

ppbRAE Plus

Parts per Billion VOC Monitor

PGM-7240

OPERATION AND MAINTENANCE

MANUAL

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2.4.1 Survey Mode

After the monitor is turned on, it runs through the start up menu. Then the message “Ready..” is displayed (see figure below). At this point, the user has two options: (1) step through the operation menu (see below), or (2) take a measurement (see page 16).

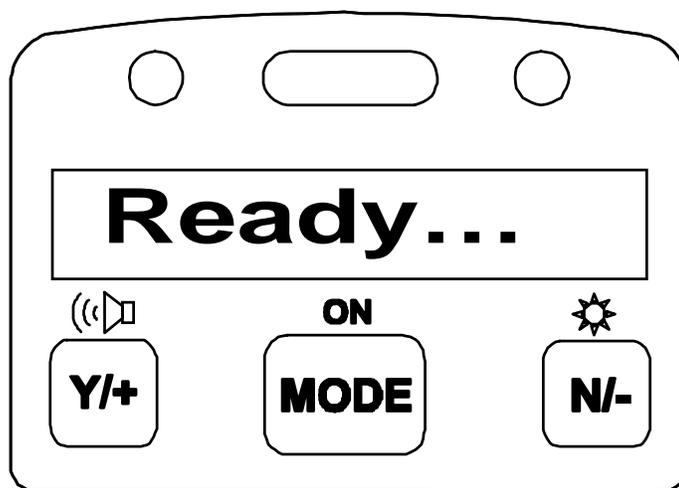


Figure 2-3. Survey mode "Ready..."

Press the [MODE] key to cycle through the main operation menu. The PID sensor and pump are turned off during this operation.

Main operation menu displays include:

- “Ready...”
- Avg reading
- Peak reading
- Run time
- Current battery voltage and shut down voltage
- Date, time, and temperature
- Log on/off?
- Gas = [reference gas] (default is isobutylene)
- Cancel background?
- PC comm?
- Mode [Survey or Hygiene]

The displays are arranged in a “round robin” order:
 To choose a specific display, press the [MODE] key one or more times until the desired display appears.

