

Met One Instruments BAM-1020 Zero Test

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December 2010



Zero Test - Purpose

- To account for small, site-specific background offsets
 - Typically $\sim 1 \mu\text{g}/\text{m}^3 - 2 \mu\text{g}/\text{m}^3$ (same instrument being moved around)
 - Could be related to site-specific grounding issues
 - RF
 - Radon
 - Other factors
- To periodically verify the lower limit of detection of the BAM-1020



Procedure

- BAM is set up on site and allowed to warm up for a minimum of 24 hours
- BKGD value set to $0 \mu\text{g}/\text{m}^3$
- Hepa-filter (P/N BX-302) connected to down tube
 - Sampling of indoor air is acceptable so long as P/N BX-596 is moved inside as well
 - Outdoor sampling is also acceptable so long as no moisture invades the hepa-filter



Procedure

- BAM-1020 is allowed to collect 72 1-hour samples of zero-air
- Sample-mean calculated
- “BKGD” entered as $-(\text{sample mean})$
- Sample standard-deviation calculated
 - Not the same as population standard deviation!



Sample Mean (X-bar)

- Should vary from instrument to instrument somewhat
- Typically between $\pm 5 \mu\text{g}/\text{m}^3$
- Slightly outside of this range shouldn't worry end user.



Sample Standard Deviation (s)

- Chief determinant of operation of BAM-1020
- Specified to less than $2.4 \mu\text{g}/\text{m}^3$
- Typically is less than $2.0 \mu\text{g}/\text{m}^3$
- For 1-hour reading lower limit of detection LLD ($2\text{-}\sigma$) specified to be less than $4.8 \mu\text{g}/\text{m}^3$



Zero Test Data

- Sample mean is being used to estimate the population mean (infinite number of readings)
- For 72 1-hour readings and a maximum specified σ ($2.4 \mu\text{g}/\text{m}^3$) we have approximately 95% confidence that the instrument sample mean (measured) will be within $\pm 0.5 \mu\text{g}/\text{m}^3$ of the true population mean (actual)



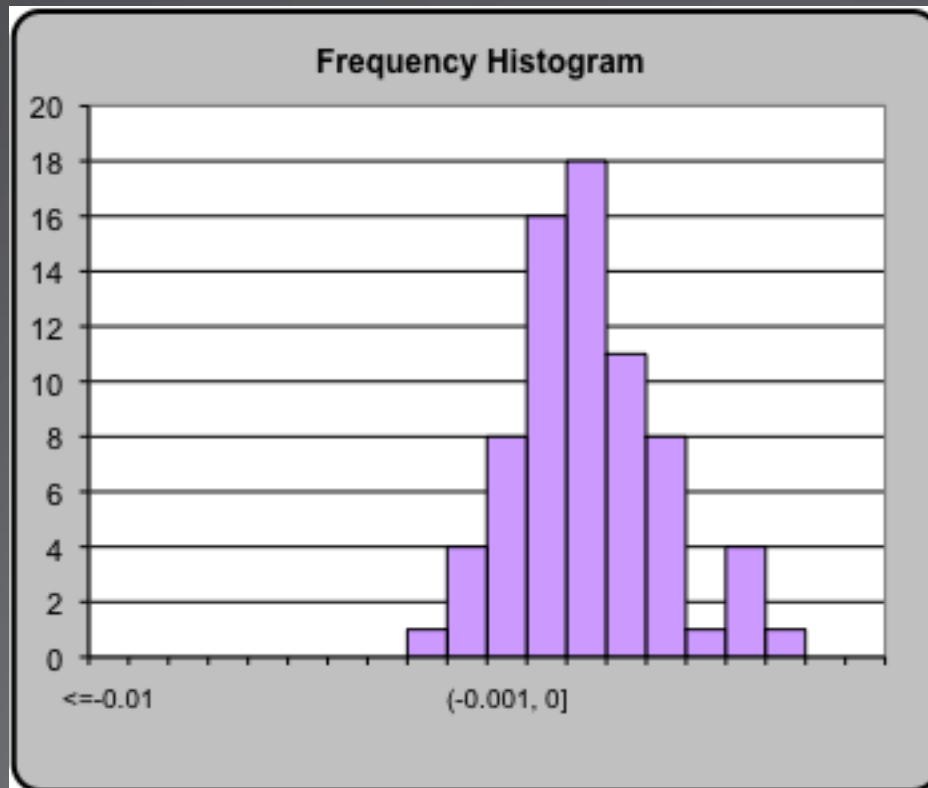
Evaluation of Zero Data

- Zero data should be carefully evaluated
- Sample standard deviation and sample mean within suggested tolerances are the first step.
- Data needs to be checked also for central tendency.
- Best to construct a histogram to verify.



