

Calibration Test Services and Equipment

Shock, Vibration, Acoustic, Pressure, Force & Torque Sensors

Highlights

- Full in-house calibration capabilities of PCB® & competitor models
- A2LA accredited to ISO 17025 for most services
- NIST & PTB traceability
- ISO 9001:2000 certified
- Specialized testing services
- Sensor performance evaluation testing
- Expedited services upon request
- Calibration workstations & turnkey systems
- Environmental stress chamber testing for HALT/HASS/ESS
- High amplitude Hopkinson bar
- Acoustic & sound level meter testing
- Shock tube, hydraulic step, pneumatic pulse, absolute calibration
- Torque sensor, load cell & strain gage calibration



Calibration Test Services and Equipment

PCB® provides calibration and test services for sensors and signal conditioners, according to recommended practices, and to either NIST or PTB, and ISO 9001 standards. Additionally, a variety of calibration equipment is available for customers wishing to conduct their own sensor calibrations. PCB® can also provide calibration services for other manufacturers' sensors. Most calibration services are accredited by A2LA to ISO 17025, as documented on the company's A2LA "Scope of Calibration." In addition, PCB® offers a number of portable, handheld sensor calibration instruments. For more information on available products and services, please consult the factory.

Vibration & Shock Sensor Testing

- Elevated & cryogenic temperatures
- High pressure static hydro
- Linearity determination
- Low amplitude back-to-back
- Piezoresistive calibration
- Primary calibration
- Random vibration screening
- Sensitivity & frequency response calibration
- Sensitivity & phase response
- Single point sensitivity
- Primary accelerometer calibration



Environmental Stress Chamber

HALT, HASS & other thermal chamber tests on prototypes and production output



Primary Accelerometer Calibration

Accelerometer is mounted to an air-bearing shaker beneath a laser vibrometer



High-amplitude Hopkinson Bar

Linearity & zero shift tests with exposures to impact shocks of more than 100k g



Low-frequency Accelerometer Calibrator

6" (152 mm) stroke shaker provides displacement for calibrations to 0.5 Hz

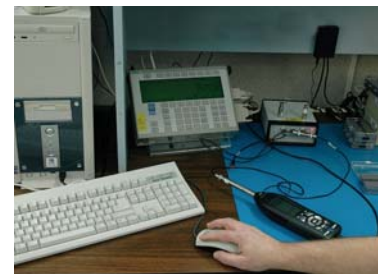
Acoustics & Sound Level Meter Testing

- Microphone Electrostatic Calibration
 - Electrostatic actuator method
 - Voltage insertion method (IEC 1094 compliant microphones)
- Sound Level Meter Calibration
 - Calibration of sound level meters, dosimeters, HVM100 human vibration meter
- Pistonphone Method
 - 124 dB SPL reference at 250 Hz
 - Accuracy of 0.45 dB of reading



Microphone Electrostatic Calibration

Test base & enclosure isolates unit under test from ambient noise and adjusts for barometric pressures, while voltage insertion generates excitation for comparative results



Sound Level Meter Calibration

Sound Level Meter calibrations are NIST traceable, with calibration services compliant with ISO 17025

Pistonphone Kit - Model 915A01

Generates a constant sound pressure level at a controlled frequency for calibrating high-intensity acoustic sensors in the field



Calibration Test Services and Equipment

Specialized Pressure Calibration & Testing

In addition to the services listed below, PCB® is also able to perform a number of special calibration and testing services, upon request. These include acceleration sensitivity; Ballistics firing range; cold gas shock tube; discharge time constant; temperature effects from -320 to +1,000 °F (-196 to +535 °C); hydrostatic and hermeticity; mechanical shock; and PIND (Particle Impact Noise Detection).

Dynamic Pressure Sensor Calibration Services

- **Pneumatic Pulse Method (low pressure)**
Series 903B
 - Strain gage pressure sensor reference
 - 0 to 100 psi (0 to 0.7 MPa) range
 - Accuracy to 0.8% FS
- **Dynamic Step Pressure Method (medium pressure)**
Series 907A
 - Aronson shockless step pressure generator
 - Strain gage pressure sensor reference
 - 0 to 1000 psi (0 to 7 MPa) range
 - Accuracy to 1.3% FS
- **Hydraulic, Dynamic Impulse Method (medium pressure)**
Series 913B
 - Piezoelectric pressure sensor reference
 - 0 to 25k psi (0 to 138 MPa) range
 - Accuracy to 1.3% FS
- **Hydraulic, Step Method (high pressure)**
Series 905C
 - Strain gage pressure sensor reference
 - 0 to 100k psi (0 to 690 MPa) range
 - Accuracy to 1.7% FS

Aronson Step Pressure Calibrator Series 907A

A guided mass impacts a plate, which quickly opens a poppet valve. This exposes the sensor under test (installed in a small volume manifold) to the step reference pressure, which is contained and regulated within a much larger storage cavity.