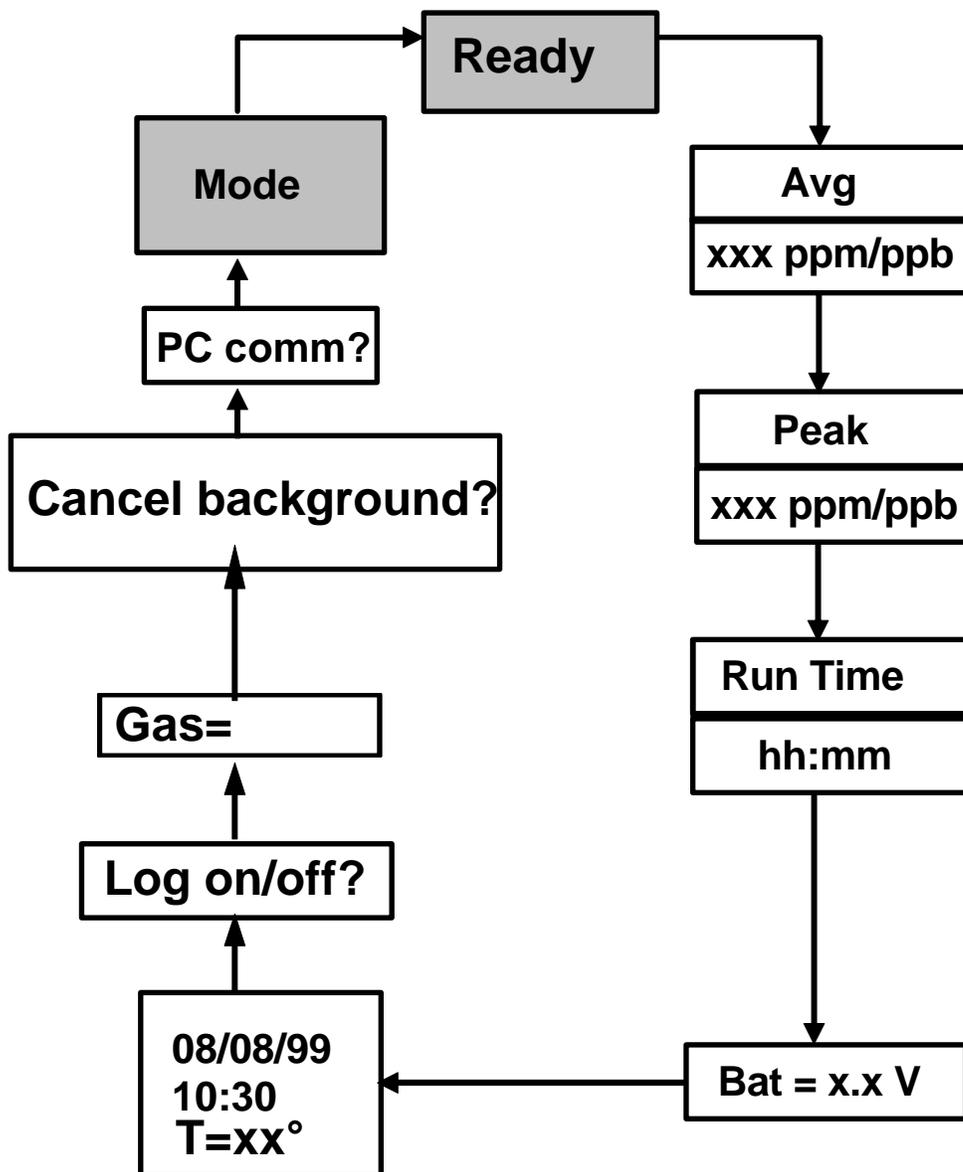


Figure 2-4. Survey Mode Flow Chart

Note: To get back to “Ready” mode from any of the above displays, press the [MODE] key repeatedly until the “Ready” message reappears.

“Ready..” To choose a specific display, press the [MODE] key one or more times until the desired display appears.

Taking a measurement:

There are two ways to start a measurement: (1)operating in the Hygiene mode and (2) manually starting and stopping measurement in the Survey mode. To start a measurement in the Hygiene mode, please refer to Section 4.7.1 on “Change Op mode.” To start a measurement in Survey mode, the ppbRAE monitor must first be in the “Ready...” mode. This is the mode that the monitor normally powers up.

Measurement phases:

- Ready
- Start measurement
- Measurement display and datalogging
- Stop measurement

Ready:

The ppbRAE monitor is ready to start a sample.

Start Measurement:

Press the [Y/+] key to start the measurement cycle. Display will say"Check", and check the lamp. If the lamp does not turn on, "Can not turn on lamp, quit!", will display. Press any key and try again. If lamp turns on, the display will show the site ID and then the gas selected for measurement. The pump will start and the reading will be displayed.

Measurement Display and Datalog :

Instantaneous readings of the gas concentration in parts per billion (ppb) are updated every second. A flashing superscript “L” is displayed when datalogging is on. Datalog information is saved only after one full datalog period is completed.

To install the adapter, remove the cover of the battery compartment. Remove the Ni-Cd or Ni-MH battery pack from the battery compartment and replace with the alkaline battery adapter. Replace the battery compartment cover.

The internal charging circuit is designed to prevent damage to alkaline batteries and the charging circuit when alkaline batteries are installed inside the monitor.

Note: The AA Alkaline battery adapter supplied by RAE Systems Inc. is intrinsically safe!

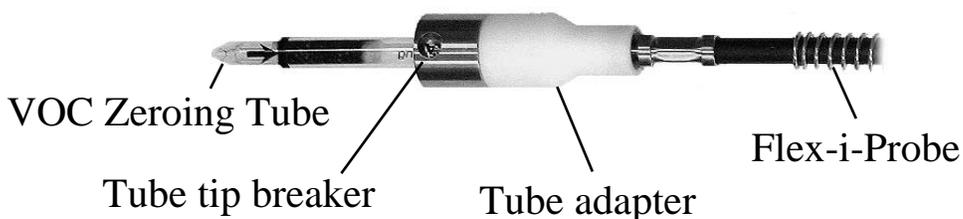
3. External Filter

The external filter is made of PTFE (Teflon(tm)) membrane with a 10-micron pore size to help minimize water from being sucked into the sensor manifold, which would cause extensive damage to the monitor. It will also prevent most dust and other particles from entering the monitor and prolong the operating life of the sensor.

