

MultiRAE Service Training

Firmware v 3.21B



PROTECTION THROUGH DETECTION

Training Agenda:

- Firmware Overview
- Repairs Allowed
- Turning unit on in Diagnostic Mode
- Diagnostic Mode
- Program Mode
- Configuration and Personal settings
- The new black MultiRAE
- Calibration



PROTECTION THROUGH DETECTION

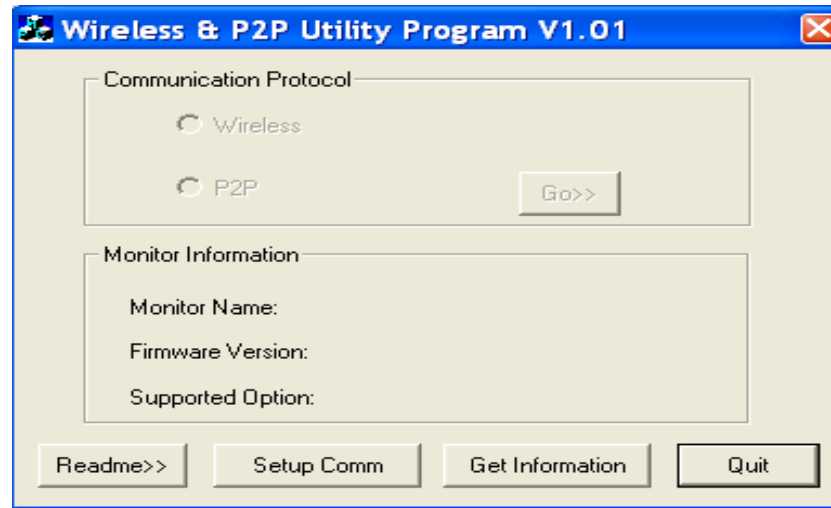
Firmware versions

Version	Capability
V3.11	<ul style="list-style-type: none">•Adds Wireless•Removes serial communications
V3.11a	<ul style="list-style-type: none">•Adds Run silent mode
V3.12	<ul style="list-style-type: none">•Enables Serial communications with “EnableP2P.exe” program
V3.21	<ul style="list-style-type: none">•Adds AutoRAE communications



PROTECTION THROUGH DETECTION

Wireless Warning!



- Do not use ProRAE Suite v. 3.01A or older to upgrade firmware!
- Wireless capability will be disabled
- If wireless capability is disabled, use WirelessP2P.exe from the website to fix

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PROTECTION THROUGH DETECTION

Repairs allowed

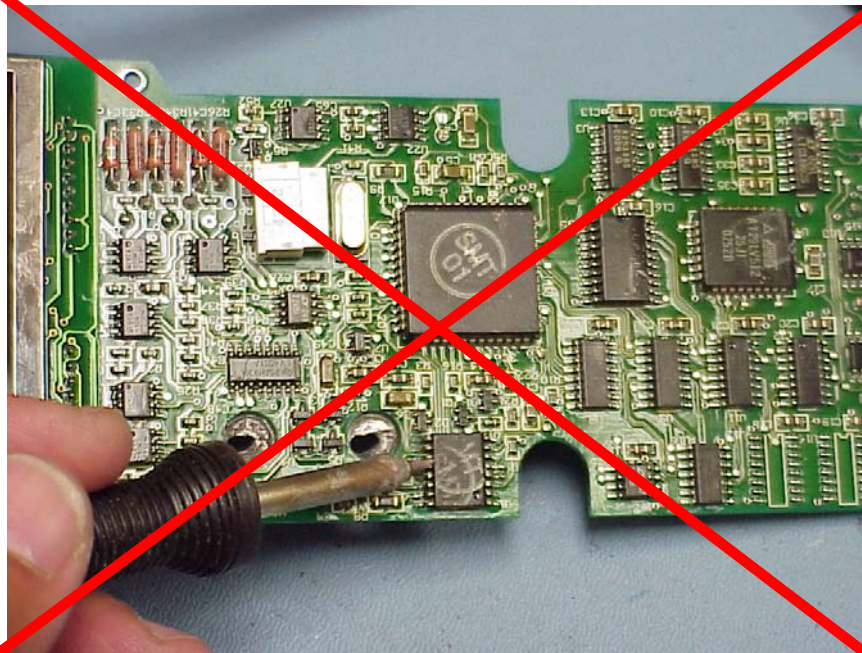
- Part Replacements: Sensors, Lamps, Batteries, Pump, Housing, Tubing, Filters, Membrane Panel (Keypad)
- PCB replacement through Service Department with serial number of unit

*Always be careful of Electric Static Discharge when working on units. Please use ESD pads on workbench or wear ESD straps on shoes. Make sure that the ESD pad is grounded and that the straps are tested to verify that they are working.



Repairs Not Allowed

- Soldering is not allowed on any of our units! This can compromise Intrinsic Safety of unit and is not allowed under ATEX approval rating in the US, Canada, Mexico and Latin America



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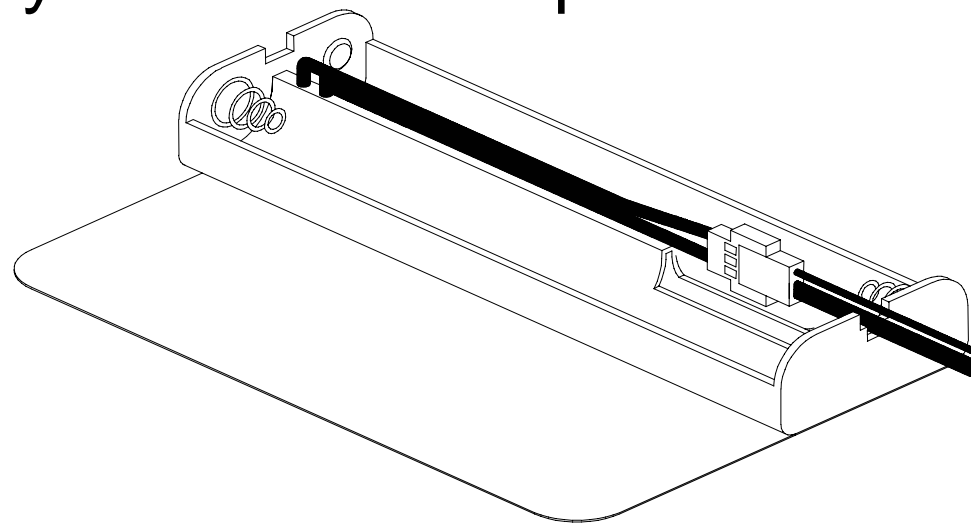
Battery Problems

- If unit will not turn on, use alkaline
- If unit works with alkaline, replace rechargeable battery
- If unit still will not turn on, check wiring
- If wiring looks OK, replace membrane panel



MultiRAE: Alkaline Adapter

- Accepts 4 AA alkaline batteries
- Provides 12-14 hours of duration
- Make sure that cable runs in groove between batteries or it won't fit
- When reattaching MultiRAE lid, seat it first at back by batteries then push the front down



MultiRAE: Navigation

Turning unit on in Diagnostic Mode

- With MultiRAE turned off, hold down “Y/+” key
- While still holding “Y/+” key, depress and hold the “MODE” key.
- Hold both keys down for 2 seconds, the MultiRAE will beep and then release
- The fourth warm-up screen will say “Diagnostic Mode,” if you push the “Y” key now, the warm-up will speed up.



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PROTECTION THROUGH DETECTION

User Screens

- Field Service
 - Raw Sensor Values
 - PID Lamp Fail Threshold
 - LCD Contrast Adjustment
 - LEL & OXY Warranty exp
 - TOX1 & TOX2 Warranty exp
 - Pump Stall Threshold
 - Back Light On/Off Threshold
 - S/N and pump speed
 - Power run down time
 - Communicate with PC
- Service Technician
 - Raw Sensor Values
 - RF test
 - PID Lamp Fail Threshold
 - Battery type / Bias
 - PID 1X and 10X Range
 - LCD Contrast Adjustment
 - LEL Power On/Off Check
 - Clock/Voltage/Temperature
 - LEL & OXY Warranty exp
 - TOX1 & TOX2 Warranty exp
 - Pump Stall Threshold
 - Back Light On/Off Threshold
 - S/N and pump speed
 - Power run down time
 - Communicate with PC



PROTECTION THROUGH DETECTION

Sensor Issues

- High readings in Fresh Air
 - Calibration
- Failed Fresh Air Calibration
 - True Fresh Air Calibration with Zero grade air or
 - Zeroing Kit
- Failed Span calibration
 - Check bottle of calibration gas against span gas value
 - Try single sensor calibration
 - Replace sensor



Sensor Issues

- Alarms in Fresh Air
 - Calibrate sensor: Fresh Air and Span
 - Check Alarm limits
 - Check LEL sensor correction factor
- Bias Error
 - Check TOX 1 sensor: Bias should be turned on for NO or NH3 sensors only
- Sensor does not appear on screen after unit warms up
 - Check “Enable/Disable Sensor?” Under Programming: Change Sensor Configuration



