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C-A OPERATIONS PROCEDURES MANUAL

8.36.1 Calibration of the RKI Instruments Model GX-2001 Personal Four Gas Monitor

Text Pages 2 through 5

Attachments

Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
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Approved: _____ *Signature on File* _____
Collider-Accelerator Department Chairman Date

A. Etkin

8.36.1 Calibration of the RKI Instruments Model GX-2001 Personal Four Gas Monitor

1. Purpose

- 1.1. This procedure details the process to be used to calibrate the RKI Instruments Model GX-2001 Personal Four Gas Monitor.

2. Responsibilities

- 2.1. The C-A Gas Monitor Calibrator shall calibrate quarterly the RKI Instruments Model GX-2001 Personal Four Gas Monitor, using either the auto calibration menu or the single calibration [CAL] menu. In addition, the check of helium sensitivity shall be performed.
- 2.2. The C-A Gas Monitor Calibrator shall record all data on the RKI Instruments Model GX-2001 Personal Four Gas Monitor Calibration Record Sheet [[C-A-OPM-ATT 8.36.1.a](#)], record data in the calibration database, and attach updated calibration label.

3. Prerequisites

- 3.1. Four Gas Calibration Kit containing:
 - 3.1.1. Cylinder of 4 gas mixture (analyzed to 2%), containing:
 - 3.1.1.1.1. 50% LEL Methane
 - 3.1.1.1.2. 12% Oxygen
 - 3.1.1.1.3. 50 ppm CO
 - 3.1.1.1.4. 25 ppm H₂S
 - 3.1.1.1.5. Balance Nitrogen
 - 3.1.2. Fixed Flow Regulator with flow rate of 0.5 LPM for cylinder in 3.1.1
 - 3.1.3. Calibration adapter plate for the model GX-2001
 - 3.1.4. Non-adsorbent tubing
- 3.2. Helium Sensitivity Check Kit containing:
 - 3.2.1. Cylinder of 10% He balance air mixture (analyzed to 2%)
 - 3.2.2. Fixed Flow Regulator with flow rate of 0.5 LPM for cylinder in 3.2.1

4. Precautions

- 4.1. This procedure shall be performed in a ventilated location with an exhaust to the outside.

5. Procedures

- 5.1. Normalize sensor readings to fresh air by
 - 5.1.1. In a fresh air environment turn on the monitor by pressing and holding the MODE/POWER button, fig. 1, for one second.
 - 5.1.2. Press and hold the AIR button for approximately three seconds to allow the monitor to zero the HC, CO and H₂S, and to set the span for the Oxygen readings [20.9%].

- 5.2. Assemble the calibration kit for the Model GX-2001 by
 - 5.2.1. Snap the adapter plate over the sensor area, fig 2.
 - 5.2.2. Attach the tubing to the adapter plate.
 - 5.2.3. Attach the regulator to the calibration gas cylinder.
 - 5.2.4. Attach the tubing to the regulator output.
- 5.3. If using the single calibration menu skip to step 5.5 .
- 5.4. To calibrate using the auto calibration mode.
 - 5.4.1. Normalize sensor readings as per 5.1.
 - 5.4.2. Assemble the calibration kit as per 5.2.
 - 5.4.3. With the monitor off, press and hold the AIR button, then press and hold the MODE/POWER.
 - 5.4.4. Release both buttons when you hear a "beep".
 - 5.4.5. Press either the DISP or the AIR button to select auto calibration mode.
 - 5.4.6. Review the auto calibration settings by pressing the MODE/POWER button.
 - 5.4.7. Verify that the settings agree with the values on the calibration gas cylinder.
Cycle through the settings by pressing either the DISP or AIR button. The gas is indicated in the upper left corner of the display [alternating with the word CAL.
 - 5.4.8. Press the MODE/POWER button.
 - 5.4.9. Flow gas for ~ 2 min
 - 5.4.10. Record pre-calibration response on the calibration record sheet, cycle through the gases by pressing either the DISP or AIR button.
 - 5.4.11. Press the MODE/POWER button to calibrate all sensors.
 - 5.4.12. If "FAIL" is displayed a sensor may need to be replaced and the unit recalibrated.
 - 5.4.13. If no sensors fail to calibrate the unit will enter the normal start up sequence and is ready for normal use.
 - 5.4.14. Go to step 5.6
- 5.5. To calibrate using the single calibration mode.
 - 5.5.1. Normalize sensor readings as per 5.1.
 - 5.5.2. Assemble the calibration kit as per 5.2.
 - 5.5.3. With the monitor off, press and hold the AIR button, then press and hold the MODE/POWER button.
 - 5.5.4. Flow gas for ~ 2 min
 - 5.5.5. Press the MODE/POWER button.
 - 5.5.6. Record pre-calibration response on the calibration record sheet.
 - 5.5.7. Match the reading for the gas indicated in the upper left of the display to the value for the calibration gas using the AIR button to raise the reading and the DISP button to lower the reading. If you can not set the proper value the sensor may need to be replaced.
 - 5.5.8. Repeat 5.5.4 and 5.5.6 for the remaining components.
 - 5.5.9. Upon completion of the fourth component press the MODE/POWER button. The unit will start its start up sequence.
- 5.6. To perform the check of helium sensitivity
 - 5.6.1. Normalize sensor readings as per 5.1.