To install the external filter, simply insert it to the front of the inlet tube of the ppbRAE monitor.

4. VOC Zeroing Tubes

VOC Zeroing Tubes (P/N 025-2000-010) are used for filtering organic air contaminants that may affect the zero calibration reading.



- 1) Connect the tube adapter to the Flex-I-Probe by inserting the tip of the sample probe into the smaller end;
- 2) Break the two ends of a VOC zeroing tube using the side hole of the tube adapter;
- 3) Insert one end (the arrow in the silk screen indicates the right direction) of the open VOC zeroing tube into the bigger end of the adapter;
- 4) Run the zeroing calibration procedure of the instrument to zero the unit;
- 5) Discard the used VOC zeroing tube (single use only) and put the tube adapter back to the VOC zeroing kit container.

4.1 Programming Mode

The programming mode allows users to change the setups in the monitor, calibrate the monitor, modify the sensor configuration and enter user information, etc. The programming mode has four menu items. Each menu item includes several sub-menus to perform additional programming functions. Appendix A shows a more detailed menu tree structure.

Table 4-1. Programming Menu

Calibrate/Select Gas?

Change Alarm Limits?

~~View or~~ Change Datalog?

Change Monitor Setup?

Once inside the programming mode, the LCD will display the first menu. Each subsequent menu item can be viewed by pressing the [N/] repeatedly until the desired menu is displayed. To enter the sub-menu of a particular menu, press [Y/+] key, the sub-menu will be displayed.

Return to Operation mode: To exit the programming mode and return to operation, press the [MODE] key once at any of the programming menu displays.

This procedure determines the zero point of the sensor calibration curve. To perform a zero air calibration, connect the tube adapter, break off both ends of a VOC zeroing tube and insert the tube into the adapter.

1. Press the [Y/+] key at the "Zero Cal?" prompt to start the zero calibration
2. The display will read "zeroing in progress". It will count down from 30 to 1 and then say, "please wait".
3. When the zero span is finished, the display will move on to the span calibration.

4.4.2 Span Calibration

This procedure determines the second point of the sensor calibration curve for the sensor. A cylinder of standard reference gas (span gas) fitted with a 500 cc/min. flow-limiting regulator or a flow-matching regulator is needed to perform this procedure. Choose the 500 cc/min. regulator only because the flow rate matches the flow rate of the pump inside. Alternatively, the span gas can first be filled into a Tedlar Bag. Connect the calibration adapter to the inlet port of the ppbRAE Monitor, and connect the tube to the regulator or Tedlar bag.

1. Before executing a span calibration, make sure the span value has been set correctly (see next sub-menu).
2. Make sure the monitor is connected to one of the span gas sources described above.
3. Press the [Y/+] key at the “Span Cal?” to start the calibration. The display shows the gas name and the span value of the corresponding gas.
4. The display shows: “Apply gas now!” Turn on the valve of the span gas supply.
5. Display shows “wait... 30” with a count down timer showing the number of remaining seconds while the monitor performs the calibration.
6. To abort the calibration, press any key during the count down. The display shows “Aborted!” and return to “Span Cal?” sub-menu.
7. When the count-down timer reaches 0, continue to apply gas. The display will read "Please wait" - continue apply gas. The display will show the calibrated value.

4.4.4 Changing the Span Value

Note: The minimum span gas concentration is 1 ppm.

This function allows the user to change the span values of the calibration gases.

