the tool necessary to transfer, save, retrieve, view, and print the data recorded in the MicroMax Pro instrument. It is a full function program that does not require an additional database program. It contains a README.doc file and help content with all information needed for installing, navigating, and using the program.

This program is compatible for use with any MicroMax Pro instruments.

7.3 PROGRAM INSTALLATION

- Place the program CD into the CD-ROM drive.

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- If the installation program runs automatically, skip to the next step. Otherwise, go to Start → Run, then type X:\LUMIDORSETUP, where X represents the drive letter of your CD-ROM drive. In most cases, this will be D:\LUMIDORSETUP or E:\LUMIDORSETUP.

- Follow on-screen instructions to complete installation.

CAUTION

Make sure that your computer's system clock and time zone are correct by double-clicking on the current time located on the Windows taskbar. Confirm/correct the date, time, and time zone and click OK.

7.4   UNINSTALL PROCEDURE

For Windows XP users, go to Start → Control Panel. For other Windows users, go to Start → Settings → Control Panel.

- When the Control Panel opens, double-click the Add/ Remove Programs icon.

- In the Add/Remove Programs dialog, select MaxPro Log.

- For Windows XP and Windows 2000 users, click Remove. For other Windows users, click on Add/Remove.

- Follow on-screen instructions to uninstall the program.

7.5   STARTING THE PROGRAM

Go to Start → Programs → Lumidor MaxPro → MaxPro. This brings up the program.

- Connect one end of the supplied download cable to an available COM port on your computer.

- Click on the Communication menu.

- Click on Select Port/Time Zone. The Select Port and Time Zone dialog box appears.

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- In this dialog box, select the appropriate COM port and time zone. The COM ports that exist and are available appear as possible selections. Make sure your port selection agrees with the COM port on your computer that the download cable is connected to. Click on OK to return to the Main Screen (See **Figure 7**).

7.6 DOWNLOADING INFORMATION FROM THE MICROMAX PRO

The Download function allows you to transfer data from the instrument to the computer.

- Follow procedures indicated in Section 7.5 *Starting the Program*.

- Turn on the instrument and allow it to go into normal operating mode.

- Click on the Communication menu, then on Download, or simply click on the Download button on the toolbar of the Main Screen. The Download Data/Instrument Parameters dialog box appears.

- In this dialog box, select Data (for downloading instrument parameters, logged gas readings, and calibration data) or Instrument Parameters (for downloading instrument parameters), and click on OK. The following will appear on the screen: "Is the cable connected and the instrument ready?"

WARNING

Choosing the download instrument parameters option dumps all logged data in the instrument and the data is not saved in the program.

- Connect the instrument interface end of the download cable to the port of the instrument.

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- Click on Yes. The instrument will start to count up. This count also takes place on the computer screen.

- After all data has been transferred, the instrument displays "DATA SENT". Depending on the firmware version, the instrument either shuts itself off, or continues to run in the normal operating mode. When the computer screen displays "Transfer complete", click OK.

- For downloading instrument parameters, click the Upload/ Modify Instrument Parameters button on the tool bar and the parameters will be displayed in a dialog box. For downloading data, type your last name, first name, and location, when prompted to do so. Then, click OK.

WARNING

All fields, including last name, first name, and location, must be entered in order to save the downloaded data. The maximum length to be entered for last name, first name, and location is 14, 14, and 20 alphanumeric characters, respectively.

Downloading at the same date and time for a particular instrument is not allowed. For example, if you download data from an instrument having serial number 1234 at 3:30 p.m. on December 8, 2002, and you try to download again with the same instrument at the same date and time as above, it will not save any data for this new download.

- Wait a moment for the computer to store the information. Now, data from the most recent download is displayed on the Main Screen and the file relating to this download can be accessed from the Open dialog box.

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7.7   DISPLAYING AND PRINTING DATA

7.7.1   Main Screen

Information on the Main Screen includes the following (See **Figure 7**):

- User information (employee's name, instrument's serial number and user ID)

- Download information (date, time, and location that data is downloaded)

- Gas data (gas types, measurement units, peaks, TWA, and number of alarms)

Note: In user-programmable immediate alarm mode, the number of alarms equals to the total number of immediate high and immediate low alarms for O2, a combustible or toxic gas. In TWA alarm mode, it represents the total number of instantaneous alarms for a toxic gas, or the total number of immediate high and immediate low alarms for O2 or a combustible gas.

- Alarm levels (immediate low, immediate high, TWA, STEL and instantaneous alarm levels)

- Note relating to a download

- Histogram (logged gas readings)

Note: The histogram is separated into groups. Each time the instrument is turned on, or when a new day begins during data logging, a new group is created and a new date and time are displayed for that group.

- When a gas alarm occurs, it indicates so in front of the gas reading in the histogram. The letters **T**, **S**, **I**, **L**, and **H** are used for alarm indication. In the immediate alarm mode, **L** and **H** represent immediate low and immediate high alarm, respectively. In the TWA alarm mode, **T**, **S**, and **I** represent TWA alarm, STEL alarm, and instantaneous alarm, respectively, for toxic gases only, while **L** and **H** represent

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immediate low and immediate high alarm, respectively, for O2 or combustible gases. On some occasions, TWA, STEL, or instantaneous alarms can occur simultaneously. As a result, any combination of those three types of alarm would be displayed before the gas reading.

Main Screen menu and toolbar

Main Screen data

Figure 7 A screenshot of the Main Screen.

- To view all the available data files, click on the File menu and then on Open, or simply click on the Open button on the toolbar. A list appears with all stored files.

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- For your convenience, information in this list can be sorted in ascending order by Employee, Serial #, Date, Time, or Location. To sort by any one of the above, simply click on the corresponding heading.

- To select a file, click on the desired employee name.

  - To open the file, click on Open to display all the data for that specific download, or simply double-click on the desired file.

  - To delete the file, click on Delete and the following appears: "Are you sure that you want to delete the selected data file?" Click on Yes to delete.

- To print all information from the Main Screen, click on the File menu and click on Print (or simply click on the Print button on the toolbar of the Main Screen). You can choose to print all or to print only specified pages.

- To print preview all information from the Main Screen, click on the File menu and click on Print Preview (or simply click on the Print Preview button on the toolbar of the Main Screen). On the print preview screen, you can view the next page, view the previous page, view one or two pages at a time, zoom in on the document, zoom out from the document, and close the print preview screen to return to the Main Screen.

7.7.2 Graph Screen

Information on the Graph Screen includes the following (See **Figure 8**):

- User information (employee's name, instrument's serial number and user ID)

- Download information (date, time, and location that data is downloaded)

- Graph limits (date, start time, and end time for which the graphs are plotted)

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- Graphs in different groups

Note: The group number for the graphs corresponds with the one for the histogram. A curve cannot be plotted for a group with fewer than two data points.

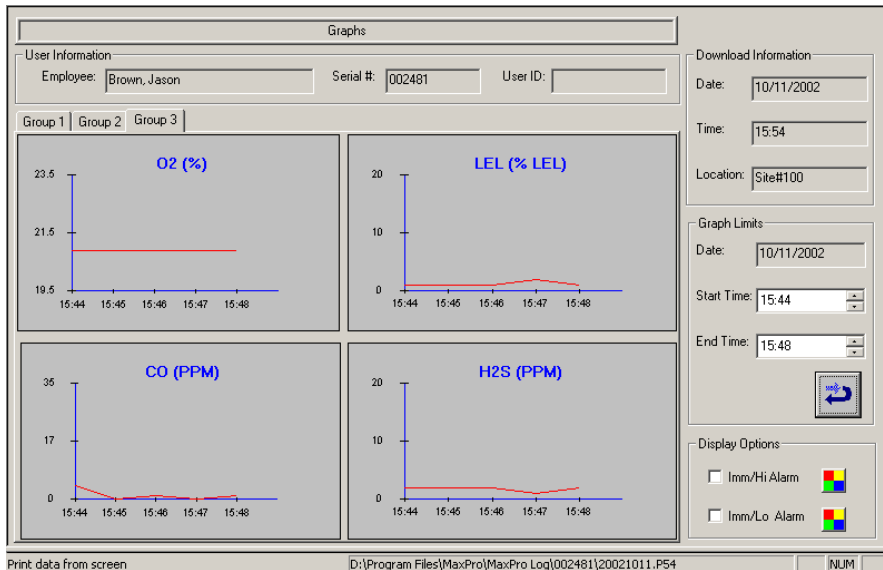Graph Screen menu and toolbar

Graph Screen data

Figure 8 A screenshot of the Graph Screen.

- To display the graphs, click on the View menu and then on Graphs (or simply click on the View Graphs button on the toolbar of the Main Screen). A group of 4 curves will be displayed (See **Figure 8**).

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- To view the graphs of another group, click on the tab of the corresponding group number.

- To view an enlarged single graph, simply double-click on the desired graph.

  - To print an enlarged single graph, click on the Print Graph button.

  - To return to the Graph Screen, click on the Close button.

- To focus on a particular time span of the graphs, enter the desired start time and end time and click on the Refresh Graphs button on the Graph Screen.

- To display the immediate high alarm level and the immediate low alarm level on the graphs, check the Imm/Hi Alarm and Imm/Lo Alarm boxes, respectively.

- To print the graphs, click on the Graphs menu and then on Print (or simply click on the Print button on the toolbar of the Graph Screen).

- To return to the Main Screen, click on the Graphs menu and then click on Close (or simply click on the Close button on the toolbar of the Graph Screen).