Sensor Issues, cont'd

- **Slow response to gas**
 - Sensor is an exotic which required extra time to respond – check TN-114
 - Verify that all sensors are installed and no empty spots in unit, if a sensor is removed and you do not have one to replace it, install a dummy sensor
- *When installing a new sensor, a burn-in (equilibration) period is required. Unit needs to be turned on and running or a SensorRAE can be used before calibration. – Check TN-114 for actual times



Diagnostics: Raw Sensor Outputs

TOX1		VOC		TOX2
	310-450	340-450	310-450	
LEL	310-1500	RAW	1000-1250	OXY

- Main display in Diagnostic Mode.
- MultiRAE will return to this screen in 60 seconds if left in any other diagnostic screen

Diagnostics: Raw Sensor Outputs

TOX1		VOC		TOX2
	310-450	340-450	310-450	
LEL	310-1500	RAW	1000-1250	OXY

- In fresh air the RAW reading should be within the indicated ranges (NH3 will be between 400-550)
 - Values can be slightly out of range in RAW and SPAN as long as the Delta is within limits and the sensor calibrates

Instant Answers

- A bad O2 sensor will read very low, if it is in the same range as the rest of the sensors than it is bad
- Any value, such as a single digit (1,3,9) or 4095 continue with the tests below
 - Check PCB where sensor plugs to board
 - Make sure shorting pin is removed
 - Make sure sensor is completely plugged in
 - Check for corrosion on sensor and PCB
 - when the LEL sensor reads 0 or 4095, it could be the sensor itself



Diagnostic Sensor Testing

310-450	340-450	310-450	520-900	600-3500	1000-1500
810-1500	RAW	1000-1250	600-1800	RAW	300-400

- For a quick Diagnostic of Sensors, TN-123 and Span gas is needed to test instrument
- Take the RAW readings in Fresh Air, apply the Span gas and allow the sensors to stabilize
- Take the Span readings and subtract the two values to get the Delta value

$$\text{SPAN} - \text{RAW} = \text{DELTA}$$

- Compare the Delta value to TN-123 to see if the sensor is still good, if it falls within the “Good” range, calibrate the instrument



PROTECTION THROUGH DETECTION

TN-123: Delta = RAW Zero – RAW Span

Sensor	Cal Gas	Raw Zero	Raw Span	Delta New	Delta Used
PID (10.6 eV) (9.8 eV)	100 ppm IBE#	310 - 450	2000 - 8500	≥1700 ≥1000	≥750 ≥500
LEL	50% LEL CH4	310 - 1500	1300 -2300	≥800	≥100
O2	Air/99.9% N2	860 - 1250	330 - 500	≥500*	≥200*
CO	50 ppm CO	310 - 450	450 - 900	≥100	≥50
H2S	10 ppm H2S	310 - 450	400 - 650	≥100	≥20
H2S	25 ppm H2S	310 - 450	600 - 950	≥300	≥50
SO2	5 ppm SO2	310 - 450	500 - 1700	≥200	≥50
NO	25 ppm NO	310 - 450	420 - 750	≥100	≥30
NO2	5 ppm NO2	310 - 450	400 - 1400	≥100	≥30
HCN	5 ppm HCN	310 - 450	400 - 500	≥100	≥10
NH3	50 ppm NH3	400 - 750	700 - 1300	≥300	≥100
PH3	5 ppm PH3	310 - 450	700 - 1800	≥400	≥50
Cl2	10 ppm Cl2	310 - 450	450 - 1200	≥120	≥75



PROTECTION THROUGH DETECTION

LEL Sensor Warning

If LEL sensor goes negative it is poisoned and should be replaced! Poisoned LEL sensors are not under Warranty! (TN-144 lists substances which poison LEL)



PROTECTION THROUGH DETECTION

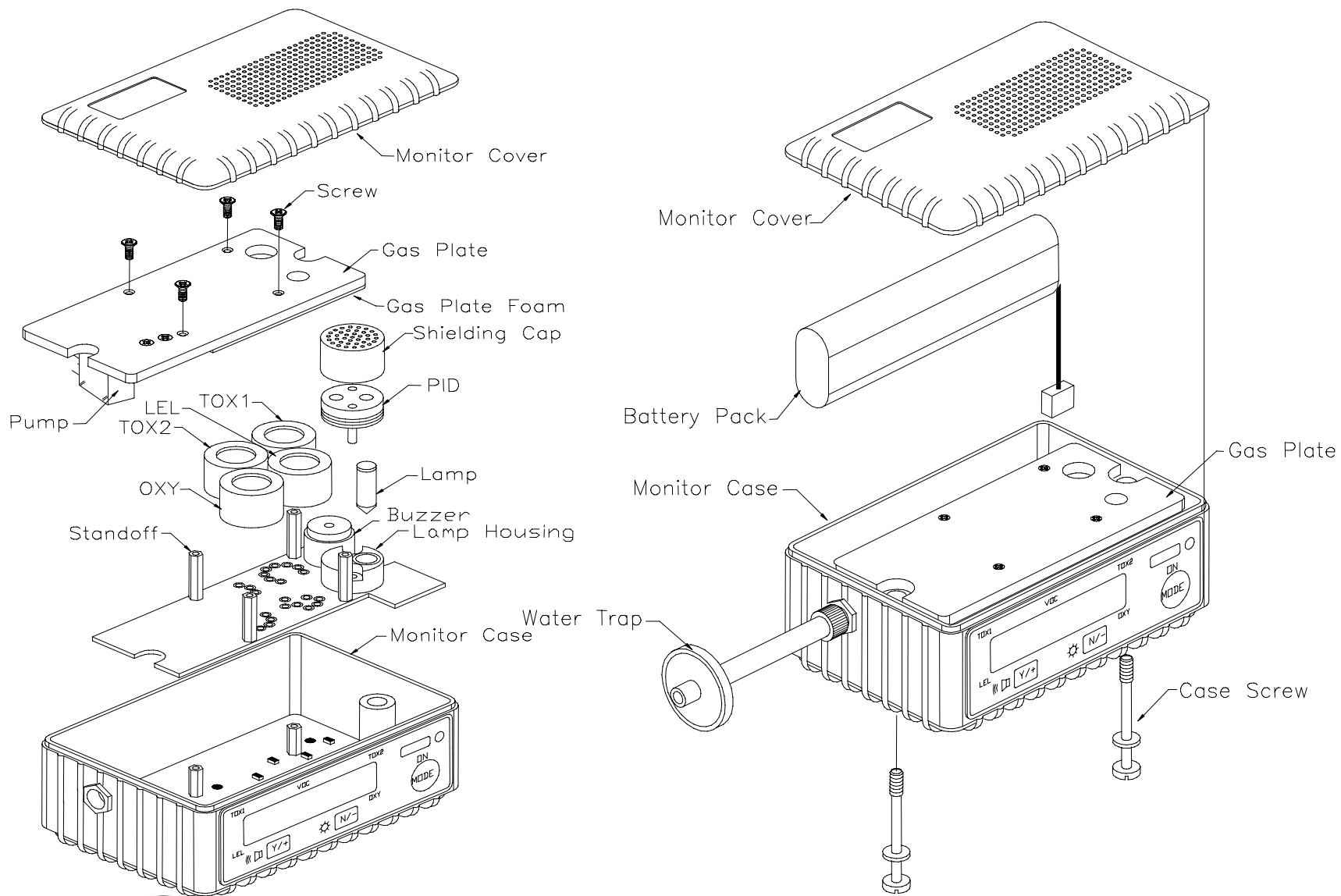
Inside the MultiRAE

- Always Loosen screws!
- Never pull a screw out!
- Use a Flat head screwdriver
- Lift the top housing off
- Unplug the battery at the white connector
- Loosen four Philips head screws and lift silver gas plate free from stand-offs
- Turn and lay in battery compartment