1. “Change Span Value?” is the fourth sub-menu item in the Calibration sub-menu.
2. Press [Y/+], display shows the gas name and the span value. A cursor will blink at the first digit of the Span value. To modify the span gas value, go to Step 3. Otherwise, press and hold the [MODE] key for one second to accept the previously stored span gas value and move to the next sub-menu.
3. Starting from the left-most digit of the span gas value, use the [Y/+] or [N/] keys to change the digit value and press the [MODE] key momentarily to advance to the next digit. Repeat this process until all digits are entered. Press and hold the [MODE] for one second to exit.
4. The display shows “Save?” To accept the new value, press the [Y/+] key. Press the [N/] key or the [MODE] key to discard the change and move to the next sub-menu.

4.6 ~~Viewing or~~ Changing the Datalog

The ppbRAE monitor calculates and stores the concentration and ID of each sample taken. In the datalog sub-menu, a user can perform the tasks and functions shown in Table 4-5. Datalog Sub-Menu

Table 4-5. Datalog Sub-Menu.

~~View Data?~~

Clear Data?

Change Data Period?

Change Average Type?

4.6.1 Viewing Data (Datalogging)

This function allows the user to review all the data that is stored in the non-volatile datalog memory.

Data is stored in groups or “events.” Each event consists of the event time (hour : minute : second), and measurement values.

For example:

Event/Log #1

Data #1	(10/01/97, 14:35:05, Avg., 0.2 PPM, Max 4.0)
Data #2	(14:35:10, Avg. 0.4, Max 11.0)
Data #3	(14:35:15, Avg. 0.4, Max 11.0)

Event/Log #2

Data #1	(10/03/98, 07:20:30, Avg. 3.4, Max 20.0)
Data #2	(07:20:40, Avg. 0.7, Max 20.0)

1. “View Data?” is the second sub-menu item in the Datalog sub-menu.
2. Press the [Y/+] key and the display shows “Event..” and “Log #1?” (see figure below). Press the [Y/+] key to view the data of the displayed event. Or press the [N/-] key to scroll to next event. If there are no more events, the message “No more events! Start from event #1?” will appear. Press the [Y/+] key, the monitor will jump back to the first event. Press the [N/-] key, the monitor will remain in the last event.
3. Press the [Y/+] key to review the first data of the selected event. The display shows the stored data including the time stamp in hours and minutes, and measurement values.

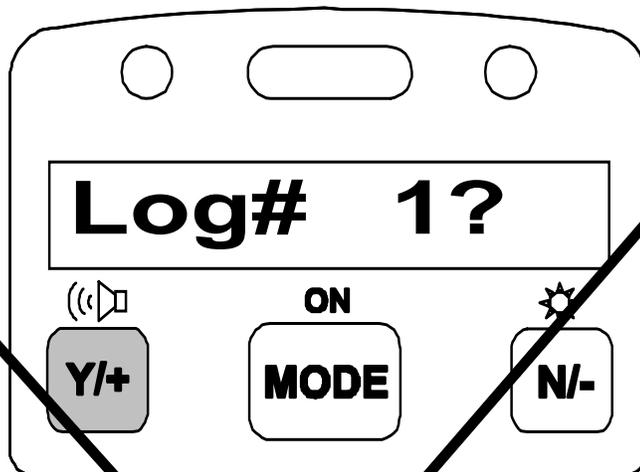


Figure 4-2. Viewing logged data.

Action	Display
	Event, Log# 1?
[Y/+]	08/01/99, 14:20:07, Avg. 150, Max 210 □
[Y/+]	14:20:08, Avg. 150, Max 200

4. Press the [Y/+] or [N/-] keys to move forward or backward to view other data from this event. When the beginning or the end of the event is reached, the message "1st data" or "End data" will appear. Press the [MODE] key to exit the current event.

Note: This Function discontinued.

4.7 Changing the Monitor Setup

Several monitor specific variables can be changed in this menu. The following is a list of configuration data that can be modified by the user.

Table 4-6. Monitor Setup Sub-Menu

Change Operation Mode?

Change Site ID?

Change User ID?

Change Alarm Mode?

Change User Mode?

Change Date?

Change Time?

Change Lamp?