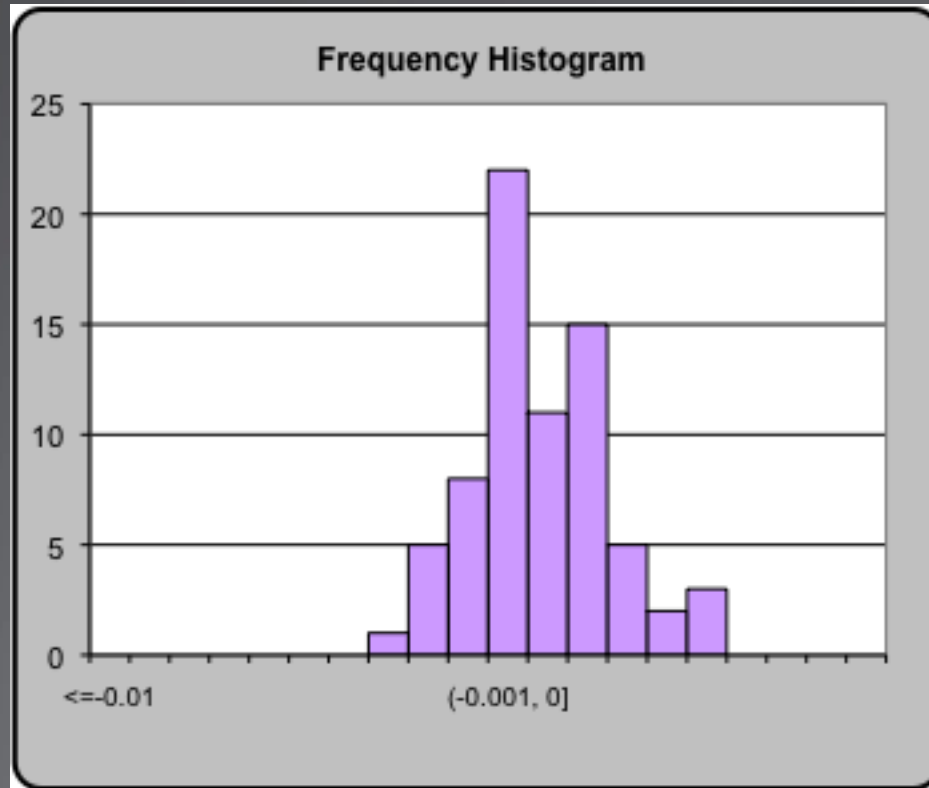
Histogram from Good Data

131_Zero Test_K1035_20100927.xls



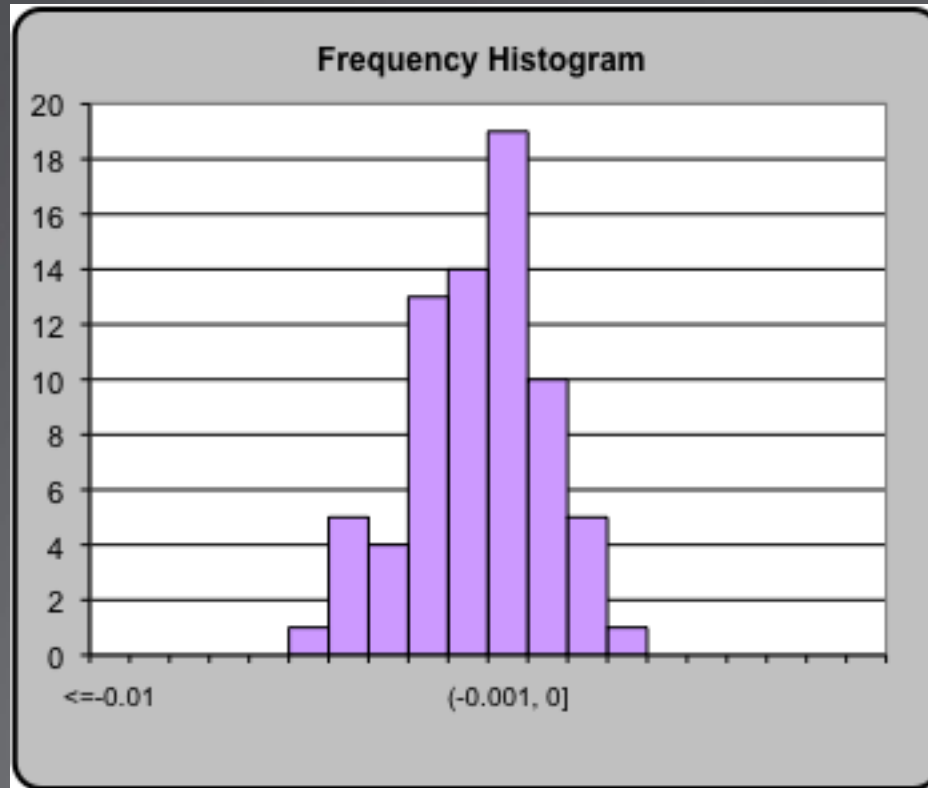
Histogram from Good Data

240_Zero Test_J10749_20100514.xls



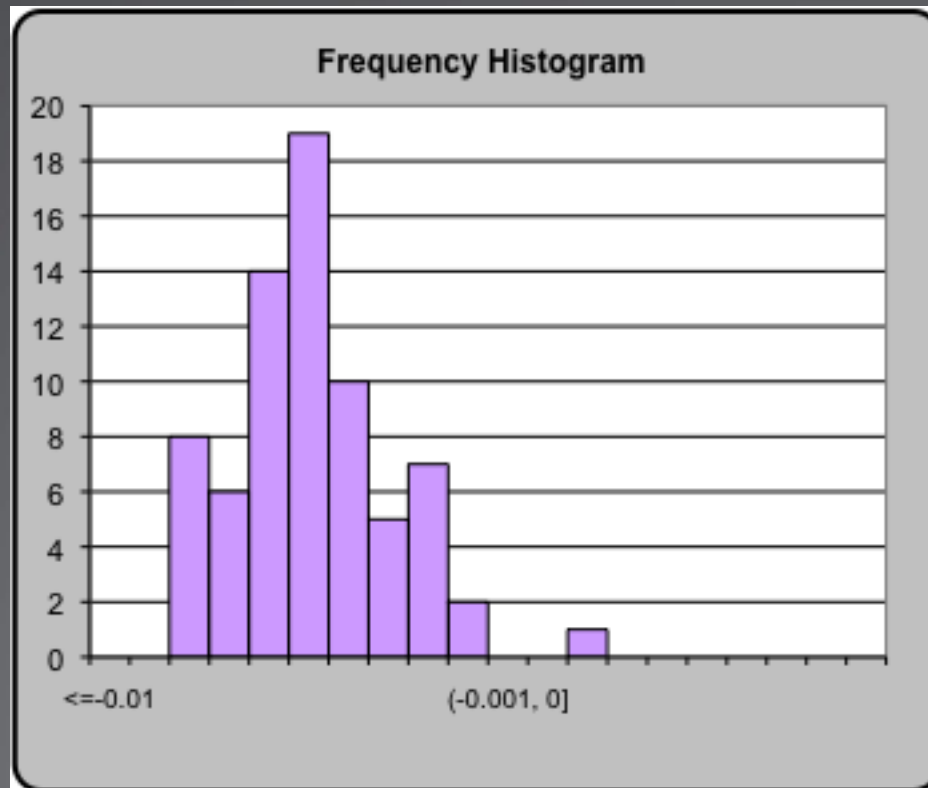
Histogram from Good Data