7.7.3 Current Calibration Records
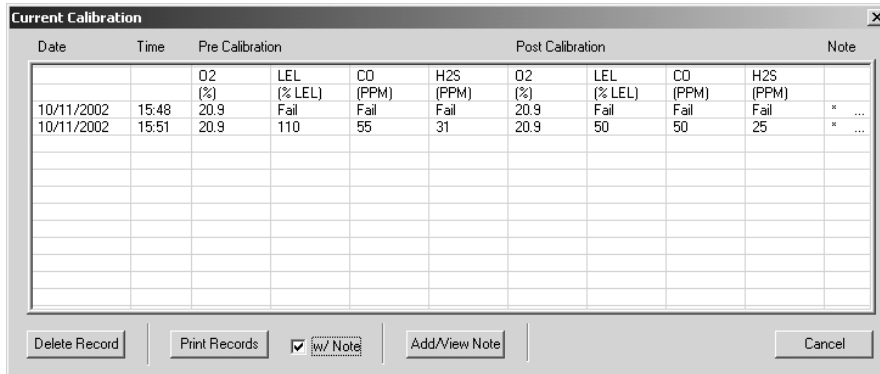
Each calibration record contains the following (See **Figure 9**):

- Date and time that calibration took place

- Pre-calibration readings (for up to 4 gases)

- Post-calibration readings (for up to 4 gases)

- An asterisk symbol (*) to indicate a note is attached

Note: For calibration readings, "Fail" indicates a calibration failure, and "N/A" indicates that a gas sensor is missing.

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Date	Time	O2 (%)	LEL (% LEL)	CO (PPM)	H2S (PPM)	O2 (%)	LEL (% LEL)	CO (PPM)	H2S (PPM)	Note
10/11/2002	15:48	20.9	Fail	Fail	Fail	20.9	Fail	Fail	Fail	* ...
10/11/2002	15:51	20.9	110	55	31	20.9	50	50	25	* ...

Figure 9 A screenshot of the Current Calibration dialog box.

- To display the current calibration records, click on the View menu and then on Current Calibration (or simply click on the View Current Calibration button on the toolbar of the Main Screen). A list of all calibration records is displayed for the instrument in that download (See **Figure 9**).

- To delete a calibration record, select the record and click on the Delete Record button.

> **WARNING**
>
> Keep in mind that current calibration records are subsets of the calibration history, so any records deleted from either the Current Calibration dialog or the Calibration History dialog are permanently removed.

- To add a note to a calibration record, select the record and click on the Add/View Note button. It brings up the Calibration Note dialog box. In this dialog box, type the note and then click on Save. An asterisk (*) is displayed at the end of the record, indicating that a note is attached.

Note: An ellipse mark (…) at the end of a record indicates that a note can be associated with that record.

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- To print the current calibration records for that download while on the Current Calibration dialog box, check on the "w/ Note" check box to indicate all the attached notes are to be printed along with the records (or uncheck it to print without the notes) and click on Print Records.

7.7.4   Calibration History

Each calibration record contains the following (See **Figure 10**):

- Date and time for which calibration takes place

- Pre-calibration readings (for up to 4 gases)

- Post-calibration readings (for up to 4 gases)

- An asterisk symbol (*) to indicate a note is attached

Note: For calibration readings, "Fail" indicates a calibration failure, and "N/A" indicates that a gas sensor is missing.

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Figure 10 A screenshot of the Calibration History dialog box.

- To display the calibration history, click on the View menu and then on Calibration History (or simply click on the Calibration History button on the toolbar of the Main Screen). A calibration history is displayed for the selected instrument (See **Figure 10**).

- To select an instrument, select the serial number from the Serial Number drop-down box, or enter the serial number manually in the box and click Find. For example, for an instrument with serial number 1234, append two 0's in the front to make it a 6-digit number, i.e. 001234, and click Find.

- To delete a calibration record, select the record and click on the Delete Record button.

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```
                    WARNING