PROTECTION THROUGH DETECTION

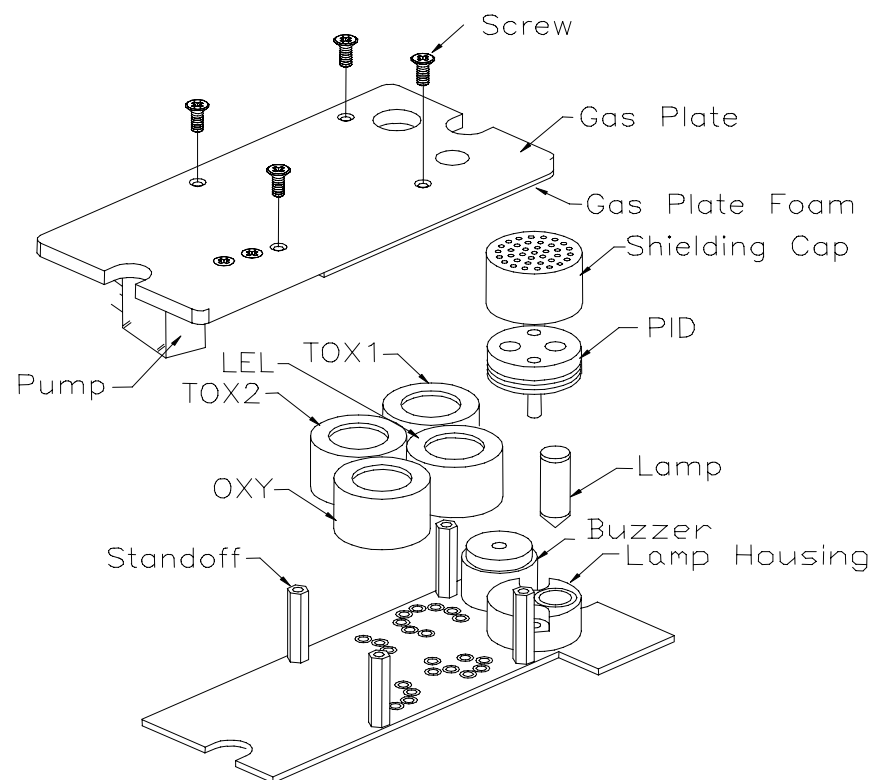
Inside the MultiRAE



PROTECTION THROUGH DETECTION

Replacing Sensors

- Identify location of problem sensor and remove it by gently pulling upwards
- Plug in a new sensor, make sure to remove shorting spring!
- Charcoal filter goes above CO sensor



- Silver MultiRAE

Lamp Troubleshooting Issues

- “Lamp” alarm even if lamp lights (ref. TN-146)
 - Reset Lamp Failure Threshold
- High lamp readings with rapid movement or moisture (ref. TN-163)
 - Clean lamp/sensor with GC grade Methanol
- Consistent high or low readings
 - Check correction factor or gas selection in Programming under “Change Sensor Configuration?”

Diagnostics: Lamp Failure Threshold

TOX1	VOC	TOX2
LEL	Lamp = 89 Fail = 83 +/-	OXY

- If MultiRAE gives a “Lamp” alarm check to make sure the Lamp value is above the Fail value if it is close and...
- If the lamp still lights this value may be reset
- A lamp that has sat on the shelf for a long period of time or in colder weather may need a longer warm-up period



Diagnostics: Lamp Failure Threshold

- Turn off battery and unplug battery
- Remove silver shielding cap from PID sensor
- Gently pull out PID sensor (white Teflon)
- Remove lamp from MultiRAE, grasp lamp by sides and pull out. Try not to touch the flat lamp surface.
- Replace white Teflon PID sensor
- Replace silver PID shielding cap
- Plug battery back into instrument



Diagnostics: Lamp Failure Threshold

TOX1	VOC	TOX2
LEL	Lamp = 94 Fail = 86 +/-	OXY

With Lamp in

- Turn off MultiRAE, remove battery and replace lamp
- Turn on MultiRAE in Diagnostic Mode
- “Lamp” reading should be at least 15-20 counts above “Fail” threshold. If not, lamp may be defective or very weak.
 - Replace weak or defective lamp
 - Reassemble if lamp is good



PROTECTION THROUGH DETECTION

MultiRAE: When to Clean PID Sensor

- PID works but creeps up to 10+ ppm even in clean air after “Fresh Air Calibration”
- Rapid movements of MultiRAE sends PID into alarm due to dirt movement in sensor
- PID responds to moisture (use the “Breathalyzer” test)
- Prior to cleaning the PID
 - ***Check/replace external inlet filter***
 - ***Make sure inlet tubing is clean***



MultiRAE: PID Sensor Clean/Replace

- Remove silver shielding cap from PID sensor
- Gently pull out PID sensor (white Teflon)
- Dip entire PID sensor into lamp cleaning solution (anhydrous methanol) for at least 3 minutes (an ultrasonic cleaner is recommended, but a shot glass is the perfect sized container)
- Dry sensor thoroughly (warm air will speed up this process) overnight is best



MultiRAE: PID Lamp Clean/Replace

- Clean lamp if it is hazy, has sensor grid imprinted on it or is otherwise dirty
- To remove lamp from MultiRAE, grasp lamp by sides and pull out. Try not to touch the flat lamp surface.
- If lamp works, use a cotton swab to clean the flat lamp surface with cleaning solution
- Replace lamp, **DO NOT TOUCH FLAT!**
- Install battery and turn on MultiRAE



MultiRAE: PID Lamp Clean/Replace

- ***If after warm-up, lamp lights proceed with reassembly***
- ***If lamp does not light, replace lamp***
- Turn off MultiRAE, remove battery
- Replace white Teflon PID sensor
- Replace silver PID shielding cap

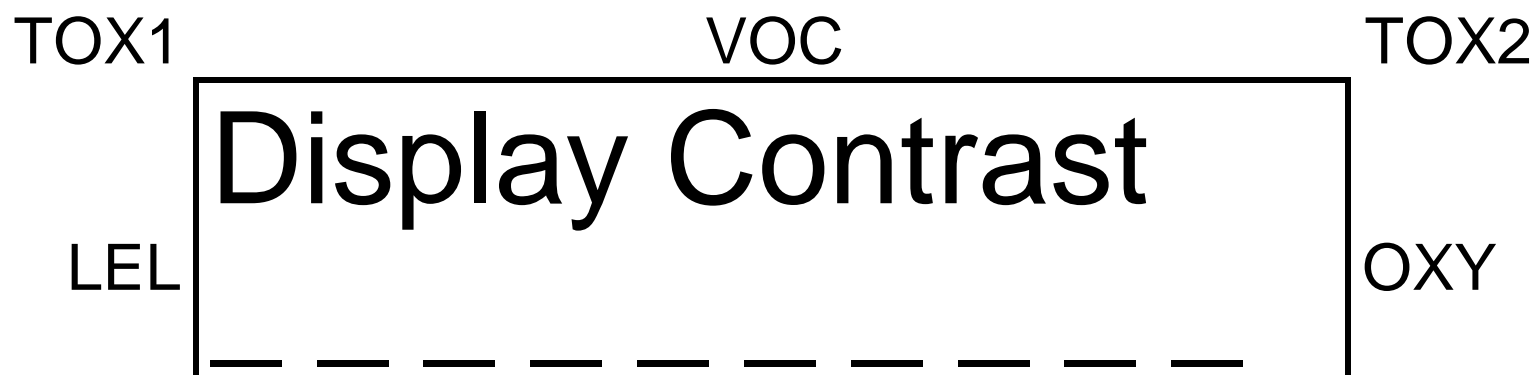


MultiRAE: Gas Plate Cleaning

- You also need to clean the Gas Plate when you clean the PID
- Follow instructions to remove pump from gas plate
- Immerse gas plate in lamp cleaning solution without pump attached (a ultrasonic cleaner will speed cleaning)
- Dry gas plate with warm air
- Follow instructions for pump replacement



Diagnostics: Display Contrast



- In cold weather the display may fade prematurely and in hot weather the display may “bleed”
- Use “Y/+” key to increase contrast and “N/-” key to decrease contrast.
- Press the “MODE” key to accept

Diagnostic Mode: Warranty Expiration

TOX1	VOC	TOX2
LEL	OXY expire 06/99 LEL expire 06/00	OXY

When calling in a WR we need the following:
Serial number of the unit and the sensor, warranty
expiration date, RAW Air and RAW Span

- A sensor with expired Warranty is still good to use if it calibrates and tests correctly



PROTECTION THROUGH DETECTION

Pump Issues

- Pump does not stall
 - Adjust Pump Stall Threshold
 - Check tubing for leaks
 - Rebuild/clean pump
- Sensors respond slowly to gas or Unit calibrates OK but doesn't see gas sample
 - Check tubing for leaks
 - Rebuild/clean pump
 - Tests sensors with gas applied directly to the sensor



Diagnostics: Adjust Pump Stall

TOX1

VOC

TOX2

LEL

Pump = 17 / 16

Stall = 34 +/-

OXY

- Block pump inlet for less than 3 seconds*: if pump reading increases, set stall to the average of the pump current and the blocked reading
- Block pump inlet for less than 3 seconds*: if the pump current reading does not increase by more than 10 counts: check tubing, o-rings, clean pump, rebuild and/or replace pump

*If held longer, the pump can be damaged



PROTECTION THROUGH DETECTION

Diagnostics: Adjust Pump Stall

- Set stall to average of Pump Idle and Pump blocked
 - $(\text{Pump Idle} + \text{Pump Blocked}) / 2 = \text{Stall}$
 - Press Mode key to save new Stall Threshold
- If you want to add tubing to take a sample from a distance than you will want to adjust the stall higher
- If you are going to be sampling close to water, loose sand or dirt, than you should adjust the stall lower



Diagnostics: Pump

- If Pump Stall adjustment does not work
 - Clean pump
- Replace pump housing if cleaning does not work
- If pump housing replacement does not work
 - replace pump