Change Conc. Unit?

~~Change Pump Speed?~~

Change Dilution Ratio?

Change External Output?

Change DAC Range?

4.7.11 Changing the Pump Speed

There are two pump speeds of approximately 600 cc/min and 400 cc/min designated as “high” and “low,” respectively.

1. “Change Pump Speed?” is the eleventh sub-menu item in the Monitor Setup menu.
2. Press the [Y/+] key and the display shows the current pump speed: “Pump = Low?”
3. Press the [Y/+] key to accept the currently displayed output option. Press [N/] to change to the other external option: “Pump = High?” Press [MODE] to exit this sub-menu and move to the next monitor setup sub-menu.
4. If there are any changes to the existing selection, pressing the [Y/+] key the display will show “Save?” Then, press the [Y/+] key to save the change or press [N/] to go back to Step 2.

Note: This Function discontinued.

4.7.9 Changing the Units

Table 4-7. Units Sub-Menu

Display Unit = ppb?

Display Unit = ug?

Display Unit = ppm?

Display Unit = mg?

The user can change the display and datalog units from parts per billion (ppb), micrograms per cubic meter (ug), parts per million (ppm), and milligrams per cubic meter (mg).

1. “Change Conc. Unit?” is the ninth sub-menu item in the Monitor Setup sub-menu.
2. Press the [Y/+] key, the display should show the current unit “Display Unit = xxx?”
3. Press [Y/+] key to accept the currently displayed unit. Press [N/-] key to toggle to the other units. Press the [MODE] key to exit this sub-menu.
4. If there are any changes to the existing selection, press the [Y/+] key to save the change or press [N/-] key to discard the change.

CAUTION:

The correction factor in the gas library is calculated based on “ppb” and “ppm” units. If either “ug” or “mg” units are selected, the built-in correction factor library is not valid.

The Automatic range is between “ppb” and “ppm” or between “ug” and “mg.” There are no other automatic conversions. When the unit name is changed from “ppb” or “ppm” to “ug” or “mg,” calibration by using a standard “mg” gas is required. The same rule applies when the unit is changed back.

QUICK REFERENCE GUIDE: Programming Mode

Calibrate/select Gas?

Fresh air cal?
Span cal?
Select cal memory?
Change span value?
Modify cal memory?
Change correction factor?

Change alarm limits?

High limit?
Low limit?
STEL limit?
TWA limit?

Change datalog?

Clear Data?
Change Data Period?
Change Average Type?

Change monitor setup?

Change Op mode?
Change Site ID?
Change User ID?
Change Alarm Mode?
Change User Mode?
Change Date?
Change Time?
Change Lamp?
Change Conc. Unit?

Change Output?
Change DAC Range?

APPENDIX B

EXPENDABLE AND REPLACEMENT PART LIST

The replacement part number of the standard expendables and common repair parts are listed in the table below:

Part Number	Part Description
000-5001-000	ProRAE-Suite software
025-2000-000	VOC Zeroing Tubes (box of 10)
025-3002-000	VOC Zeroing Tube adapter
008-3003-000	Computer interface cable
002-3011-000	Regulator with adapter
500-0003-000	Tedlar calibration bag
011-3006-000	Filter and O-ring
012-3009-000	Air outlet adapter
012-3051-000	NiMH battery pack
012-3052-000	Alkaline battery adapter
021-2400-000	6" Flex-i-Probe
025-3009-000	Hard transport case with keys
025-3042-000	Rubber boot
025-4001-000	ppbRAE Plus Manual
050-0000-001	½", 10.6 eV PID lamp
081-0002-000	Lamp cleaning kit
600-0069-000	10 ppm Isobutylene, 34L
011-3022-000	External filter
081-0008-000	Tool kit
300-0012-170	Pump
411-0018-037	Tygon tubing, 1/8" diameter inside
430-0014-001	O-ring, ½" diameter inside
430-0025-001	O-ring, 3/8" diameter inside
500-0036-000	Batter charger, 110VAC, 12VDC
023-0201-000	ppbRAE Plus sensor assembly