    Keep in mind that the current calibration records are
    subsets of the calibration history, so any records deleted
    from either the Current Calibration dialog or the Calibration
    History dialog are permanently removed.
```

- To add a note to a calibration record, select the record and click on the Add/View Note button. It brings up the Calibration Note dialog box. In this dialog box, type the note and then click on Save. An asterisk (*) is displayed at the end of the record, indicating that a note is attached.

Note: An ellipse mark (…) at the end of a record indicates that a note can be associated with that record.

- To print the calibration history while on the Calibration History dialog box, check on the "w/ Note" check box to indicate all the attached notes are to be printed along with the history (or uncheck it to print without the notes) and click on Print History.

7.7.5 Instrument Parameters

To display the instrument parameters, click on the Communication menu and then on Upload/Modify Instrument Parameters (or simply click on the Upload/Modify Instrument Parameters button on the toolbar of the Main Screen). The Upload/Modify Instrument Parameters dialog box appears (See **Figure 11**). Parameters in this dialog box can be modified for uploading purposes.

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Figure 11 A screenshot of the Upload/Modify Instrument Parameters dialog box.

The upper section consists of 19 instrument parameters, each of which must have accurate information.

- **Serial Number:** The serial number is the S/N marked on your MicroMax Pro instrument. Prior to downloading, MAXPRO is displayed. After downloading, your instrument's serial number is indicated in this field. Zeroes are placed in front of the serial number to make it a 6-digit number. It is set at the factory and cannot be modified by the user.

- **MFG Date:** The MFG Date is the manufacture date of your MicroMax Pro instrument. Prior to downloading, 99/12 is displayed. After downloading, your instrument's manufacture date is indicated in this field. It is set at the factory and cannot be modified by the user.

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- **Current Date:** The current date is in MM/DD/YYYY format. This field allows user to transfer the current date to the instrument. To change the current date, click on the down arrow to display a calendar and then click on the correct date.

- **Current Time:** The current time is in a 24-hour format. The following are a few examples of the time conversion from a 12-hour format to a 24-hour format.

12-hour format		**24-hour format**
2:00 p.m.	=	14:00
10:15 a.m.	=	10:15
12 noon	=	12:00
12 midnight	=	00:00

- **Daylight Saving:** This feature allows the instrument to be adjusted to daylight saving time. The default setting is OFF. To turn on this feature, select ON for Daylight Saving.

- **User ID:** The user ID is a user identification number. It is not required to enter the user ID. To create or change it, enter a value up to 12 characters.

- **Time Zone:** This feature allows the user to view the selected time zone, depending on their location. The default setting is (GMT – 07:00) Mountain Time. To select another time zone, click on the Config button from the Main Screen's toolbar and select the appropriate time zone.

- **Language:** There are four kinds of languages available in the MicroMax Pro instrument: English, Spanish, French and German. Both visual and audible messages can be set for the chosen language. The default setting is English. To select another language, click the down arrow and select from the list.

- **Data Logging Interval:** The interval between data points displayed in the histogram. There are 5 different data logging intervals to choose from 1, 2, 3, 4, and 5 minutes. The default setting is 1 minute. To change the interval, click

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the down arrow and select from the Data Logging Interval list.

- **LEL Gas Type:** There are 5 LEL gas types available: methane, propane, pentane, hexane, and xylene. To change the LEL gas type, select the appropriate type from the list.

- **Auto-zero:** If this feature is enabled on the MicroMax Pro, the instrument will automatically zero itself during the start-up routine. (Regardless, zeroing takes place each time a calibration is completely done). The default setting is ON. To turn off this feature, select OFF for Auto-zero.

- **Pump:** Pump is required for pre-testing and calibration. However, users may at times prefer to operate the instrument in diffusion mode, for example, when longer run time is desired. The default setting is ON, which represents the pump mode. To go into diffusion mode, select OFF for Pump.

- **TWA Alarm:** User can choose between two alarm settings: TWA alarm mode and immediate alarm mode. To turn on the TWA alarm mode, set the TWA Alarm option to ON. To turn on the immediate alarm mode, set the TWA Alarm option to OFF. The factory alarm setting is immediate alarm, with values chosen to provide earlier warning than the STEL and TWA settings. The immediate high and immediate low alarms are user-programmable. STEL is the short-term exposure limit over a 15-minute period. TWA is the time weighted average over an 8-hour period. Instantaneous alarm is an exposure level that generates an alarm instantly.

- **Latching Alarm:** If the instrument goes into gas alarm and latching alarm is set to OFF, the alarm will cease when gas levels fall below the alarm level. If latching alarm is set to ON, the alarm will continue even if gas levels fall below the alarm level. In this case, the latching alarm will stop only when the **ON/OFF** button is depressed momentarily. The

7. DATA LOGGING

default setting is OFF. To turn on this feature, select ON for Latching Alarm.

- **Voice:** This feature enables voice messaging while operating the instrument. The default setting is ON. To turn off this feature, select OFF for Voice.

- **Confidence Beep:** The confidence beep is a visual flash, accompanied by an audible beep every 20 seconds to reassure user that the instrument is working. The default setting is OFF. To turn on this feature, select ON for Confidence Beep.

- **Display Last Calibration Date:** This feature allows the date for the last calibration to be displayed in the start-up routine each time the instrument is turned on. The default setting is OFF. To turn on this feature, select ON for Display Last Calibration Date.

- **Display Calibration Due Date:** This feature allows the calibration due date to be displayed in the start-up routine each time the instrument is turned on. The default setting is OFF. To turn on this feature, select ON for Display Calibration Due Date.

- **Calibration Frequency:** Calibration frequency represents the number of days between calibrations. If Display Calibration Due Date is selected, Calibration Frequency must be specified. The default period is 30 days. To change this option, choose between 1 and 90 days for Calibration Frequency. After this period is chosen, the instrument must be calibrated to initialize the process.

The lower section of the dialog box contains the following information:

- **Gas type**

- **Imm. Lo** (Immediate low alarm levels)

- **Imm. Hi** (Immediate high alarm levels)

7. DATA LOGGING

- **TWA** (TWA alarm levels)

- **STEL** (STEL alarm levels)

- **Inst.** (Instantaneous alarm levels)

- **Calibration Level**

Note: Once the gas is chosen, the program automatically provides the correct default TWA alarm levels that conform to United States OSHA recommendations. It also chooses the default values for all other alarm levels and calibration levels. The immediate low alarm levels, immediate high alarm levels, and calibration levels may be changed.

To print the instrument parameters while on this dialog box, simply click on the Print button at the bottom.

To store the instrument parameters to a default user setting, click on the Store User Default Instrument Parameters button. The following dialog box appears: "Are you sure that you want to overwrite the default instrument parameters?" Click on Yes. The user setting is stored.

To restore the instrument parameters from a user setting, click on the Restore User Default Instrument Parameters button. The following dialog box appears: "Are you sure that you want to restore the user-defined setting?" Click on Yes. The user setting is restored.

To restore the instrument parameters to the factory default, click on the Restore Factory Default Instrument Parameters button. The following dialog box appears: "Are you sure that you want to restore the factory default setting?" Click on Yes. When it displays "The factory default instrument parameters are loaded," click on OK.

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7.8 EDITING LOCATION

The Edit Location function allows you to modify the location for a specific download.

- After a data file is opened, click on the Edit menu, then on Edit Location, or simply click on the Edit Location button on the toolbar of the Main Screen. This brings up the Edit Location dialog box.

- In this dialog box, enter a new location of 20 characters or less for the opened file, and click OK.

7.9 EDITING NOTE

The Edit Note function allows you to modify the note for a specific download.

- After a data file is opened, click on the Edit menu, then on Create/Edit Note, or simply click on the Create/Edit Note button on the toolbar of the Main Screen. This brings up the Edit Note dialog box.

- In this dialog box, enter a note for the opened file (up to 2000 characters), and click Save.

7.10 UPLOADING INFORMATION TO THE MICROMAX PRO

The Upload function allows you to transfer information from the computer to the instrument. It provides the capability to set date and time in the instrument, as well as modify operating parameters such as the variables in the user setup or supervisory modes.

- Follow procedures indicated in Section 7.5 *Starting the Program*.

- Click on the Communication menu and then on Upload/ Modify Instrument Parameters. The Upload/Modify Instrument Parameters dialog box (See **Figure 11**) appears.

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- In this dialog box, modify the instrument parameters as desired (See Section 7.7.5 *Instrument Parameters*).

CAUTION

Make sure that you have the correct type and number of gases.

- After verifying that all information is correct, click on the Upload Instrument Parameters button. The following will appear on the screen: "Have you verified that all instrument parameters are correct? Is the cable connected and the instrument ready?"

- Connect the 6-pin connector cable to the instrument, and click on Yes.

- After uploading is complete, the instrument shuts itself off and the computer screen displays "Upload Complete." Click OK and disconnect cable from the instrument.

- To return to the Main Screen, click on the Close button located at the bottom of the window.

7.11   IMPORTING FILES

The Import File function enables files to be imported from an earlier "max" dos program as well as MaxPro Log data files from another source, such as a floppy disk, a directory on your computer, or a network directory.

- Click on the Utility menu, then on Import File (or simply click on the Import File button on the toolbar of the Main Screen). A dialog box appears (See **Figure 12**).

- In this dialog, browse to the directory that contains the data file(s) to be imported. Usually, this is a folder named as the instrument's serial number, such as 001143.

7. DATA LOGGING

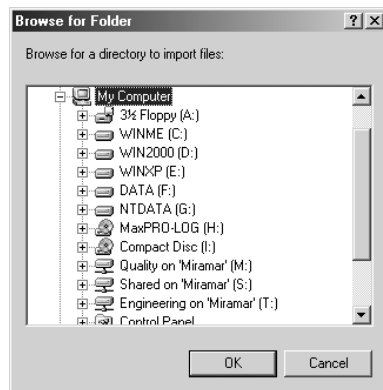- Select the directory and click OK. The files can now be accessed in the Open dialog.

Figure 12 A screenshot of the Import File dialog box.

7.12 ARCHIVING DATA

The Archive Data function enables data files to be stored as an archived file with a .csv extension.

- Click on the Utility menu, then on Archive Data, or simply click on the Archive Data button on the toolbar of the Main Screen. This brings up the Archive Data dialog box (See **Figure 13**), which lists all the files available.

- In this dialog box, select the file you wish to archive and click on Archive. The Save As dialog box appears.

- In the File Name box, type the desired file name.

- In the Save In box, select a directory to save the file in. If this is not selected, the file will be saved in "C:\Program Files\MaxPro\MaxPro Log."

- Click on Save. The file is now saved as a .csv file (comma delimited file).

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- The file can be opened in most major spreadsheet programs (such as Microsoft Excel).
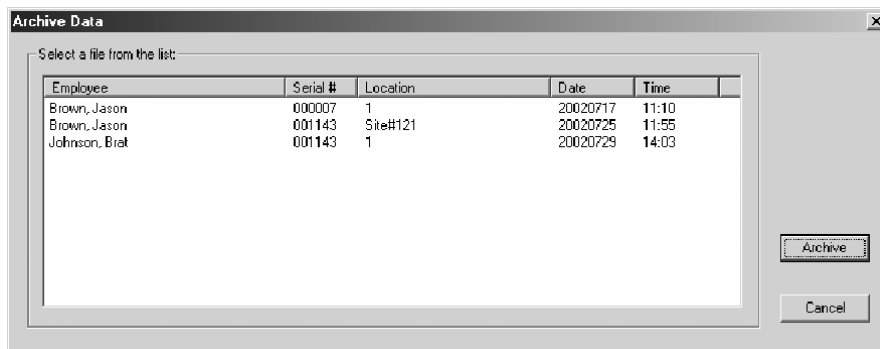
Figure 13 A screenshot of the Archive Data dialog box.

7.13 RECOVERING DATA

The Recover Data function enables the transfer of missing data from a temporary file to the Open dialog for easy access if a file cannot be accessed after a successful download.

- Click on the Utility menu, then on Recover Data, or simply click on the Recover Data button on the toolbar of the Main Screen. The Recover Data dialog box appears (See **Figure 14**).

- In this dialog box, enter the last name, first name, and location, and then click on OK. The file should now appear in the Open dialog where it may be accessed in the normal way.

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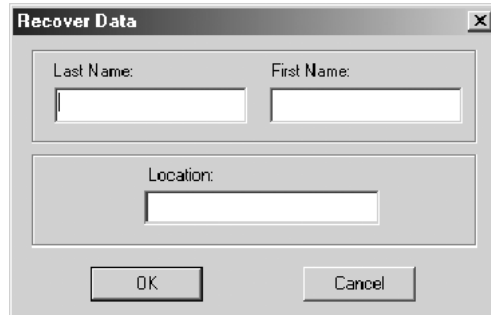
Figure 14 A screenshot of the Recover Data dialog box.

7.14 GETTING HELP

7.14.1 Using MaxPro Log Help

The help function is available from the Main Screen, the Graph Screen, and the Upload/Modify Instrument Parameters dialog box.

7.14.2 Lumidor on the Web

User can access different areas of the Lumidor website from the program. From the Main Screen, click on Help, click on Lumidor on the Web and then select the area you are interested in.

7.14.3 Customer Support

From the Main Screen, click on Help and then on Customer Support. The customer support information is displayed. Click OK to close it.

7.14.4 MaxPro Log Version and Copyright

From the Main Screen, click on the Help menu and then on About MaxPro Log. The software version and copyright information is displayed. Click OK to close it.

8. MAINTENANCE

8.1   BATTERY INSTALLATION

```
                    CAUTION

Use only MPRO NiMH rechargeable battery pack or
MPRO alkaline battery holder with 4 each of the following
alkaline cells only: Duracell Pro-cell-2400, Duracell MN-
2400 and Eveready E-92 or EN-92. Observe proper
polarity when installing alkaline batteries.

