

# sensor & calibration tips



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Your one-stop sound & vibration shop

## Greetings!

### Welcome to issue #11-

The team at The Modal Shop and PCB Group have been sending out monthly training/tips for dynamic sensors for about a year now! If you are new to our newsletter, please enjoy this short communication, share it with a colleague and have a look at the archive links below where you'll find all the back issues with their wealth of information. We're glad to have you on board!

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### Tip of the Month

#### Calibration with fixtures

Mechanical fixtures are often required for mounting accelerometers for calibration. Use fixtures that are designed to be very low mass and high stiffness, recognizing the potential impact on the mounted resonant frequency. Consider an accelerometer with a 5-40 integral stud mount. A slight but measurable difference will be seen at the higher frequencies (around 10 kHz) during calibration when comparing data acquired with the accelerometer directly mounted to a piggyback reference to data acquired against a reference with the typical 1/4-28 mount and an adapter. This can be an issue because manufacturers may calibrate the accelerometers with no adapter (best case scenario) while commercial systems require a variety of adapters to maintain

### Selecting Accelerometers for Mechanical Shock

An excellent PCB technical note by Dr. Patrick Walter



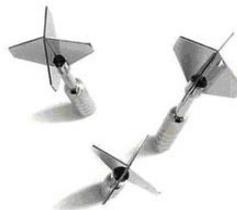
The definition of mechanical shock is "a nonperiodic excitation of a mechanical system that is characterized by suddenness and severity and usually comes with significant relative displacements." While the definitions of the

characteristics are somewhat dependent on the system of consideration, common shock applications are seen in transportation crash, projectile firing, aerospace pyrotechnic separation, civil infrastructure and consumer/shipping package drop. Due to the extremely broad energy content of shock phenomenon and the real world behavior of accelerometers there are significant risks for data contamination; and accordingly, there are a few rules of thumb for selecting an appropriate accelerometer to ensure a valid measuring transaction.

[Click to read application discussion](#)

([http://www.pcb.com/techsupport/docs/vib/LoRes\\_24\\_Mechanical\\_Shock\\_Tech.pdf](http://www.pcb.com/techsupport/docs/vib/LoRes_24_Mechanical_Shock_Tech.pdf))

### Still more about uncertainties...



There are many factors contributing to accelerometer calibration uncertainty and last month we scratched the surface by discussing some of the major ones. This month we'll cover a few more. Consider the equation

for accelerometer calibration,  $V_{ref}/V_{sut} = S_{ref}/S_{sut}$ , which states the ratio of the accelerometer output (both reference and sensor-under-test) voltages must be equal to the ratio of their respective sensitivities.

maximum flexibility in the field.

#### Quick Links

[NCSL](#)  
[IMEKO](#)  
[NIST](#)  
[PTB](#)  
[Wiki on uncertainty](#)

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

[Auto side impact video](#)  
[Pyrotechnic shock](#)

#### Newsletter Archive

[sensor & cal tips #8](#) - What is ISO17025 all about? What makes a good modal array accelerometer?

[sensor & cal tips #9](#) - Seismic accelerometer for low frequency measurements; Uncertain about your cal?

[sensor & cal tips #10](#) - Facts about Triax; Uncertainty Redux

Because of the ratio nature of the voltage measurement, it is easy to see that if an external factor effects the voltage measurement ...

[Click to read more about calibration improvements](#)([http://www.modalshop.com/test\\_calibration.asp?ID=218](http://www.modalshop.com/test_calibration.asp?ID=218))

We appreciate your interest and are glad to be providing regular information to help you in your dynamic testing and calibration needs. If you have any questions you would like answered or have a topic you would like to see covered, please contact us and we'll be glad to help out. Your question may even be featured in a future newsletter...

Sincerely,



Michael J. Lally  
The Modal Shop  
A PCB Group Company

[Forward email](#)