Pump Maintenance

Extra Tools needed:

Needle-nose pliers

Hex or #6 Torx

PROTECTION THROUGH DETECTION

Pump Maintenance

- Pump rebuild kit costs \$40.00 – but they do take practice
 - (081-0007-000) old pumps use entire kit, new pumps use the diaphragm only
- Most pump problems can be resolved with a cleaned or rebuilt pump, if this doesn't work, try replacing everything except the motor
 - Pump Housing costs \$65.00 (021-0020-100)
- New Pump Assembly costs \$295.00
 - Silver (008-3043-002)



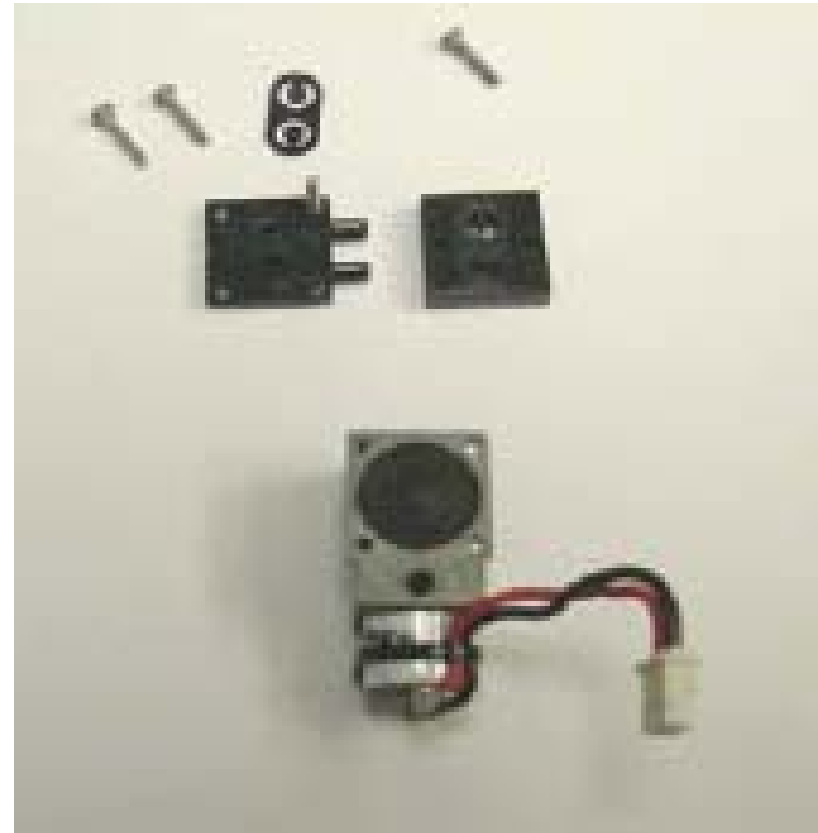
MultiRAE: Remove Pump

- Prior to replacing or rebuilding pump
 - ***Clean pump***
- Remove hose from housing and gas plate
- Unplug pump from sensor board power connector
- Lift gas plate assembly from MultiRAE
- Loosen and remove screw from gas plate
- Separate pump from gas plate



Clean Pump

- Unscrew 4 screws on black valve body
- Clean diaphragm, both pieces of the head, and flapper valve
- Allow to dry before putting back together



Installation of Pump

- Place black valve body on top of metal/black chassis with gas inlets pointing over motor
- Replace 4 screws and tighten snugly
- Reconnect tubing from housing to pump inlet (arrow on pump points inward)
- Plug pump into sensor board power connector



Replace Pump

- Reconnect inlet tubing to gas plate (arrow on pump points outward)
- Make sure that sensors/dummy sensors fill all places to prevent gas leakage
- Replace gas plate and tighten screws
- Replace battery

Stall Test

- After warm up period, block pump inlet
 - If pump does not increase more than 10 counts, inspect pump hose connections and reconnect if necessary
 - If pump still does not increase after inspecting hose connections replace Pump
 - If pump does increase, reset Pump Stall Threshold
 - replace MultiRAE cover and calibrate monitor



Replace Pump

- Remove hose from housing and gas plate
- Unplug pump from sensor board power connector
- Lift gas plate assembly from MultiRAE
- Loosen and remove screw from gas plate
- Separate pump from gas plate
- Take new pump and screw it to gas plate



Replace Pump

- Reconnect tubing from housing to pump inlet (arrow on pump points inward)
- Plug pump into sensor board power connector
- Reconnect inlet tubing to gas plate (arrow on pump points outward)

Replace Pump

- Make sure that sensors/dummy sensors fill all places to prevent gas leakage
- Replace gas plate and tighten screws
- Replace battery
- Turn on MultiRAE in Diagnostic Mode, pump value should be below 40 with filter on
- The lower the pump value, the better



Stall Test

- After warm up period, block pump inlet
 - If pump does not increase more than 10 counts, inspect pump hose connections and reconnect if necessary
 - If pump does increase, reset Pump Stall Threshold
 - replace MultiRAE cover and calibrate monitor



Replace Pump

- If unit passes testing, finish installation and close instrument

Diagnostics: Adjust Backlight

TOX1

VOC

TOX2

LEL

Light=242

Trigger=128 +/-

OXY

- Automatic backlight trigger threshold

*In this screen the backlight will not turn on



PROTECTION THROUGH DETECTION

Diagnostics: S/N & Pump Toggle

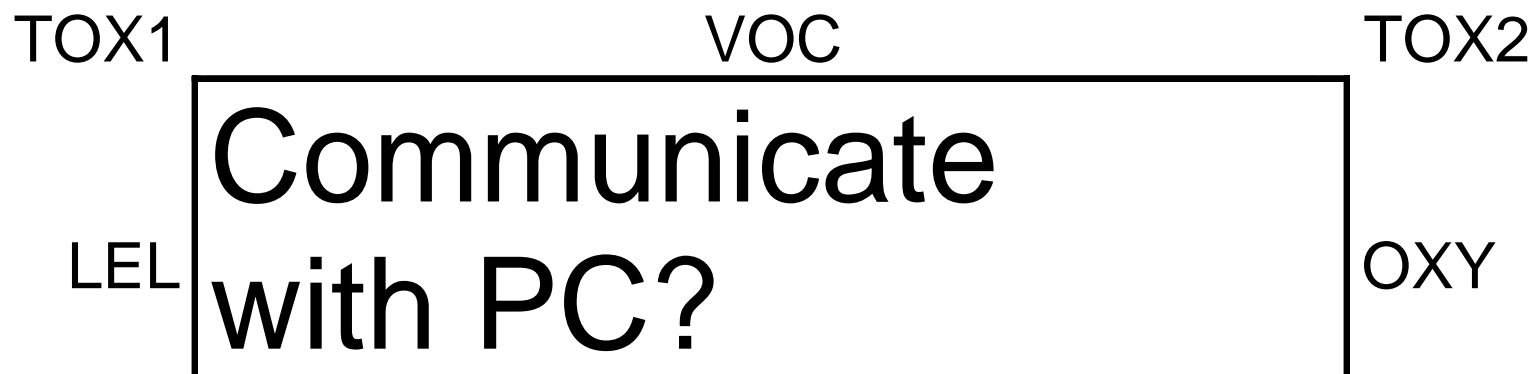
TOX1	VOC	TOX2
LEL	SN 501692	OXY
	Pump =HI (y/n)	

- Serial Number of MultiRAE is displayed
- Pump can be toggled from High flow (~250cc/min) to Low flow (~150cc/min) by pressing the “N/-” key



PROTECTION THROUGH DETECTION

Communicate with PC Display



- If “Y/+” key is pushed then MultiRAE will display “Monitor will Pause. OK?”
- If “Y/+” key is pushed again the MultiRAE will display “ready...” after 5 minutes, unit will no longer communicate with PC
- Tap “MODE” key to return to Main Display



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PROTECTION THROUGH DETECTION

Programming Mode

Getting into Programming from Diagnostic Mode

- *Hold “MODE” and “N/-” keys for 5 sec. to get in Programming Mode – The unit will normally ask for a password, default password is 0000*
- If MultiRAE asks a question “?”
 - Answer “Y” or “N”
- To Accept or Escape
 - Use “MODE” Key
- *Hold “MODE” and “Y/+” keys for 5 sec. to get in Regular operations*