Do not change batteries in a hazardous location.
```

Open battery compartment by turning the screw (See
Figure 15) a half turn counterclockwise to release.

8.2   ALKALINE BATTERY PACK INSTALLATION

- Refer to Section 8.1 *Battery Installation*.

- Remove existing battery pack.

- Insert 4 approved alkaline cells into the supplied alkaline
  battery holder. Observe the polarity indicated in the holder
  when inserting each cell.

- Insert alkaline battery holder, with 4 approved AAA cells, into
  the battery compartment. Observe battery pack contacts
  orientation (See **Figure 16**). This means that the connector
  end faces the rear of the instrument where it makes electrical
  contact. Once the end with the connector is pushed in, the
  rear of the battery pack may be pushed down.

- Push down cover and secure with a half turn clockwise on
  screw.

8. MAINTENANCE

1/2 turn to release

Figure 15 Battery Compartment

Figure 16 Battery Pack Orientation

8.3   NIMH BATTERY PACK INSTALLATION

- Refer to Section 8.1 *Battery Installation*.

- Remove existing battery pack.

- Insert the MPRO NiMH rechargeable battery pack into battery compartment as shown. (See **Figure 16**). The

8. MAINTENANCE

connector end faces the rear of the instrument where it makes electrical contact. Once the end with the connector is pushed in, the rear of the battery pack may now be pushed down.

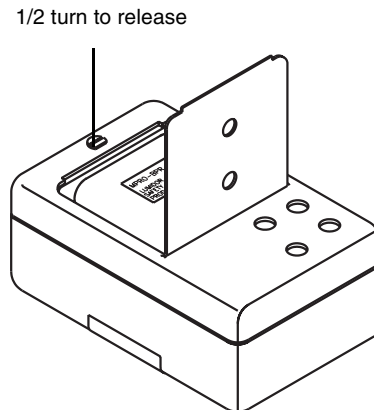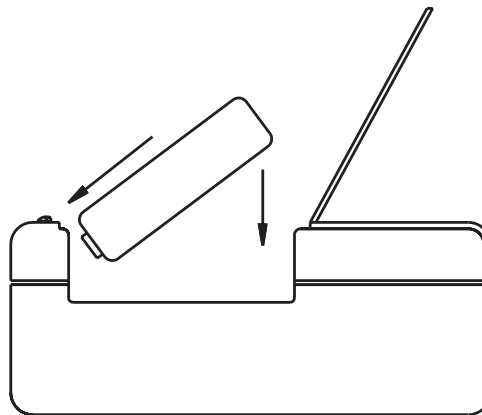- Push down cover and secure with a half turn clockwise on screw.

- Charge instrument prior to use.

8.4   NIMH BATTERY PACK – GENERAL INFORMATION

- The supplied NiMH battery pack represents the latest in battery technology, and as an added benefit, does not have the environmental problems associated with Nickel Cadmium technology.

- It should be left on charge when not in use. There is a small current drain on the pack.

8.5   SENSOR REPLACEMENT

- Turn off the instrument and remove the 4 screws (See **Figure 17**) securing the top half of the case.

- Disconnect battery pack connector by lifting it straight up.

- Remove the single screw securing the gas plate (See **Figure 17**).

- Remove sensor by lifting it straight up.

- Toxic sensors include a small wafer-thin printed circuit board as part of the sensor assembly. Make sure that this board is removed with the sensor.

- If installing a new toxic sensor, it is necessary to remove any shorting clip or spring attached to the sensor pins.

- Align pins of new sensor with sockets and push down to secure sensor.

- Reconnect gas plate and secure with screw.

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8. MAINTENANCE

- Reconnect battery connector.

- Install case cover and secure with 4 case screws.

- Allow sensors to stabilize for 15 minutes prior to turn-on.

- Calibrate the instrument.

8.6 REMOVING AND ADDING A SENSOR

CAUTION

If you are adding or removing a sensor, be aware of the following:

- **Adding a sensor**. This involves increasing the number of sensors in the instrument. For example, to add a fourth sensor to a three-gas unit, remove the plug, which is located on the gas plate above the new sensor, so that gas is allowed to reach the new sensor.

- **Removing a sensor**. This involves reducing the number of sensors in the instrument. In this event, it is necessary to insert a plug (Part number XIF936) in the gas plate to prevent gas leakage where the vacated sensor no longer resides.

8.7 CLEANING

Clean exterior of instrument with a clean damp cloth. Do not use solvents, soap, polishes etc., on the display.

8.8 PUMP INLET FILTER REPLACEMENT

- If the inlet filter is clogged, the flow rate of the pump is decreased, and in severe cases, the instrument will go into low flow alarm, or the pump can be heard to be struggling under the increased load caused by the restriction.

- To replace the filter, use tweezers to pull out the tubing and filter. Install a new filter (Part number XIP604) and secure

8. MAINTENANCE

with 0.05" of tubing (Part number GFV194). The new filter is held in place by the tubing (Part number GFV194).

8.9   SAMPLING HOSE MAINTENANCE

- Check water trap (Part number GFV196), the spherical disc located near the middle of the sampling hose, periodically to make sure it is clean and unobstructed. Replace if necessary.

- Check the porous dust cap (Part number 20HFC), located at the very end of the sampling hose, periodically to make sure it is clean and unobstructed. Replace if necessary.

8.10   STORAGE

If the instrument will be out of service for more than 2 months:

- Charge NiMH battery pack.

- Remove NiMH or alkaline pack from instrument.

- Remove O2 sensor if more than two years old.

- Store the instrument in a contaminant-free area.

- Store the instrument at ambient temperature.

8.11   SENSOR AND BATTERY DISPOSAL

The U.S. Environmental Protection Agency (EPA) governs the disposal of waste products in the United States. EPA Regulations are listed in the code of Federal Regulations, CFR40, entitled "Protection of Environment." Individual states and local communities may also establish regulations covering disposal of waste products. These may be more stringent than Federal Regulations and may cover disposal of household waste, which is not included in Federal Regulations. Thus, state and local agencies should be contacted for their disposal requirements.
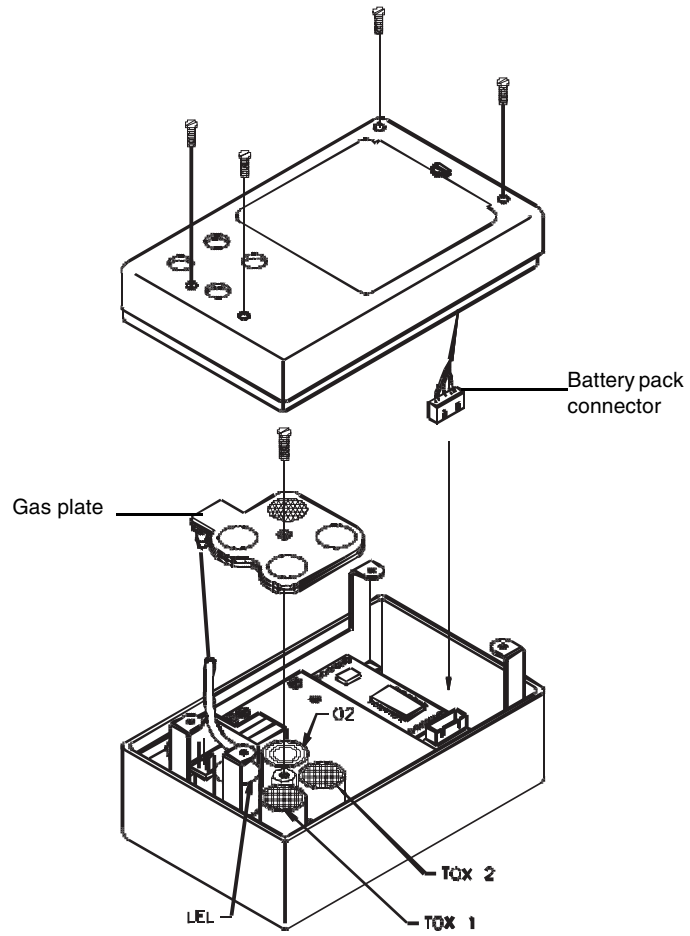
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Figure 17 Sensor Replacement

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9. TROUBLESHOOTING

9.1 SENSOR NOT RECOGNIZED ("XXX" DISPLAYED)

When "XXX" is shown in sensor position on the display, it indicates a missing or defective sensor. If it is a LEL sensor, the sensor may need to be zeroed using the procedure in Section 9.2 *"LEL FAIL" Message*.

9.2 "LEL FAIL" MESSAGE

When this message comes up after start-up, you can reset the zero base of the LEL sensor as follows:

Turn on the instrument.

(1) When the instrument displays "TESTING" and "PLEASE WAIT" and starts to count down from 30, depress and hold the **MODE** button for about 5 seconds, until display reads "SEL LEL GAS TYPE".

