

# sensor & calibration tips



[www.modalshop.com](http://www.modalshop.com)

[www.pcb.com](http://www.pcb.com)

Your one-stop sound & vibration shop

## Greetings!

### Welcome to issue #24-

Welcome to the summertime edition (for those of us in the northern hemisphere)! During this time of sunshine, family fun and vacations, I thought we could make it easy and provide a summary of some of the most read articles of the last few years. Take your time, grab a cold drink, lay back in your hammock and catch up on your rest. Take a quick look at any of our best articles that you may have missed...

[Join Our Mailing List!](#)

### Quick Links

[NCSL](#)  
[IMEKO](#)  
[NIST](#)  
[PTB](#)

[NCSL - San Antonio, TX \(July 26-30\)](#)

[Inter-Noise - Ottawa, Canada \(August 23-26\)](#)

[IMEKO - Portugal \(September 7-11\)](#)

[Quality Expo - Rosemont, IL \(September 22-24\)](#)

[Vibration Institute](#)

[The Modal Shop website](#)  
[PCB Piezotronics website](#)  
[IMI website](#)

### Newsletter Archive

[sensor & cal tips #1](#) - Basics of accel function; How standards link together

[sensor & cal tips #2](#) - Shear, compression, flexure; ISO 16063 overview

[sensor & cal tips #3](#) - Accel transduction types; Laser primary cal

[sensor & cal tips #4](#) - Which is better quartz or ceramic; What is piggyback cal

[sensor & cal tips #5](#) - Similarities between ICP and charge; Shock cal methods

[sensor & cal tips #6](#) - Ideal v real world accel behaviors; Primary v transfer cal

[sensor & cal tips #7](#) - The trouble with cables; How to maintain cal integrity

[sensor & cal tips #8](#) - What is ISO 17025; Modal array accels

### Accelerometer Basics:

- [Function and Structure of Accelerometers](#)
- [Accelerometer Internal Structure](#)
- [Transduction Types: PE, PR, VC](#)
- [Sensing Elements: Quartz vs Ceramic](#)
- [Similarities Between Charge and ICP Operation](#)
- [Specification and Behavior of Accelerometers](#)
- [The Trouble with Cables](#)
- [Discharge Time Constant](#)
- [Common Options for ICP Accelerometers](#)
- [Accelerometer Selection Considerations](#)
- [Why Calibrate?](#)
- [Cable Consideration and Constant Current](#)
- [Transducer Electronic Data Sheet \(TEDS\)](#)
- [Decoding the Accelerometer Specification Sheet Presentation](#)

### Calibration and Standards:

- [Overview of Quality Systems and Standards](#)
- [Overview of ISO 17025 Competence of Testing and Calibration Laboratories](#)
- [Overview of ISO 16063 Accelerometer Calibration Standards](#)
  - [ISO 16063-11 Accelerometer Calibration via Laser Interferometry](#)
  - [ISO 16063-21 Accelerometer Calibration via a Reference Standard](#)
  - [ISO 16063-22 Shock Calibration by Comparison to a Reference](#)
- [Primary vs Secondary/Transfer Calibration](#)
- [Calibration Traceability](#)
- [Overview on Calibration and Measurement Uncertainty](#)
  - [Uncertainty and Proficiency Testing](#)
  - [More Contributors to Uncertainty](#)
  - [Statistical Method for Evaluating Uncertainty](#)
- [Relative Motion in Calibration](#)
- [Proficiency Testing](#)
- [Interpreting Calibration Results](#)
- [New Optical Calibration References: Laser Primary and Encoder Low Frequency](#)
- [Improving your Low Frequency Calibration Reference](#)
  - [Improved Low Frequency Calibration Technical Paper](#)

[sensor & cal tips #9](#) - Seismic accel; Uncertain about your cal

[sensor & cal tips #10](#) - Facts about triax; Uncertainty redux

[sensor & cal tips #11](#) - Mechanical shock accel; More uncertainty contributors

[sensor & cal tips #12](#) - Flight test accels; Random uncertainty

[sensor & cal tips #13](#) - ESS accel considerations; Relative motion in cal

[sensor & cal tips #14](#) - Proficiency in cal; Sensor considerations for NVH

[sensor & cal tips #15](#) - Interpreting cal results; Discharge time constant

[sensor & cal tips #16](#) - New development in accel cal; Industrial accels

[sensor & cal tips #17](#) - Low frequency accel cal; ICP options

[sensor & cal tips #18](#) - Why calibrate; Accel selection considerations

[sensor & cal tips #19](#) - Linearity and the small world

[sensor & cal tips #20](#) - Low frequency calibration; Cable considerations

[sensor & cal tips #21](#) - ICP triaxial accels aid vehicle field diagnostics; New transverse methods of cal

[sensor & cal tips #22](#) - Proficiency Deficiency; TEDS

[sensor & cal tips #23](#) - Decoding accel specs; Quality system deficiencies

- [Calibration and Linearity](#)
- [New Transverse Calibration Apparatus Technical Paper](#)
- [Quality System Audits and Proficiency Test Deficiencies](#)
- [Quality System Audits and Equipment Control Deficiencies](#)

### Sensor Applications:

- [Modal Array Accelerometers](#)
- [Seismic Accelerometers](#)
- [Triaxial Accelerometers](#)
- [Selecting Accelerometers for Mechanical Shock](#)
- [Accelerometers for Flight Test Applications](#)
- [Accelerometer Considerations in ESS, HALT & HASS](#)
- [Accelerometer Considerations for Automotive Modal/NVH](#)
- [Introduction to Industrial Accelerometers](#)
- [Miniature Accelerometers and Small Structures](#)

### Application Development:

- [Instrumented Speed Bump for Vehicle Structural Health Monitoring](#)

We hope that you've enjoyed our newsletter and its educational content over the last few years. No where like the calibration field is certainty and reliability more important. We're part of the PCB Group which is going on 45 years. We're here to serve you with all your dynamic sensor and calibration needs... whenever you get back from vacation!

Sincerely,



Michael J. Lally  
The Modal Shop  
A PCB Group Company  
[mike.lally@modalshop.com](mailto:mike.lally@modalshop.com)