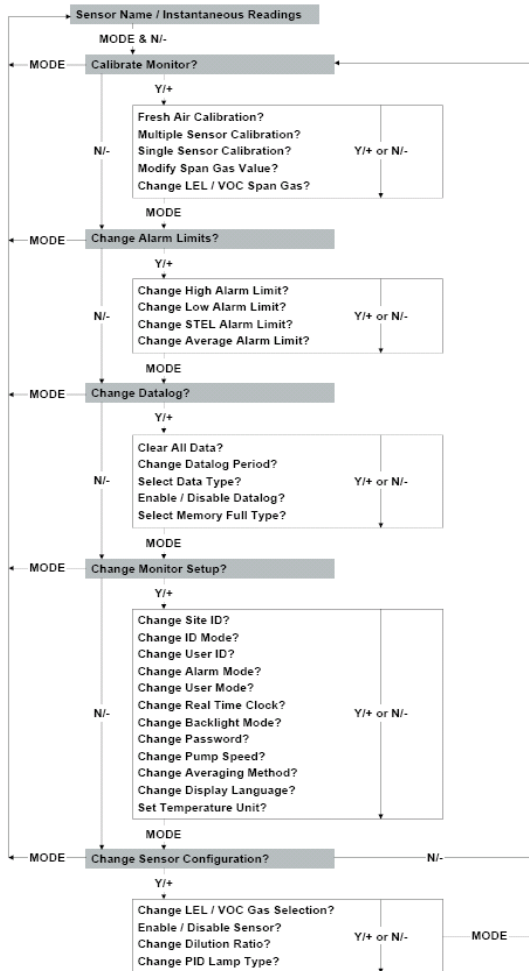
Appendix A/Table 5

- Appendix A/Table 5 always guides you through Programming Mode
- Diagnostic Mode offers new choices in “Change Monitor Set Up”
 - “Change Unit ID?”
 - “Change Host ID?” (not used at this time)
 - “Enable/Disable Run Silent Mode?”