(2) Open the instrument by removing the 4 screws from the rear cover of the case. Do not unplug the wires from the rear cover to the sensor board. Observe the potentiometer (trimpot) for the LEL zero. It is located beside the pump and is the only potentiometer (trimpot) in the instrument.

(3) Set digital voltmeter to the DC voltage range, black lead to test point 12 (analog ground) and the red lead to test point 10. These test points are on the same sensor board as the pump, trimpot and sensors.

(4) Adjust the potentiometer (trimpot) for a reading of 0.500 volts (+/- 0.005 volts).

(5) Reinstall cover.

(6) Exit supervisory mode.

9. TROUBLESHOOTING

9.3   LOW FLOW ALARM WHEN SAMPLING HOSE ATTACHED

Low flow alarm is activated when a sampling hose is connected.

(1)   Clean the stone filter at end of sampling hose.

(2)   Make sure that the sampling hose, or water-trap is not "kinked" or blocked with debris.

(3)   Remove sampling hose, clean or replace inlet filter.

9.4   "CALIBRATION FAIL" MESSAGE

Check for proper gas concentration and expiration date.

9.5   INSTRUMENT WILL NOT TURN ON

Charge instrument or install fresh alkaline batteries.

9.6   INSTRUMENT IS IN DIFFUSION MODE BUT PUMP COMES ON WHEN CALIBRATING

This is normal instrument behavior. The pump will automatically turn off when calibration is complete.

APPENDIX A - SPECIFICATIONS

(A) Mechanical

Dimensions   4.75"L x 3"H x 1.8"D
                 (120.65mm x 76.2mm x 45.72mm)

Weight   < 17.6 ounces (498.96 grams)

(B) Operating Temperature Range

-4 degrees F to + 122 degrees F

(-20 degrees C to + 50 degrees C)

(C) Operating Relative Humidity Range

Continuous   0-90% (Noncondensing)

Intermittent   0-95% (Noncondensing)

(D) Power Sources

Rechargeable NiMH battery pack or 4 AAA alkaline batteries

(E) Battery Life

Rechargeable NiMH pack   12 hours minimum

4 AAA alkaline batteries   9 hours

(F) Alarm Outputs

Audible   >90db at 1 foot

Visual   Large LED bar; Flashing display characters

APPENDIX A - SPECIFICATIONS

(G)   Gas Ranges and Resolution

Sensor	Instrument Range	Resolution
Combustible (LEL)	0-100% LEL	1%LEL
Combustible (% by vol.) *	0-100% CH4	0.1%(0-9.9%), 1%(10-100%)
Oxygen (O2)	0-40%	0.1%
Carbon Monoxide (CO)	0-999PPM	1PPM
Hydrogen Sulfide (H2S)	0-500PPM	1PPM
Sulfur Dioxide (SO2)	0-20PPM	0.1PPM
Phosphine (PH3)	0-20PPM	0.1PPM
Ammonia (NH3)	0-500PPM	1PPM
Chlorine (CL2)	0-20PPM	0.1PPM
Chlorine Dioxide (CLO2)	0-9.9PPM	0.1PPM
Combo-Tox (CO/H2S)	0-500PPM	1PPM
Nitrogen Dioxide (NO2)	0-50PPM	0.1PPM
Hydrogen Cyanide (HCN)	0-50PPM	1PPM

* The % by volume sensor is for monitoring methane, natural gas & hydrogen only

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WARNING

If instrument is used in oxygen environments below 10%, the displayed LEL reading will be lower than actual value. In this event, use of dilution tube, part number MAX-DT, is recommended.

(H)   Repeatability

+/- 2%

APPENDIX A - SPECIFICATIONS

(I)   User Programmable High and Low Alarm Set Points

Sensor	Increment	Low Range/(Default)	High Range/(Default)
Oxygen (O2)	0.5%	18.0-20.5% (19.5%)	21.5-25% (23.5%)
Combustible (% LEL)	5% LEL	5-20%LEL (10% LEL)	15-50%LEL (20% LEL)
Combustible (% by vol.)	0.1%	0.3 - 0.8% (0.5%)	0.9 - 2.0% (1.0%)
Carbon Monoxide (CO)	5PPM	10-50PPM (25PPM)	35-400PPM (35PPM)
Hydrogen Sulfide (H2S)	1PPM	5-15PPM (10PPM)	10-25PPM (20PPM)
Sulfur Dioxide (SO2)	0.5PPM	0.5-2.0PPM (1.0PPM)	1.0- 5.0PPM (2.0PPM)
Phosphine (PH3)	0.1PPM	0.2-0.5PPM (0.2PPM)	0.3 to 1.0PPM(0.3PPM)
Ammonia (NH3)	5PPM	5-20PPM (15PPM)	20-50PPM (25PPM)
Chlorine (CL2)	0.1PPM	0.3-1.0PPM (0.3PPM)	0.5-2.0PPM (0.5PPM)
Chlorine Dioxide (CLO2)	0.1PPM	0.2.-0.4PPM (0.3PPM)	0.3-1.0 PPM (0.5PPM)
Combo-Tox (CO/H2S)	5PPM	20-50PPM (25PPM)	25-100PPM (35PPM)
Nitrogen Dioxide (NO2)	0.5PPM	0.5-3.0PPM (3.0PPM)	2.0-5.0PPM (5.0PPM)
Hydrogen Cyanide (HCN)	1PPM	3-5PPM (3PPM)	5-10PPM (5PPM)

(J)   Time Weighted Averages (Only if "TWA ON" is selected) (Toxic sensors only)

Sensor	Instantaneous	STEL	TWA
Carbon Monoxide (CO)	200PPM	100PPM	35PPM
Hydrogen Sulfide (H2S)	20PPM	15PPM	10PPM
Sulfur Dioxide (SO2)	10.0PPM	5.0PPM	2.0PPM
Phosphine (PH3)	5.0PPM	1.0PPM	0.3PPM
Ammonia (NH3)	50PPM	35PPM	25PPM
Chlorine (CL2)	5.0PPM	1.0PPM	0.5PPM
Chlorine Dioxide (CLO2)	1.0PPM	0.3PPM	0.1PPM
Combo/Tox (CO/H2S)	200PPM	100PPM	35PPM
Nitrogen Dioxide (NO2)	5.0PPM	5.0PPM	3.0PPM
Hydrogen Cyanide (HCN)	10PPM	5PPM	5PPM

APPENDIX A - SPECIFICATIONS

(K)   User Programmable Calibration Gas Levels

Sensor	Increment	Range	Defaults
Combustible (% LEL)	5% LEL	5-60% LEL	50% LEL
Combustible (% by vol.)	0.5%	1.0-3.0%	2.5% CH4
Carbon monoxide (CO)	5PPM	50-300PPM	50PPM
Hydrogen sulfide (H2S)	5PPM	5-25PPM	25PPM
Sulfur dioxide (SO2)	5PPM	5-20PPM	10PPM
Phosphine (PH3)	0.1PPM	1.0-5.0PPM	5.0PPM
Ammonia (NH3)	5PPM	10-50PPM	25PPM
Chlorine (CL2)	1PPM	1-10PPM	10PPM
Chlorine Dioxide (CLO2)	1PPM	1-5PPM	1PPM
Combo-Tox (CO\H2S)	5PPM	50-300PPM CO	50PPM CO
Nitrogen Dioxide (NO2)	1.0PPM	2.0-10.0PPM	10.0PPM
Hydrogen Cyanide (HCN)	1PPM	5-20PPM	10PPM

(L)   Voice Messaging

User selectable languages:

- English

- Spanish

- French

- German

(M)   Response Time Data

GAS	RESPONSE TIME (T90) SECONDS
Oxygen	10
Combustible (LEL)	20
Carbon Monoxide	08
Hydrogen Sulfide	15
Sulfur Dioxide	05
Phosphine	23
Hydrogen Cyanide	21

Note: Consult factory for response time data for other gases.

APPENDIX A - SPECIFICATIONS

(N)   Cross Sensitivity Data

Cross Sensitivity Data-Toxic

CARBON MONOXIDE

GAS	CONCENTRATION (PPM)	TYPICAL RESPONSE (PPM)
Hydrogen	1000	140
Methane	10,000	<1
Ethylene	50	154
Carbon Monoxide	100	100
Carbon Dioxide	25,000	<2
Sulfur Dioxide	25	38
Nitric Oxide	100	44
Hydrogen Sulfide	25	0

HYDROGEN SULFIDE

GAS	CONCENTRATION (PPM)	TYPICAL RESPONSE (PPM)
Hydrogen	500	15
Methane	10,000	<1
Ethylene	500	15
Carbon Monoxide	100	7
Carbon Dioxide	10,000	<3
Hydrogen Sulfide	25	25

SULFUR DIOXIDE

GAS	CONCENTRATION (PPM)	TYPICAL RESPONSE (PPM)
Carbon Monoxide	300ppm	<3ppm
Hydrogen Sulfide	15ppm	5ppm
Nitric Oxide	35ppm	0ppm
Nitrogen Dioxide	5ppm	negative 5ppm