Hydraulic Step Pressure Calibrator Model 905C

High-pressure pump exposes unit under test to graduated pressure steps with a dump valve for rapid, full-scale pressure release



Pneumatic Pulse Calibrator Model 903B02

Manually actuated poppet valve exposes sensor under test (installed in a small volume manifold) to the step reference pressure, contained and regulated within a much larger storage cavity



Medium Pressure Hydraulic Impulse Calibration (to 25k psi) - Model 913B02

The piston rod on top is struck by a mass to generate a pressure pulse in the two-port manifold for reference comparative calibration



Shock Tube - Model 901A10

Helium shock wave is generated past a burst diaphragm to create sub-microsecond pressure steps for evaluating various sensor performance characteristics such as rise time and resonant frequency

Static Pressure Testing & Calibration Services

- **Hydraulic Deadweight Tester Method (medium pressure)**
 - 0 to 15k psi (0 to 138 MPa) range
 - Accuracy of $\pm 1.0\%$ FS
- **Pneumatic Comparator (Nitrogen gas)**
 - 0 to 10k psi (0 to 69 MPa) range
0.021% FS accuracy
 - 0 to 1000 psi (0 to 7 MPa) range
0.015% FS accuracy

Static Pressure Comparison Calibration

Pressure sensor is exposed to nitrogen pressurized manifold with output compared to reference standard sensor



Dynamic Strain, Force, and Strain Gage Torque & Load Calibrations

PCB® offers calibration services for dynamic strain and force sensors, as well as strain gage torque sensors and load cells. Each dynamic strain or force sensor is provided with a five-point ascending compression calibration. Sensitivity and non-linearity data are reported. Tension calibration may be supplied upon request. Strain gage torque sensors are calibrated in both clockwise and counterclockwise directions. Strain gage load cells are calibrated in both tension and compression. Sensitivity, non-linearity, hysteresis, and shunt calibration data are provided for static sensors.

Dynamic Strain Sensor Calibration Services

- Strain gage reference
- For Series 240 and 740 ICP® strain sensors



Dynamic Strain Sensitivity Calibrations

A known strain input is placed on the sensor, and sensitivity measured via reference sensor

Dynamic Force Sensor Calibration Services

- Strain Gage Reference
 - 10 to 100k lb (445 to 450k N range)
 - 1.0 % FS accuracy

Comparison Calibration

A large, hydraulic press generates compressive loads for reference comparative testing



Torque Sensor Absolute Calibration

- Torque arm method, where known weights are applied from a beam at known distances from the sensor's axis of symmetry
 - 10 to 25k in-lb (1,10 to 2800 N-m) range
0.04% FS accuracy
 - 25k to 100k in-lb (11,300 to 56,500 N-m) range
0.14% FS accuracy
 - 100k to 300k in-lb (0 to 33,896 N-m) range
0.09% FS accuracy

Torque Sensor Absolute Calibration

Otherwise known as a "torque arm", known weights are suspended from the beam at known distances from the sensor's axis of symmetry



Static Load Cell Absolute Calibration

- Deadweight 10 to 500 lb (45 to 2230 N),
0.04 % FS accuracy
- Back-to-back to 100 to 10k lb (2230 to 45k N)
0.06% FS accuracy
- Back-to-back to 10k to 100k lb (45 to 450k N)
0.08% FS accuracy

Load Cell Absolute Calibration

Accurate dead weights are utilized for testing against basic physical parameters



Calibration Test Services and Equipment

Calibration Workstations & Turnkey Systems

In addition to the calibration and test services offered by PCB®, a number of calibration workstations and turnkey systems are available through sister company **The Modal Shop**. These systems are designed to offer automated, quality calibrations, which conform to recommended industry standards, and are available for rental or purchase. For more information on the products shown here, call (513) 351-9919 or visit www.modalshop.com.

Workstation & Turnkey Systems

Model 9155C

Turnkey Accelerometer Calibration Workstation

- Accurate NIST or PTB traceable calibrations from 0.5 Hz to 20k Hz in less than one minute per axis
- Supports variety of accelerometer sizes & types and prints certificates compliant with ISO 17025
- Automates TEDS sensor updating
- Achieves 0.85% uncertainty with primary laser calibration
- Configure a system for any budget with customizable options

Model K394A30/31 Air Bearing Shaker (shown)

- High quality, calibration grade air bearing exciter easily adjusts to a wide range of sensor sizes
- 70k Hz mounted resonance of reference provides linearity over large frequency range
- Meets ISO 16063-21 recommendation for transverse motion



Model 9155C-525

PneuShock™ Shock Accelerometer Calibration System

- Provides calibration & linearity check from 20 to 10k g
- Pneumatically actuated exciter provides controlled & consistent impacts
- Electronic control of projectile drive pressure & pulse width
- Conforms to ISO 16063-22 shock calibration standard
- Stand-alone version available as Model 9525C PneuShock™



Model 9100C

Portable Vibration Calibration System

- Perform frequency & amplitude calibration with adjustable settings
- Acquire NIST traceable measurements with reliable instruments
- Displays information for acceleration, velocity & displacement
- Excel macro generates ISO 17025 compliant calibration certificates (K9100C)



Model 9350C

Turnkey Microphone Calibration Workstation

- Provides conformance testing for traditional and ICP™ preamplifiers
- Ensures accurate NIST traceable calibrations up to 100k Hz
- Automates calibration of 1/4", 1/2" & 1" precision condenser microphones & pistonphones
- Prints certificates compliant with ISO 17025



Modal Shakers & Accessories

- 100 lbf modal shaker with through-hole armature for easy connection to stingers
- 5 lbf shaker with integral amplifier in compact portable package
- 6" long stroke shaker for ultra-low frequency applications