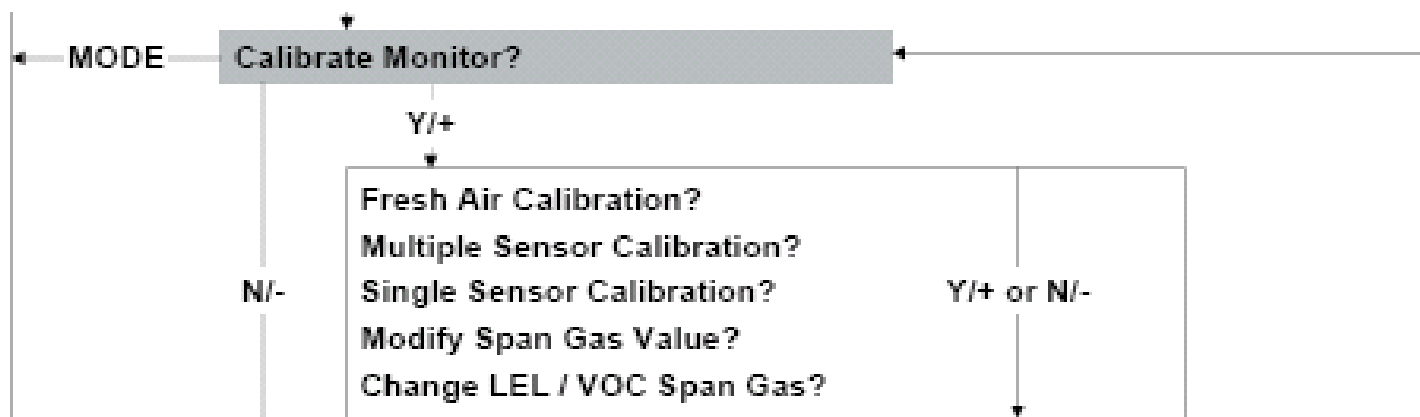
Program Menu

Programming Menus

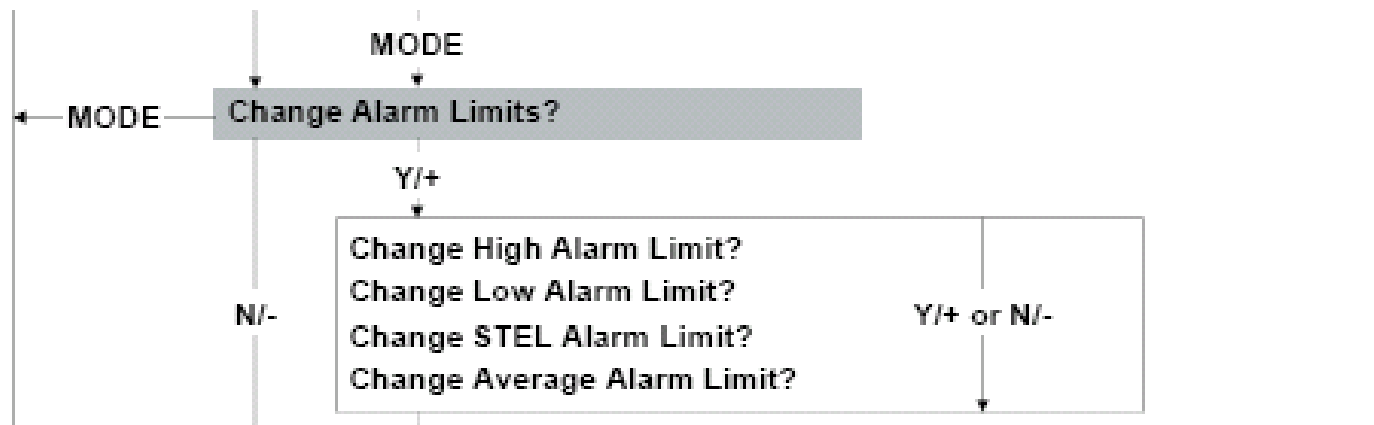


PROTECTION THROUGH DETECTION

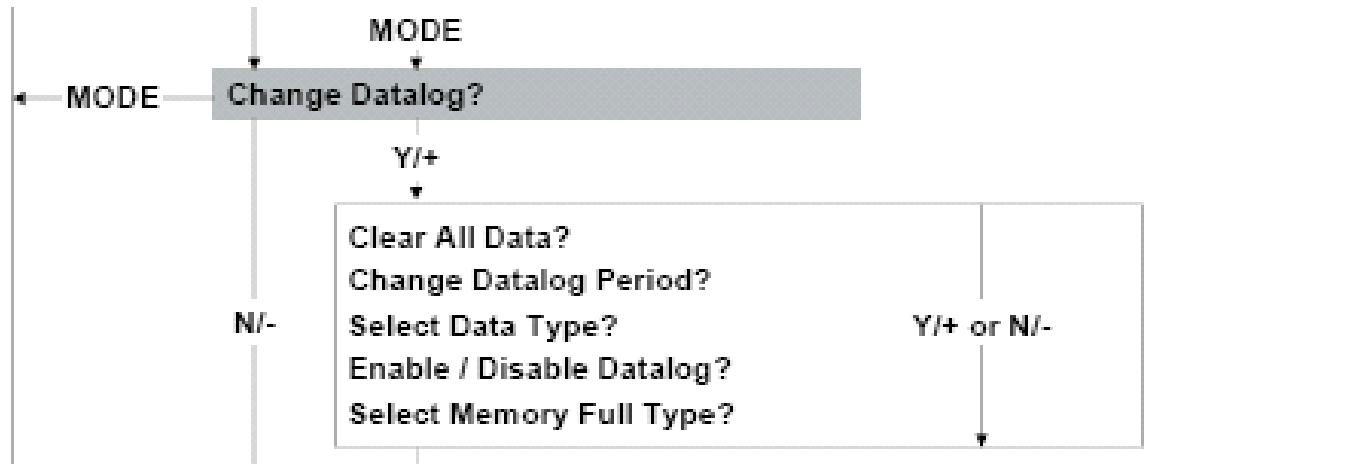
Program Menu



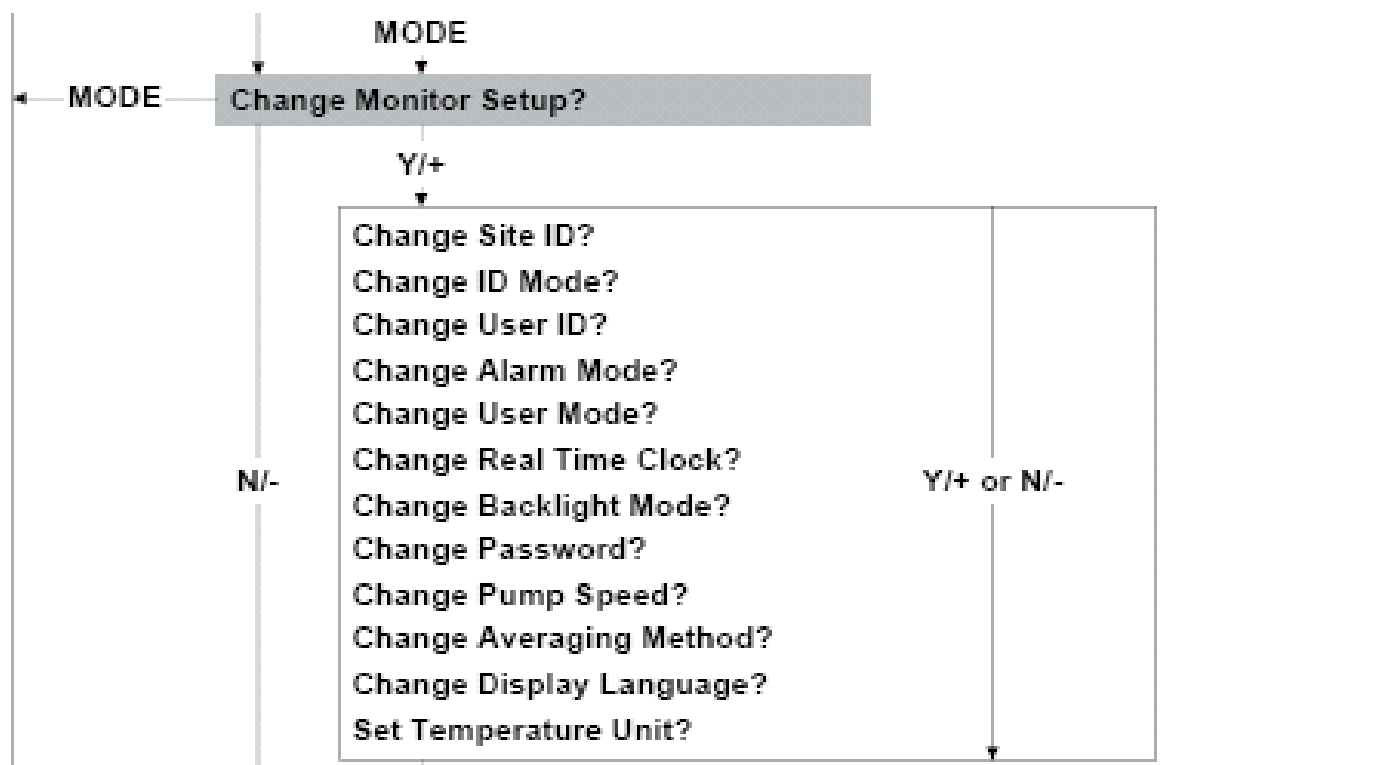
Program Menu



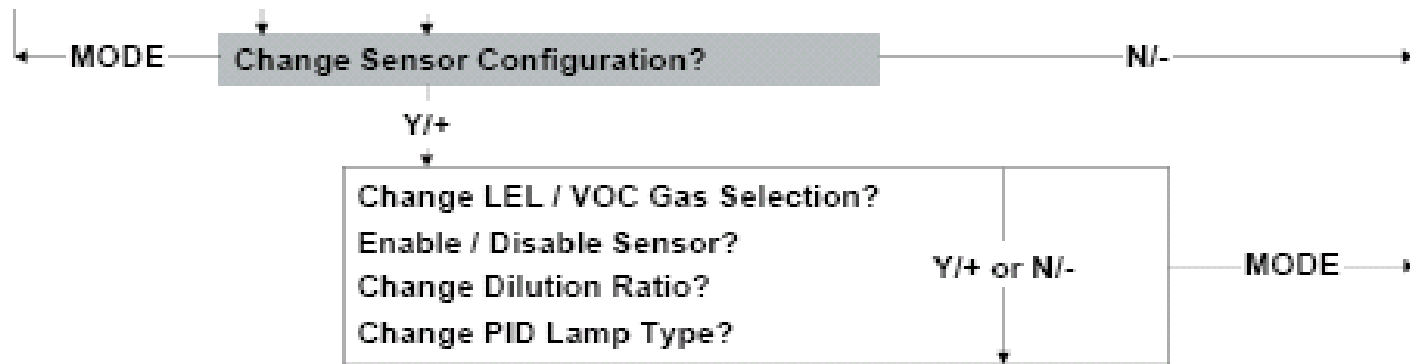
Program Menu



Program Menu



Program Menu



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PROTECTION THROUGH DETECTION

Using ProRAE Suite

- Update Firmware
- Config All
- Editing Configuration Files
- Upgrade to Datalogging
- Error Messages
- Troubleshooting



PROTECTION THROUGH DETECTION

Updating Firmware

- You can purchase a copy of ProRAE
 - PN 000-5001-000 \$30.00
 - PN 000-5002-000 \$70.00 with cable
- Download it off of the website for free!
 - When downloading, always remember where you save the zip file
 - When you unzip the file, remember where you save that file
 - ProRAE Suite will download into your Program Files under the file RAE Systems



PROTECTION THROUGH DETECTION

RAE Systems Website

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Mail Print Mail New Folder Favorites

Address <http://www.raesystems.com/> Go Links

RAE SYSTEMS China Europe Japan

Products **Support** Purchase Company Partners

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- » Chemical

ATEX ISO 9001 CERTIFIED

HAZARDOUS ENVIRONMENT

CAUTION

»»RAE Systems Has Moved!

Effective May 31st, 2005, our new headquarters location is:
**3775 North First Street
San Jose, CA 95134**

Our new main phone number: +1-408-952-8200
Our new main fax number: +1-408-952-8480
Our toll-free number will remain the same: +1-877-723-2878
Our email address will remain the same: raesales@raesystems.com

[more info](#)

[04.2005 - Product Alert]
An **important notice** for users of RAE Systems' RAE-Sep™ tubes.
[» more](#)

[06.21.05 - Press Release]
SAFER Systems Announces New Release for SAFER Real-Time Chemical Emergency Response Solution
See the Press Release
[» more](#)

[06.07.05 - Press Release]
RAE Systems Announces Completion of SEC Filings

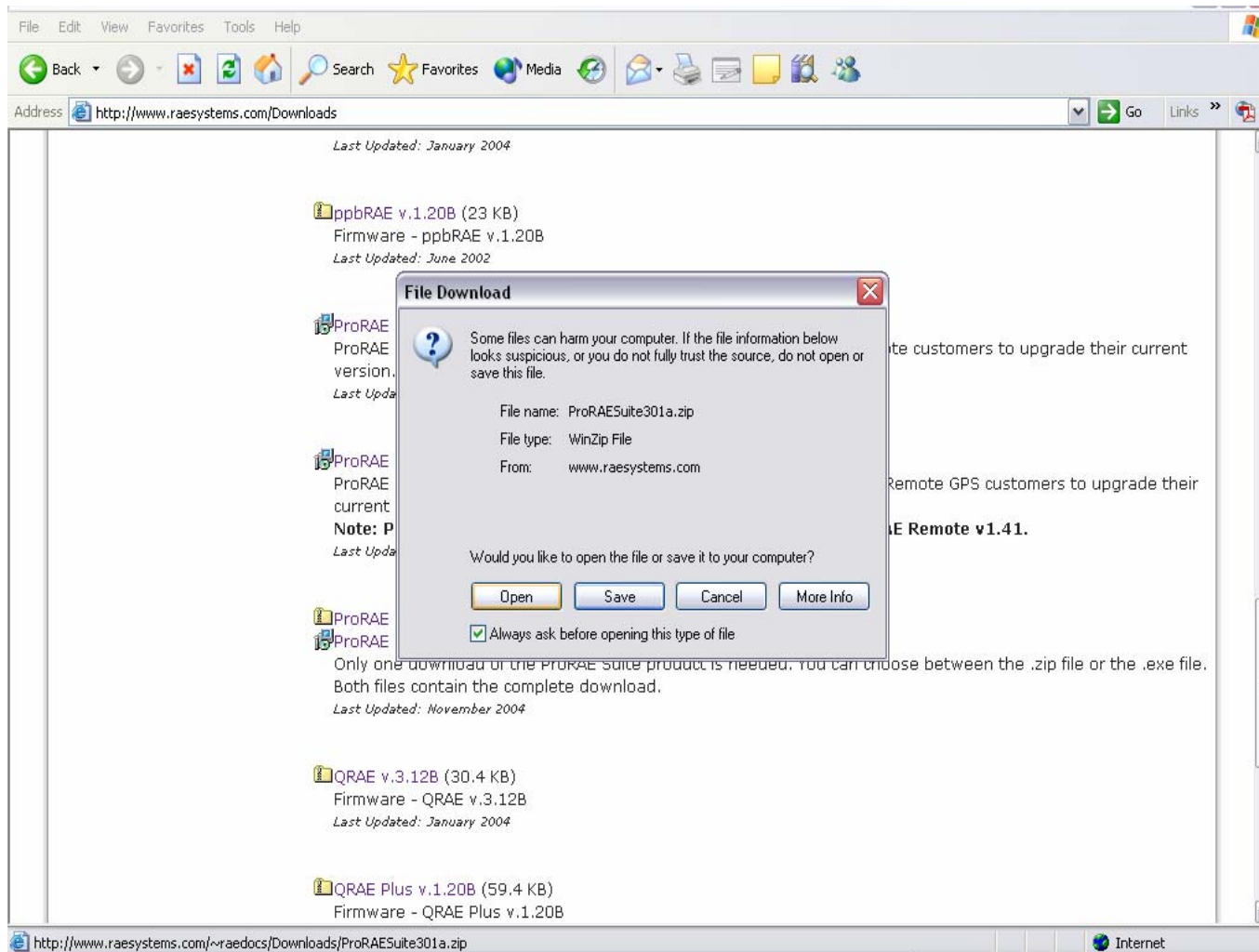
»»PID Trade-In Program

Purchase Offer extended through August 31, 2005!
Trade in your MiniRAE, MiniRAE Plus, MiniRAE