Chlorine	1ppm	no data
Hydrogen	100ppm	n/d
Hydrogen Cyanide	10ppm	n/d
Hydrogen Chloride	5ppm	n/d
Ethylene	100ppm	n/d

APPENDIX A - SPECIFICATIONS

PHOSPHINE

GAS	CONCENTRATION	TYPICAL RESPONSE
Arsine	150ppb	120ppb
Silane	1000ppb	900ppb
Diborane	300ppb	100ppb
Germane	600ppb	510ppb
Sulphur Dioxide	5ppm	1ppm
Hydrogen	100ppm	<0.1ppm
Ethylene	100ppm	1.8ppm

AMMONIA

GAS	CONCENTRTION (PPM)	TYPICAL RESPONSE (PPM)
Hydrogen Sulfide	10	0 (NOTE 1)
Sulfur Dioxide	2	0
Hydrochloric Acid	5	0
Phosphine	300	0
Carbon Monoxide	1000	0
Carbon Dioxide	5000	0
Nitrogen	1,000,000	0
Chlorine	1	0
Hydrogen	10,000	0
Hydrocarbons	10,000	0
Hydrogen Cyanide	10	0
Hydrogen Selenide	0.1	0
Diborane	0.1	0
Arsine	1	0
Germane	1	0
Hydrogen Fluoride	4	0
Alcohols	1000	0

NOTE 1. Short term in minute range

APPENDIX A - SPECIFICATIONS

HYDROGEN CYANIDE

GAS (PPM)	CONCENTRATION (PPM)	TYPICAL RESPONSE (PPM)
Hydrogen Sulfide	10	40
Sulfur Dioxide	2	0 (Note)
Hydrochloric Acid	5	0 (Note)
Phosphine	0.3	0
Carbon Monoxide	1000	0
Carbon Dioxide	5000	0
Nitrogen	1,000,000	0
Chlorine	5	Neg. 1
Hydrogen	1000	0
Nitrogen Dioxide	10	Neg. 12
Hydrocarbons	10,000	0
Nitrogen Monoxide	100	0
Arsine	0.1	0
Hydrogen Fluoride	3	0
Alcohols	1000	0
Ozone	0.1	0.2

Note: Short term exposure minutes.

CHLORINE DIOXIDE

GAS	CONCENTRATION (PPM)	TYPICAL RESPONSE (PPM)
Hydrogen sulfide	10	0 (Note)
Sulfur Dioxide	2	0
Hydrochloric Acid	5	0
Phosphine	0.3	0.3
Carbon Monoxide	1000	0
Carbon Dioxide	5000	0
Nitrogen	1,000,000	0
Chlorine	1	0 (Note)
Hydrogen	10,000	0
Hydrocarbons	10,000	0
Hydrogen Cyanide	10	0
Hydrogen Selenide	0.1	0
Arsine	1	0.8
Hydrogen Fluoride	3	0
Alcohols	1000	0
Ozone	0.1	0.03

Note: Short gas exposure in minute range

APPENDIX A - SPECIFICATIONS

CHLORINE

GAS	CONCENTRATION (PPM)	TYPICAL RESPONSE (PPM)
Hydrogen Sulfide	10	Neg. 0.3 (Note 1)
Sulfur Dioxide	5	0
Carbon Monoxide	300	0
Carbon Dioxide	10,000	0
Nitrogen	1,000,000	0
Nitrogen Dioxide	10	1.2
Bromine	1	1
Fluorine	1	0.44
Chlorine Dioxide	0.25	0.05
Hydrogen Chloride	20	0
Hydrocarbons	10,000	0
Hydrogen	1000	0
Hydrogen Cyanide	10	0
Ethanol	66,000	0
Ammonia	65	0

Note 1: Continuous exposure will damage cell

NITROGEN DIOXIDE

GAS	CONCENTRATION (PPM)	TYPICAL RESPONSE (PPM)
Hydrogen sulfide	10	no data
Sulfur dioxide	50	0
Hydrochloric Acid	5	0
Phosphine	0.1	0
Carbon Monoxide	1000	0
Carbon Dioxide	5000	0
Nitrogen	1,000,000	0
Chlorine	1	3
Hydrogen	1000	0
Hydrocarbons	10,000	0
Ammonia	30	0
Ozone	1	0.7
Diborane	0.1	0
Arsine	0.1	0
Germane	1	0
Fluorine	3	0
Alcohols	1000	0
Nitrogen Monoxide	100	0

APPENDIX A - SPECIFICATIONS

COMBO-TOX (CO/H2S)

GAS	CONCENTRATION (PPM)	RESPONSE (PPM)
Hydrogen Sulfide	15	38
Sulfur Dioxide	5	2.5
Nitric Oxide	35	10
Nitrogen Dioxide	5	Neg3
Chlorine	1	<Neg1
Hydrogen	100	<40

LEL Cross Sensitivity Data

CAUTION

The following is not applicable to CH4 % by volume sensor)

Gas/Vapor	Relative Span
Acetone	50
Allyl alcohol	50
Benzene	44
Butane	51
Butan-2-one (MEK)	48
Butyl Acetate	36
Cyclohexane	44
Di n-butyl ether	43
Ethane	82
Ethanol	64
Ethene	81
Ethyl acetate	46
Ethyl benzene	30
Ethylene oxide	64
Hexane	46
Heptane	44
Hydrogen	107
Methane	100

APPENDIX A - SPECIFICATIONS

Gas/Vapor	Relative Span
Methanol	84
Methylamine	80
Methylethylketone	48
Methyl,t-butylether	44
n-Propanol	50
Octane	38
Pentane	50
Propane	63
Propan-2-ol (IPA)	49
Propylene	64
Propylene Oxide	46
Styrene	32
Tetrahydrofuran	64
Toluene	44
t-Butylalcohol	74
Xylene	31

Note: This section below should be disregarded if you have chosen the "LEL GAS TYPE" in the supervisory mode).

The cross sensitivity data above contains the relative span for a number of combustible gases. This information enables the following cross sensitivity calculations:

(1)   Instrument reading in LEL when exposed to a specific combustible gas included in the table:

$$\text{Instrument reading in LEL} = \frac{\text{LEL concentation of gas applied} \times \text{relative span of gas applied}}{\text{relative span of calibration gas}}$$

Example 1:   What will an instrument, calibrated to methane, read when exposed to 10% toluene?

Calculation: $\dfrac{10 \times 44}{100}$ **= 4.4%LEL toluene**

(2)   The actual gas concentration applied to an instrument, when an LEL reading is observed.

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APPENDIX A - SPECIFICATIONS

$$\text{Gas concentration applied (LEL)} = \frac{\text{Instrument reading (LEL)} \times \text{relative span of calibration gas}}{\text{relative span of gas applied}}$$

Example 2: An instrument, calibrated to methane, reads 22%LEL when exposed to propane. What is the level of propane being applied?

Calculation: $\dfrac{22 \times 100}{63}$ **= 34.9%LEL propane**

(O) General

Sample Flow Rate:

The pump in the Micromax Pro samples at 450 cc/minute. Use of the supplied sampling accessories requires the user to be aware that delay time will occur based on the length of tubing. Refer to Section 4.5 *Remote Sampling (Pretesting)* for details. If the sample flow is restricted or below pre-determined limits, the Micromax Pro will indicate a flow failure alarm and for safety reasons will automatically switch to diffusion mode. In diffusion mode, the sampling pump does not operate but the instrument is fully operational and will sense the atmosphere surrounding the instrument.

Refer to Section 8.8 *Pump Inlet Filter Replacement* for maintenance.

DO NOT USE non-standard sampling tube or fittings.

Storage:

Temperature Range:	-20 degrees C to + 50 degrees C (-4 degrees F to + 122 degrees F)
Humidity Range:	0-95% (Noncondensing)
Expected Life:	Instrument - 10 Years Sensors - 2 Years Batteries - NiMH 2 Years

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APPENDIX A - SPECIFICATIONS
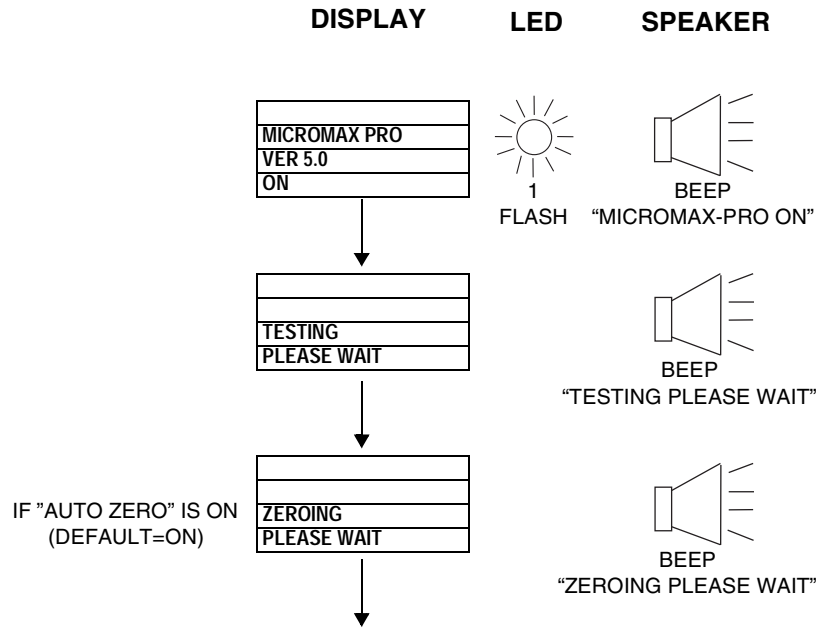
Oxygen Enriched Atmospheres:

This instrument is safe for use in normal oxygen (20.9%v/v) atmosphere. In enriched oxygen atmospheres (above 21%) extreme caution should be exercised as electrical safety certification is not applicable nor has it been tested as being safe to use in such atmospheres.
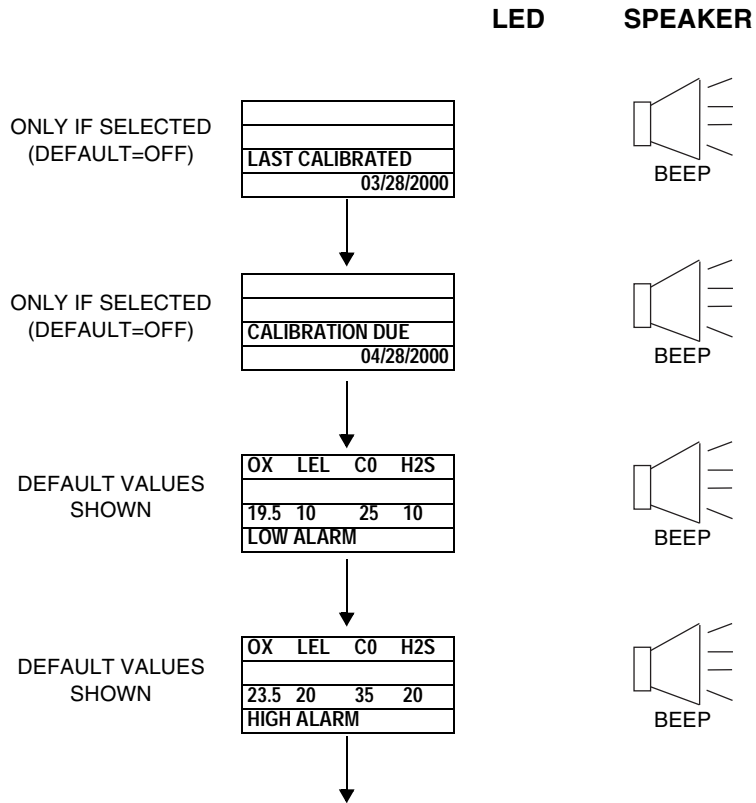
Oxygen Deficient Atmospheres:

The LEL readings cannot be relied upon in atmospheres deficient of oxygen. For example, most catalytic sensors cannot be relied upon when oxygen is lower than 10% v/v.

Use extreme caution when the oxygen readings are below 10% v/v and do not enter any confined space when oxygen alarm is operating and/or reading shows less than 19.5% v/v.

APPENDIX B - TURN-ON SEQUENCE

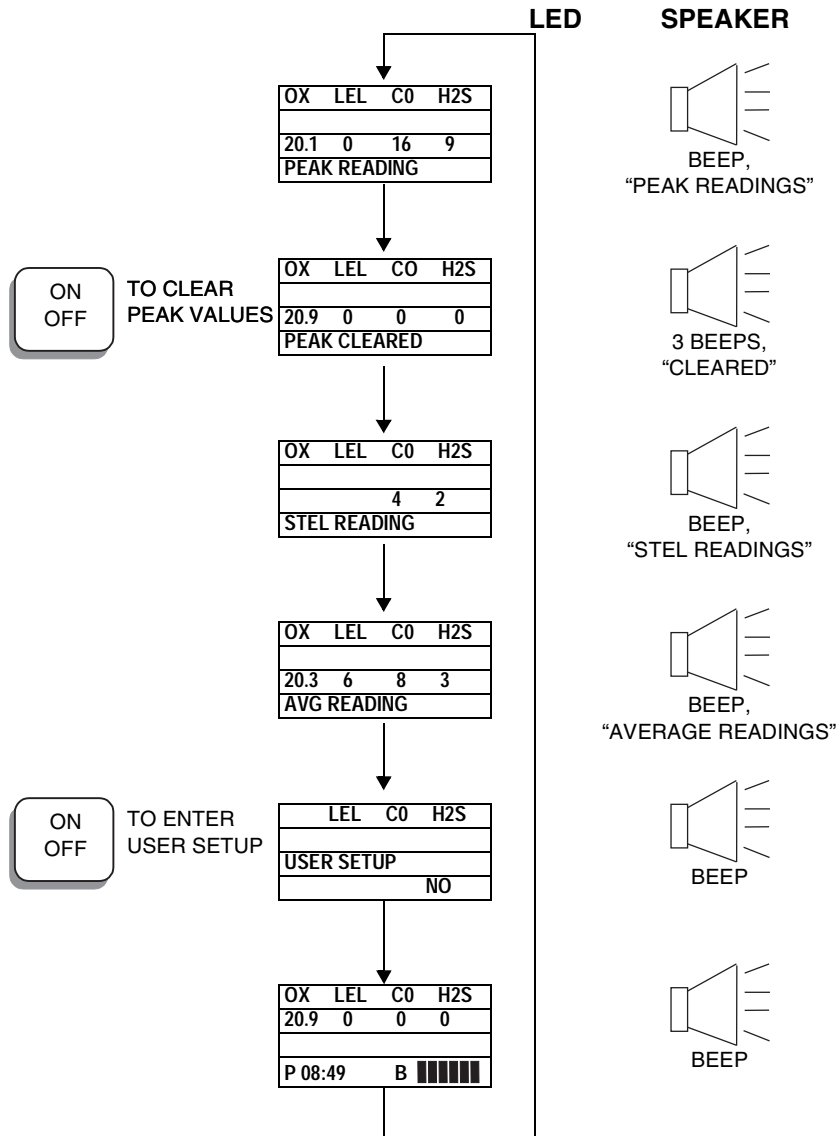| DISPLAY	LED	SPEAKER

MICROMAX PRO
VER 5.0
ON

1
FLASH

BEEP
"MICROMAX-PRO ON"

TESTING
PLEASE WAIT

BEEP
"TESTING PLEASE WAIT"

IF "AUTO ZERO" IS ON
(DEFAULT=ON)

ZEROING
PLEASE WAIT

BEEP
"ZEROING PLEASE WAIT"

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APPENDIX B - TURN-ON SEQUENCE

		LED	**SPEAKER**

ONLY IF SELECTED
(DEFAULT=OFF)

LAST CALIBRATED
03/28/2000

BEEP

ONLY IF SELECTED
(DEFAULT=OFF)

CALIBRATION DUE
04/28/2000

BEEP

DEFAULT VALUES
SHOWN

OX	LEL	C0	H2S
19.5	10	25	10
LOW ALARM			

BEEP

DEFAULT VALUES
SHOWN

OX	LEL	C0	H2S
23.5	20	35	20
HIGH ALARM			

BEEP

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APPENDIX B - TURN-ON SEQUENCE

LED   **SPEAKER**

VOICE ON   1 BEEP"

READY

3   3 BEEPS,
FLASHES   "MICROMAX PRO
           READY""

NORMAL OPERATING MODE

OX	LEL	C0	H2S
20.9	0	0	0

P 11:52   B ▐▌▌▌▌

Note: Max time from "Turn On" to "Ready" does not exceed 80 seconds.

APPENDIX C - MODE SEQUENCE, STANDARD MODE

LED   **SPEAKER**

OX	LEL	C0	H2S
20.1	0	16	9
PEAK READING			

BEEP,
"PEAK READINGS"

ON
OFF TO CLEAR
PEAK VALUES

OX	LEL	C0	H2S
20.9	0	0	0
PEAK CLEARED			

3 BEEPS,
"CLEARED"

OX	LEL	C0	H2S
		4	2
STEL READING			

BEEP,
"STEL READINGS"

OX	LEL	C0	H2S
20.3	6	8	3
AVG READING			

BEEP,
"AVERAGE READINGS"

ON
OFF TO ENTER
USER SETUP

LEL	C0	H2S
USER SETUP		
		NO

BEEP

OX	LEL	C0	H2S
20.9	0	0	0
P 08:49	B ▊▊▊▊▊▊		

BEEP

*Note: Use the **MODE** button to scroll through these screens.*

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APPENDIX D - MODE SEQUENCE, USER SET-UP MODE

Note: See Appendix C Mode Sequence, Standard Mode for how to enter User Set-up Mode.

LED   **SPEAKER**

DEFAULT=ON

PUMP STATUS
ON

BEEP
"PUMP ON"
OR
"PUMP OFF"

DEFAULT=ON

VOICE STATUS
ON

BEEP
"VOICE ON"

DEFAULT=OFF

CONFIDENCE
ON

BEEP
"CONFIDENCE OFF"
OR
"CONFIDENCE ON"

(A)
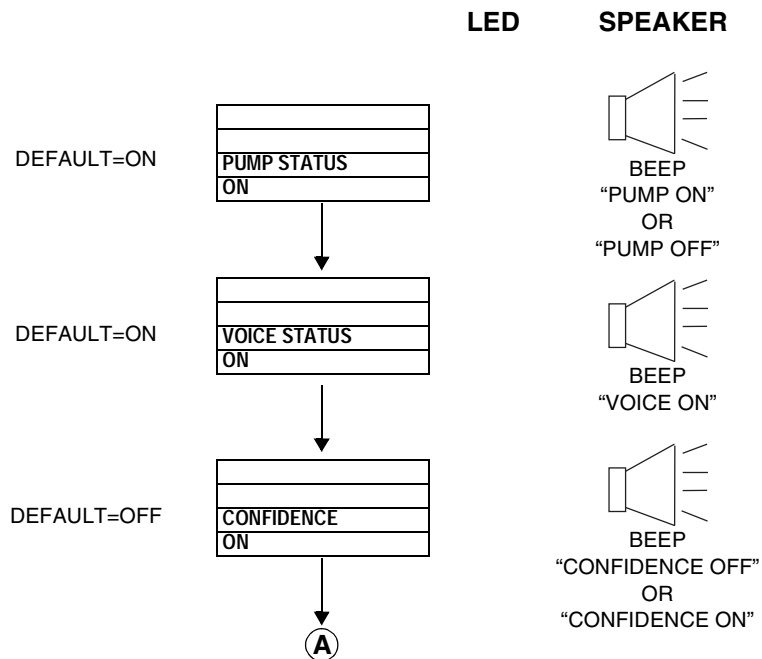
Notes: 1. There will be no voice message if "VOICE" is turned off in User Set-Up Mode.

*2. Use the **MODE** button to scroll through these screens.*

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APPENDIX D - MODE SEQUENCE, USER SET-UP MODE

Calibration

		LED	**SPEAKER**

Ⓐ

OX	LEL	C0	H2S
20.9	0	0	0
CALIBRATE?			

ON / OFF — TO ENTER CAL MODE

BEEP
"CALIBRATION MODE ON"

MODE — TO ZERO AND EXIT, WITHOUT CALIBRATING, HOLD 3 SEC ANYTIME DURING COUNTDOWN

OX	LEL	C0	H2S
ZEROING			
PLEASE WAIT			

3 BEEPS,
"ZEROING COMPLETE"

OX	LEL	C0	H2S
APPLY GAS			

"APPLY GAS"

Ⓑ

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APPENDIX D - MODE SEQUENCE, USER SET-UP MODE

Calibration

LED   SPEAKER

Ⓑ

OX	LEL	C0	H2S
CALIBRATING			
PLEASE WAIT			

BEEP
"CALIBRATING"

"CALIBRATION
COMPLETE" (ONLY
SHOWS GASES
CALIBRATED)

OX	LEL	C0	H2S
CAL COMPLETE			
OX	LEL	C0	H2S

3 BEEPS
"CALIBRATION COMPLETE"

OX	LEL	C0	H2S
20.9	5	5	25
PURGING			
PLEASE WAIT			

ALL GASES CAL CORRECTLY?

OX	LEL	C0	H2S
APPLY GAS			

"APPLY GAS"

YES

NO

AUTOMATIC MEMORY CLEAR AFTER PURGING

3 BEEPS "CLEARED"

ON OFF

NORMAL OPERATING MODE

OX	LEL	C0	H2S
20.9	0	0	0
P 10:56	B		

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APPENDIX D - MODE SEQUENCE, USER SET-UP MODE

Calibration Failure

LED   **SPEAKER**

OX	LEL	C0	H2S
APPLY GAS			

TIME
OUT

3 BEEPS,
"CALIBRATION FAIL"
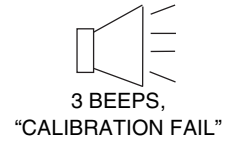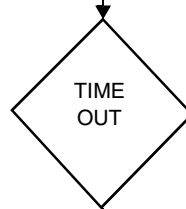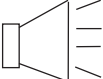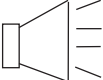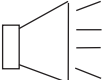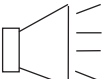
OX	LEL	C0	H2S
APPLY GAS			
CAL FAILURE			

OX	LEL	C0	H2S
20.9	0	0	0
P 08:49	B		

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APPENDIX E - ALARM MODES

		LED	**SPEAKER**

LOW GAS ALARM

(VOICE: DANGER FOR O2 ONLY)

OX	LEL	C0	H2S
20.9	0	0	0
WARNING			
P 08:49		B	▮▮▮▮▮

FLASH

3 BEEPS
"WARNING" OR
"DANGER" FOR O2

HIGH GAS ALARM

OX	LEL	C0	H2S
20.9	0	0	0
DANGER			
P 08:49		B	▮▮▮▮▮

FLASH

3 BEEPS
"DANGER"

LOW FLOW ALARM

OX	LEL	C0	H2S
20.9	0	0	0
LOW FLOW			
P 08:49		B	▮▮▮▮▮

FLASH

CONTINUOUS
HORN

OX	LEL	C0	H2S
20.9	0	0	0
PUMP FAIL			
P 08:49		B	▮▮▮▮▮

FLASH

LONG CONTINUOUS
BEEPS

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APPENDIX E - ALARM MODES

LED   **SPEAKER**

LOW BATTERY
WARNING

OX	LEL	C0	H2S
20.9	0	0	0
LOW BATTERY			
P 08:49	B	▌▌▌▌▌	

2 SHORT BEEPS, 15 TO
20 SEC.

BATTERY
DEPLETED

OX	LEL	C0	H2S
20.9	0	0	0
BATT. DEPLETED			
P 08:49	B	▌▌▌▌▌	

5 BEEPS
TURN OFF

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APPENDIX F - CHARGING SCREENS

"BLANK"

(1)   When unit is turned off.

(2)   When an attempt is made to turn on but battery is very low.

"CHARGING"

(1)   When charger is connected and charging.

CHARGING BATTERY

"CHARGE COMPLETE"

(1)   Remains on screen until charger is removed.

CHARGE COMPLETE

"CHECK BATTERY"

(1)   When unit is placed on charge with alkaline battery.

CHECK BATTERY

(2)   When unit is placed on charge with a defective battery, or if battery is defective.

(3)   When unit is placed on charge without battery.

APPENDIX G - CALIBRATION KITS

Model No.	Description
MPRO-KIT # 1	Kit containing 58-liter calibration gas cylinder (GFV207-CH4, CO, H2S, balance air), regulator with gauge, tubing, and high impact waterproof carrying case (MCC215A).
MPRO-KIT # 1 - MINI	Kit containing 34-liter calibration gas cylinder (GFV243-CH4, CO, H2S, balance air), regulator, tubing, and water resistant carrying case (MCC210A).
MPRO-KIT # 2	Kit containing 103-liter calibration gas cylinder (GFV123-CH4, CO, balance air), regulator with gauge, tubing, and high impact waterproof carrying case (MCC215A).
MPRO-KIT # 5	Alarm test kit containing "bump check" gas cylinder (TEST-1A), and water resistant carrying case (MCC210A).