- 5.6.2. Assemble the calibration kit as per 5.2 except use the 10% Helium in air mixture [18.8% Oxygen] cylinder instead of the calibration gas cylinder.
- 5.6.3. Flow gas for ~ 2 min.
- 5.6.4. Record the Oxygen reading on the calibration record sheet.
- 5.7. To verify proper settings of the alarms
 - 5.7.1. With the RKI Instruments Model GX-2001 Personal Four Gas Monitor off, press and hold the AIR button, then press and hold the POWER/MODE button.
 - 5.7.2. As soon as the display appears release the AIR button.
 - 5.7.3. When the unit beeps release the POWER/MODE button
 - 5.7.4. The Alarm 1 setting for O₂ is displayed [see table 1].
 - 5.7.5. The AIR button can be used to raise the setting and the DISP button to lower the setting.
 - 5.7.6. Use the POWER/MODE button to sequence through the setting row by row in table 1.
 - 5.7.7. Press the POWER/MODE button after verifying the last alarm setting and the GasWatch2 will start its startup sequence.
 - 5.7.8. Record the verification on the calibration record sheet.

Table 1

Gas	Alarm 1	Alarm 2	STEL	TWA
O ₂	19.5%	23.5%	NA	NA
HC Combustibles	10% LEL	50% LEL	NA	NA
CO	25 ppm	50 ppm	200 ppm	25 ppm
H ₂ S	1 ppm	5 ppm	5 ppm	1 ppm

- 5.8. Verify that in fresh air the Oxygen reading is 20.9% ±0.1% and the HC, CO and H₂S are zero.
- 5.9 Upon successful completion of this procedure, attach a new calibration label and record appropriate data in the calibration database. Calibration labels are available through BNL stock, stock number S-33844, or equivalent.
 - 5.9.1 Upon failure of any steps within this procedure, document failure on record sheet, repair gas monitor as per manufacturers instruction, and re-perform calibration procedure.

6. Documentation

- 6.1. Calibration database records shall be maintained for a minimum of three (3) years.

7. References

- 7.1. RKI Instruments Model GX-2001 Operator's Manual
- 7.2. [C-A-OPM 13.8.2 "Calibration"](#).

8. Attachments

- 8.1 [C-A-OPM-ATT 8.36.1.a "RKI Instruments Model GX-2001 Personal Four Gas Monitor Calibration Record Sheet – C-A-OPM-ATT 8.36.1.a"](#)

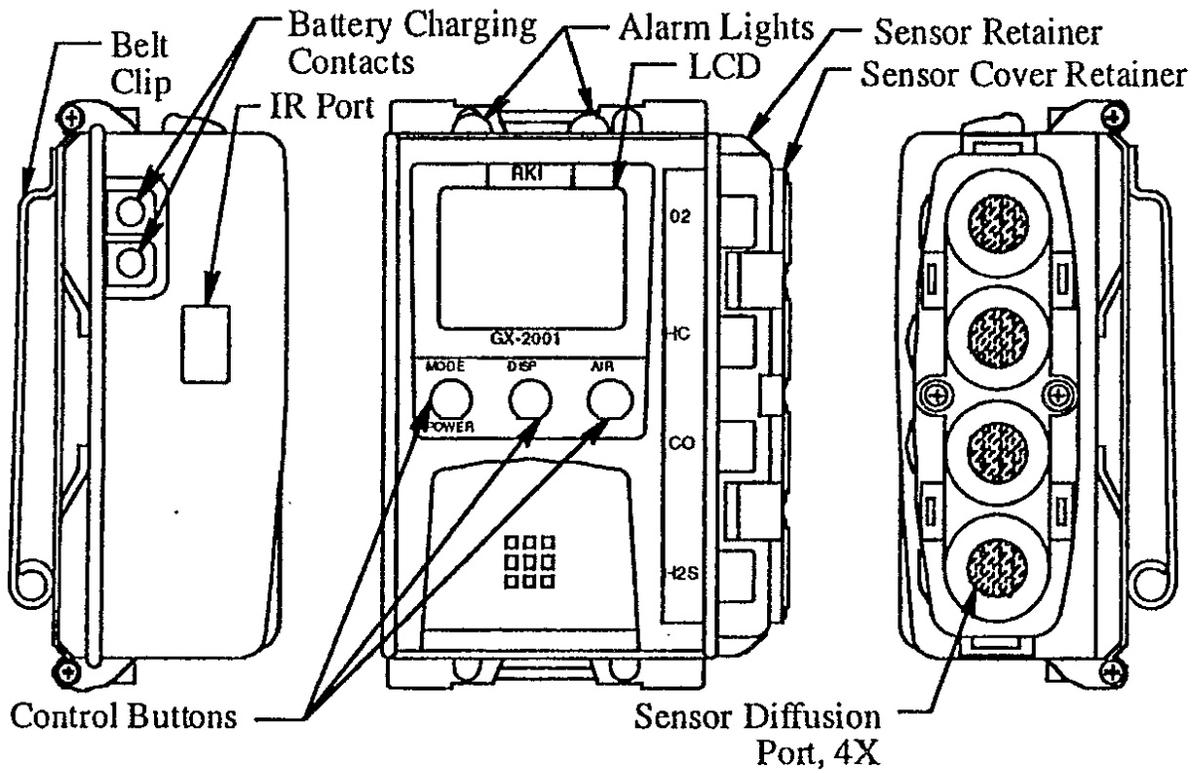


Figure 1: Components of the Model GX-2001

Assembling the Calibration Kit

WARNING: Calibrate the Model GX-2001 in a non-hazardous environment.