538_Zero Test_K1038_20101004.xls



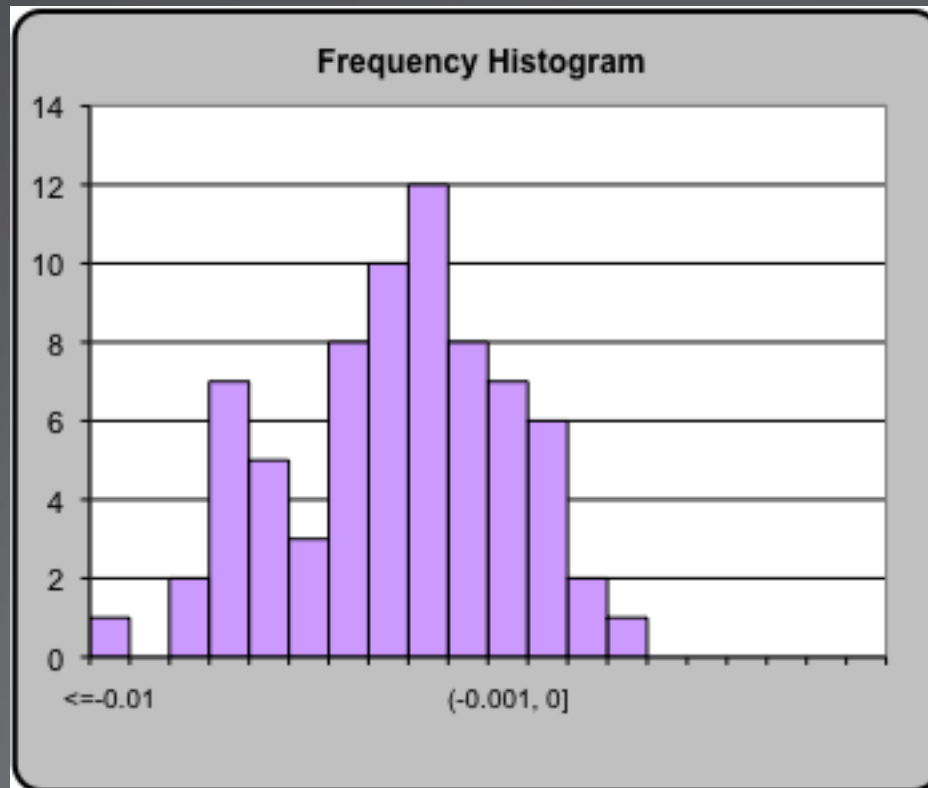
Histogram from Good Data

643_Zero Test_K10252_20100715.xls

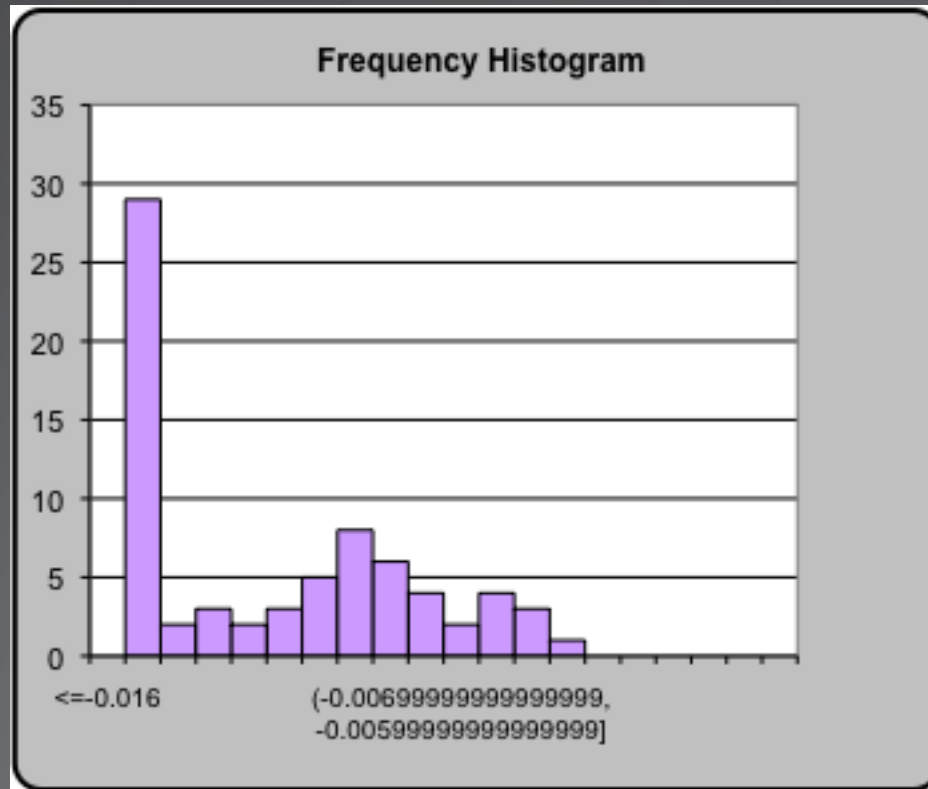


“marginal” Data

433_Zero Test_K10249_20100913.xls



“bad” Data



Re-Zero of BAM-1020

- Met One recommends running zero test upon deployment
- First re-zero at 6 months.
- Thereafter yearly



Purpose of Re-Zero

- To verify LLD is still within specification
- To note any “gross” change in BKGD (greater than $\sim 2 \mu\text{g}/\text{m}^3$)