MPRO-KIT # 7	Kit containing 23-liter minimix calibration gas in steel cylinder (GFV1090-CH4, CO, balance air), regulator, tubing, and water resistant carrying case (MCC210A).
MPRO-KIT #10 -MINI	Kit containing 34-liter calibration gas cylinder (GFV279-CH4, CO, SO2, balance air), regulator, tubing, and water resistant carrying case (MCC210A).
TEST-1A	Alarm check gas - single canister.
TEST-1A-6	Alarm check gas - six pack.
TEST-1A-12	Alarm check gas - twelve pack.

APPENDIX H - OPTIONAL ACCESSORIES

Model No.	Description
MPRO-EAR	Earphone assembly
MPRO-VIB	Vibrator assembly
MPRO-15	Adapter for charging a single battery
MPRO-2	230V 50Hz AC charger
MPRO-6	Vehicle charger
MAX-18	Collapsible fiberglass search probe (30")
MAX-19	Collapsible aluminum search probe (30")
16-21	Filter (4") with water-trap and dust filter
16HEX-10	Hose extension (10') with fittings
16HEX-20	Hose extension (20') with fittings
MAX-DT	Dilution tube
MCC215A	Waterproof briefcase style case (Houses monitor and calibration kit)

APPENDIX I - REPLACEMENT PARTS

PART NUMBER	DESCRIPTION
MPRO-BPR	NiMH rechargeable battery pack
MPRO-1	120V AC 4hr charger for MPRO-BPR
MPRO-BPA	Alkaline battery holder
MCF-930	Rubber boot
16-27	Sampling hose (10') with water and dust filters
16-27T	Sampling hose (10') with water and dust filters With Tygon tubing (for use with SO2, CLO2, CL, PH3, NH3, and NO2)
16-PFC	Dust filter (2.5")
GFV107	PVC hose tubing (sold by the foot)
GFV256	Tygon hose tubing (sold by the foot)
GFV196	Replacement water filter
20HFC	Replacement dust filter
MPRO-DATALOG	Data logging software and cable
MPRO-LOG	Data logging software (CD ROM)
MPRO-COMM	Data logging communications cable
MPRO-02	O2 sensor with ID board
MPRO-CL	Chlorine sensor with ID board
MPRO-CLO	Chlorine Dioxide sensor with ID board
MPRO-NO2	Nitrogen Dioxide sensor with ID board
MPRO-TCS-E	% by volume (CH4) sensor
MPRO-ES-S	LEL sensor
MAX-CS-S	Carbon Monoxide sensor with ID board
MAX-HS-S	Hydrogen Sulfide sensor with ID board
MAX-SS	Sulfur Dioxide sensor with ID board
MAX-NH	Ammonia sensor with ID board
MAX-PS	Phosphine sensor with ID board
MAX-HCN-K	Hydrogen Cyanide sensor with ID board

APPENDIX I - REPLACEMENT PARTS

MAX-TOX	CO/H2S COMBO-TOX sensor w/ID board
MPRO-SB	Sensor board assembly
MPRO-DB	Digital board assembly
MPRO-VB	Voice board assembly
MPRO-GSP	Pump assembly
MPRO-MC	Main case assembly
HSR476	Case screw (4 required)
XIF936	Gas-plate hole plug
MAX-IF	Inlet fitting with "O" ring, screen and plastic fitting
HOR 123	"O" Ring (for inlet)
XIP604	Filter screen (for inlet)
GFV194	Plastic fitting (for inlet)

APPENDIX J - CALIBRATING WITH MULTIPLE CANISTERS

Whether the calibration procedure falls under Section 5.2 *Calibration Procedure (when all calibration gases are in a single canister)* or under Section 5.3 *Calibration Procedure (when not all calibration gases are in a single canister)* is dependent on the instrument's sensor complement. If the sensor complement is O2, LEL, CO and H2S, all four calibration gases are available in one canister (GFV207 or GFV243). Similarly, if the sensor complement is O2, LEL, CO and SO2, all four calibration gases are available in one canister (GFV279). Again, if the sensor complement is O2, LEL, and CO then all three-calibration gases are available in one canister (GFV123). GFV123 would also be used where the sensor complement is O2 and LEL.

Where not all the calibration gases are available in a single canister, the position is as follows:

(1) Five-gas models with combo-tox sensor

First, apply GFV123 (O2, LEL and CO). Then apply the gas appropriate to the other toxic sensor in the unit. Do not calibrate the combo-tox sensor with H2S gas.

Four-gas models with O2, LEL and CO sensors

First, apply GFV123 (O2, LEL and CO), followed by the gas appropriate to the other toxic sensor.

(2) Models with O2 and/or LEL sensors

First, apply GFV123 (O2, LEL and CO), followed by the gas(es) appropriate to the other toxic sensor(s).

(3) Examples

a. MPRO-4ABCE (O2, LEL, CO and NH3). Follow the procedure in Section 5.3 *Calibration Procedure (when not all calibration gases are in a single canister)*. The first calibration gas is GFV123; the second calibration gas is either GFV 213 (58 Liters) or GFV 250 (34 Liters).

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APPENDIX J - CALIBRATING WITH MULTIPLE CANISTERS

b.   MPRO-4ABCH (O2, LEL, CO and SO2). Follow the procedure in Section 5.2 *Calibration Procedure (when all calibration gases are in a single canister)* because all the calibration gases are in one canister (GFV279).

c.   MPRO-2AC (O2 & CO). Follow the procedure in Section 5.2 *Calibration Procedure (when all calibration gases are in a single canister)* because all the calibration gases are in a single canister (GFV123).

d.   MPRO-2EF (NH3 and CL2). Follow the procedure in Section 5.3 *Calibration Procedure (when not all calibration gases are in a single canister)*. The first gas is NH3 (GFV213 or GFV250) and the second gas is CL2 (GFV252 or GFV249).

e.   MPRO-AN (O2 and LEL/%by volume). Follow the procedure in Section 5.2 *Calibration Procedure (when all calibration gases are in a single canister)* because all the gases are in a single cylinder (GFV123).

f.   MPRO-4ABCJ (O2, LEL, CO and PH3). Follow the procedure in Section 5.3 *Calibration Procedure (when not all calibration gases are in a single canister)*. The first calibration gas is GFV123; the second calibration gas is GFV272 (5PPM PH3).

APPENDIX K - CALIBRATION GASES

PART NO.	GAS COMPLEMENT	VOLUME (Liters)
GFV207	50% LEL CH4, 50PPM CO, 25PPM H2S, BAL. AIR	58
GFV243	50% LEL CH4, 50PPM CO, 25PPM H2S, BAL. AIR	34
GFV279	50% LEL CH4, 50PPM CO, 10PPM SO2, BAL. AIR	34
GFV123	50% LEL CH4, 50PPM CO, BAL. AIR	103
GFV177	10PPM SO2, BAL. N2	58
GFV261	10PPM SO2, BAL. N2	34
GFV272	5PPM PH3, BAL. N2	58
GFV213	25PPM NH3, BAL.N2	58
GFV250	25PPM NH3, BAL.N2	34
GFV252	10PPM CL2, BAL N2	58
GFV249	10PPM CL2, BAL.N2	34
GFV234	10PPM HCN, BAL N2	58
GFV263	10PPM HCN, BAL N2	34
GFV217	10PPM NO2, BAL. N2	58
GFV264	10PPM NO2, BAL. N2	34
GFV232	50% LEL PENTANE, BAL. AIR	103
GFV239	50% LEL PROPANE, BAL. AIR	58
GAS124	50% LEL HEXANE, BAL. AIR	103
GAS123	50% CH4 (50% BY VOLUME)	58