PROTECTION THROUGH DETECTION

Download ProRAE Suite



PROTECTION THROUGH DETECTION

ProRAE Suite

- Open ProRAE Suite
- Select “Options”
- Select “Load Firmware”
 - Remember to disconnect from the internet
 - Plug unit into the wall adapter
 - Turn off any screensavers
- Choose correct .a07 (firmware) file for the MultiRAE

***If anything interrupts the download, the unit will turn off and not be able to turn back on! You will have to send the instrument back to the factory!**



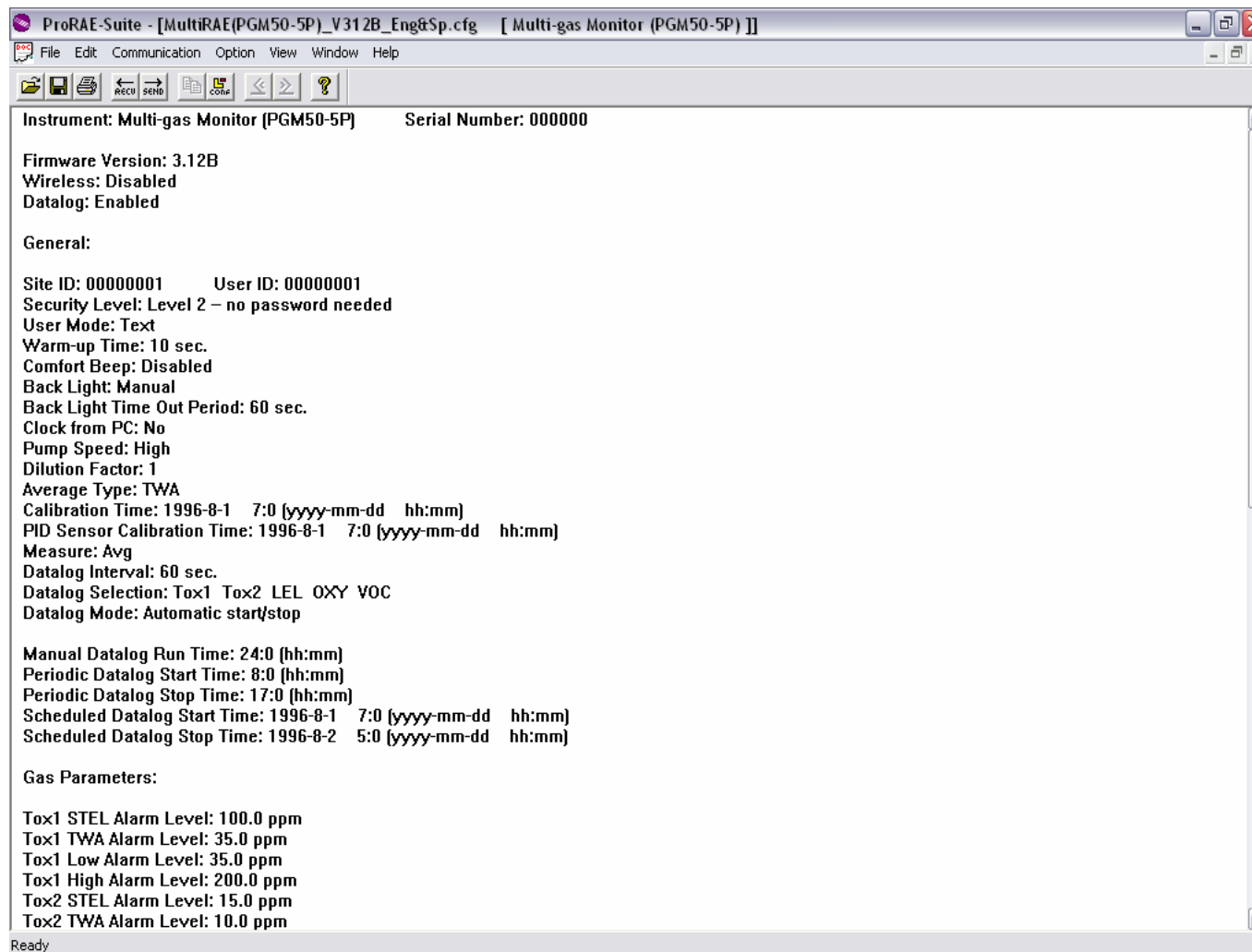
PROTECTION THROUGH DETECTION

Select "Load Firmware"



PROTECTION THROUGH DETECTION

Configuration File



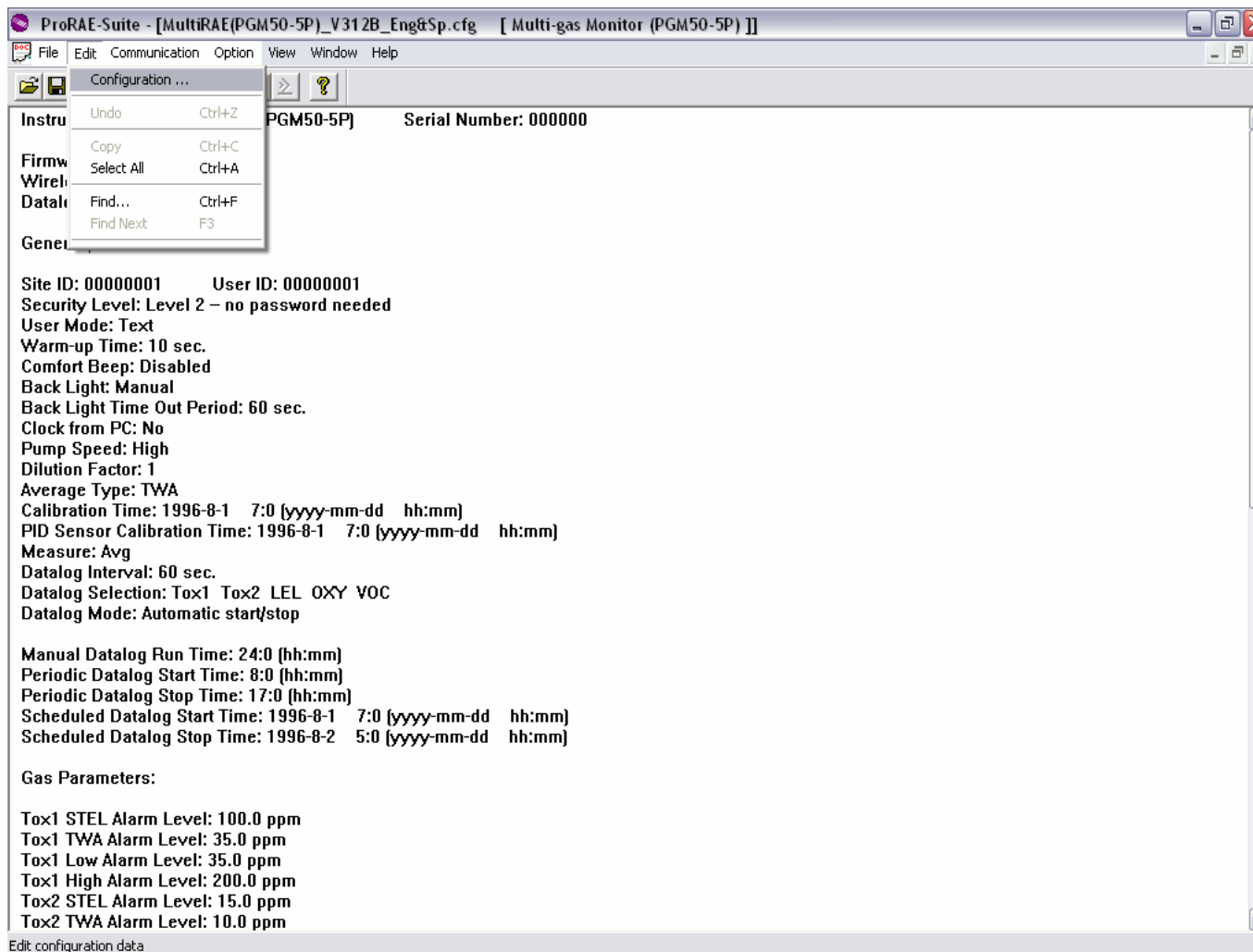
PROTECTION THROUGH DETECTION

Editing Configuration Files

- You can receive a configuration file from the unit
or
- Edit the Default configuration file that comes with ProRAE Suite
 - Configuration files are .cfg files and are found in the Firmware folder
 - Default configurations are the only way to overwrite a lost password



Edit Configuration



PROTECTION THROUGH DETECTION

Edit Configuration

Change password

General | Gas Parameters | Gas Selection | Others

ID
Site: 00000001
User: 00000001

Security Level
 Level 0 - no change allowed
 Level 1 - need password
 Level 2 - no password needed

User Mode
 Display
 Program
 Text

Warm-up Time: 10 Sec
Comfort Beep: Disabled
Back Light: Manual, Time out period: 60 Sec
Clock from PC: No
Pump Speed: High

Measure: Avg
Datalog Selection: Tox1, Tox2, LEL, OXY, VOC
Datalog Interval: 60 Sec
Datalog Mode: Automatic start/stop

OK Cancel Apply

How often you save data determines what your data will look like



PROTECTION THROUGH DETECTION

Change Alarm Limits

Edit Configuration File

General | Gas Parameters | Gas Selection | Others

Tox1 Alarm Levels (ppm)

STEL	TWA	Low	High
100.0	35.0	35.0	200.0

Tox2 Alarm Levels (ppm)

STEL	TWA	Low	High
15.0	10.0	10.0	20.0

LEL Alarm Levels (%)

Low	High
10.0	20.0

OXY Alarm Levels (%)

Low	High
19.5	23.5

VOC Alarm Levels (ppm)

STEL	TWA	Low	High
25.0	10.0	50.0	100.0

Alarm Mode

Auto Set
 Latched

PowerOnZero

Disabled
 Enabled

PowerOnSingle

Disabled
 Enabled


Calibration Span

Tox1 (ppm)	Tox2 (ppm)	VOC (ppm)	LEL (%)	OXY (%)
50.0	25.0	100.0	50.0	20.9

OK Cancel Apply

Instrument will ask for a Fresh Air or Single Sensor Calibration when you turn on the unit

Custom Gas Selection

Edit Configuration File New gas appears as an option 

General | Gas Parameters | Gas Selection | Others factor is only used if gas is chosen

LEL Current Gas Selection

Calibration Gas	Measurement Gas	Custom Gas	Custom Factor
Methane	LEL_custom_gas	Propyne	2.3

VOC10.6 Current Gas Selection

Calibration Gas	Measurement Gas	Custom Gas	Custom Factor
Isobutylene	VOC10.6_eV_gas	Diketene	2.0

VOC11.7 Current Gas Selection

Calibration Gas	Measurement Gas	Custom Gas	Custom Factor
Isobutylene	Isobutylene	VOC_11.7_eV_gas	1.0

OK Cancel Apply



Personalize MultiRAE

Edit Configuration File [X]

General | Gas Parameters | Gas Selection | Others

Power On Message:

Language
 English Spanish

On Line Printing
 Disabled
 Enabled

Temperature
 Fahrenheit
 Celsius

Memory Full Action Type
 Stop Datalogging
 Wrap Around

User ID Mode
 Disabled
 Enabled

Pump Duty Cycle: %

Buzzer/Light
 Both On Light Only Both Off

OK Cancel Apply



PROTECTION THROUGH DETECTION

Send Configuration/Config All

- If you have made any major changes, save the file
 - When you have multiple instruments, you can save the file and send the configuration multiple times
- If you are upgrading firmware to get rid of a bug in the firmware, we suggest using “Config All”



Error Messages

- Most common problems
 - Unit does not have data
 - Incorrect COMM Port is selected
 - Unit is no longer in Communication Mode
- Error messages do not give you the problem in easy/simple-to-understand terms

Troubleshooting

- Try taking instrument out of Communication Mode and putting it back in
- Try receiving Configuration file
 - Check the data selection: Data Interval, Sensors selected, Automatic vs Manual, etc.
- Try a different COMM Port
- Try a new cable



Training Agenda:

- Firmware Overview
- Repairs Allowed
- Turning unit on in Diagnostic Mode
- Diagnostic Mode
- Program Mode
- Configuration and Personal settings
- **The new black MultiRAE**
- Calibration



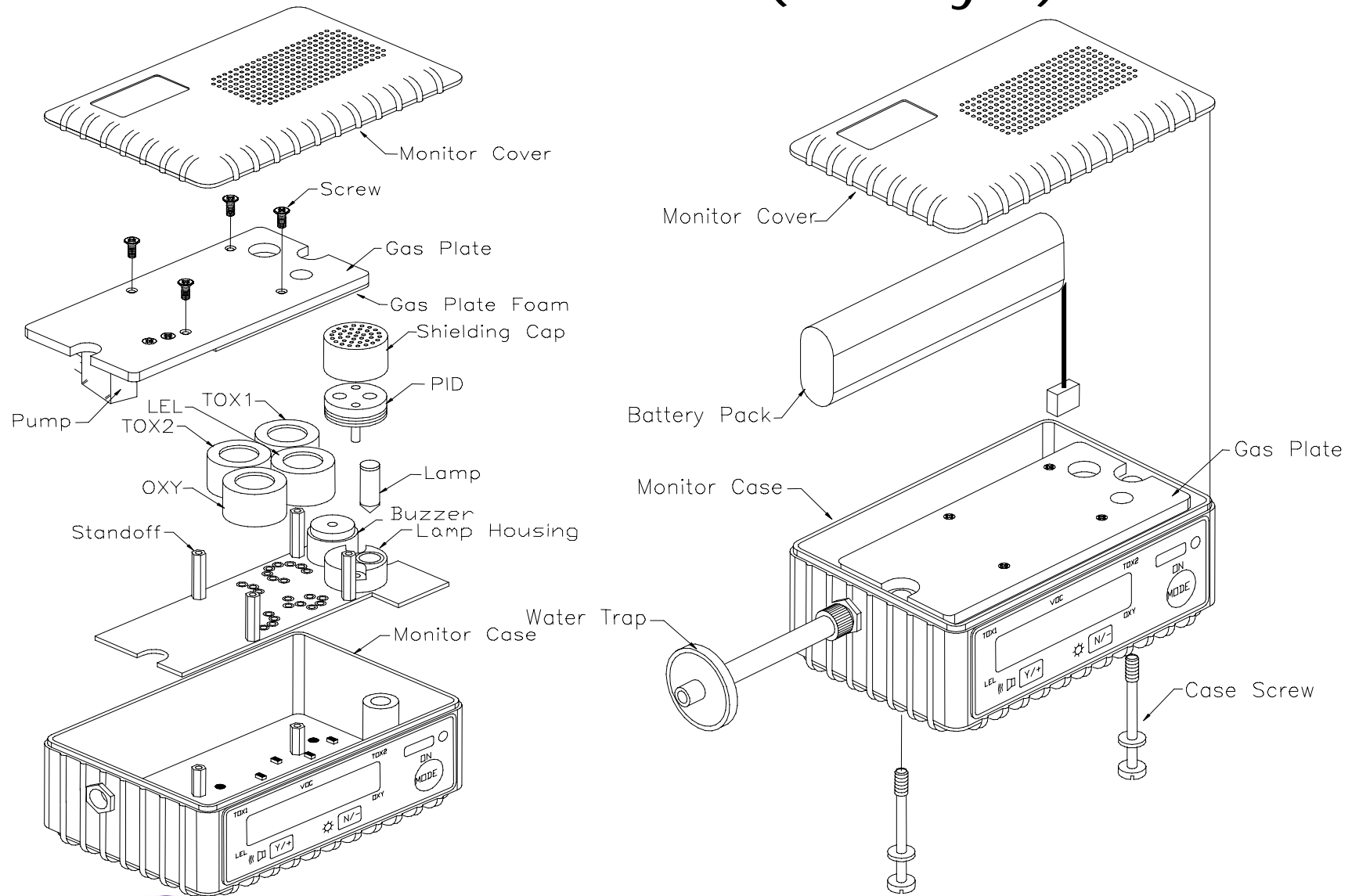
PROTECTION THROUGH DETECTION



The New Black MultiRAE

PROTECTION THROUGH DETECTION

Inside the MultiRAE (old style)



PROTECTION THROUGH DETECTION

Inside the MultiRAE (New style)



- Top Housing
 - PN 008-2602-000
 - List Price \$25.00
- Pump
 - PN 008-3043-003
 - List Price \$295.00
- Bottom Housing
 - PN 008-2101-000
 - List Price \$25.00
- Membrane panel
 - PN 008-2104-004
 - List Price \$40.00

Training Agenda:

- Firmware Overview
- Repairs Allowed
- Turning unit on in Diagnostic Mode
- Diagnostic Mode
- Program Mode
- Configuration and Personal settings
- The new black MultiRAE
- **Calibration**



PROTECTION THROUGH DETECTION

Calibrate Monitor?

- Fresh Air Calibration?
- Multiple Sensor Calibration?
- Single Sensor Calibration?
- Modify Span Gas Value
- Change LEL/VOC Span Gas?



PROTECTION THROUGH DETECTION

MultiRAE: Calibration

- After performing service it is always important to calibrate the MultiRAE



PROTECTION THROUGH DETECTION

Questions?



PROTECTION THROUGH DETECTION