The Precision Sensor Calibration Workstation Model 9155 delivers accurate back-to-back comparison calibration of ICP® (IEPE), charge mode, and piezoelectric accelerometers in accordance with ISO 16063-21: 2003 (accelerometers), ISO 16063-22: 2005 (shock accelerometers) and/or IEC 61094-5 (microphones). Options to calibrate piezoresistive, capacitive, velocity, 4-20 mA, visual output (meters), and dynamic pressure sensors are also available. A range of vibration and shock exciter options bring you a wide scope of capabilities. Each system provides all the necessary components ‘out-of-the-box’ – from precision actuators to state-of-the-art data acquisition hardware paired with a Windows® PC software controller.

Benefits of the Model 9155 form in two areas: conformance to existing standards and automation of the calibration task under ISO 16063-21 and/or IEC 61094-5. Hardcopy printed calibration certificates fulfill the requirements of ISO 17025. The automation afforded by the easy-to-use Windows software provides for simplified calibration procedures, as test parameters are stored and recalled automatically for each sensor under test (SUT). This makes for ‘hands-off’ operation once the sensor is mounted. With a typical cycle time of one minute per axis, the 9155 System is an efficient and reliable tool. Use of a dedicated exciter provides a high quality vibration environment for accurate calibrations. ISO 16063-21 outlines the back-to-back configuration in which the (SUT) and the Reference Accelerometer (or Microphone) are subjected to identical input accelerations (or sound pressure levels). Consequently, the ratio of the two transducers’ sensitivities is simply the ratio of their measured outputs. A comparison is performed by the control software, while obtaining the measured outputs at every frequency.
ELEGANT USABILITY

SOFTWARE TO AUTOMATE AND MANAGE DATA

The 9155 software serves as the central hub of each 9155 Calibration System. It controls system hardware and acquires data for the wide range of SUT’s. This common user interface reduces customer training costs by providing a familiar experience for test setup, data management, and report generation. This familiar interface also allows operators to focus on the intricate details of SUT mounting and operation, reducing the risk of procedural errors.

- Clearly defines Pass/Fail criteria for each sensor type
- Database of sensor specifications (including free field and random field corrections for microphones) and test requirements automate system setup
- Customizable printed calibration certificates comply with ISO 17025 and ISO 16063-21 requirements
- Retrieve and archive calibration data in SQL compliant database
- Reports calibration data in English or metric units
- User definable reference frequencies
- Extensive language database for local language support

In addition, the vibration sine controller in the 9155 software has been optimized for the particular stepped sine test technique. Rather than modifying a general purpose shaker controller algorithm, the 9155 has been optimized for calibration precision and increased throughput.

PRECISION, RELIABILITY, AND USABILITY IN VIBRATION CALIBRATION

Over 20 years ago, PCB realized that our accelerometers were only as good as their calibration after manufacturing. We committed to implementing air bearing shakers for sensor calibration – seeking the benefits of reduced transverse motion, repeatability, and precision. PCB experimented with the best air bearing shakers available. We quickly learned the tedious adjustments required by those shakers’ elastomer suspension bands were suited for research experiments, rather than regular day-to-day use. The only solution was to develop our own calibration shaker.

A Ph.D led design team at PCB developed and introduced the Lorentz force DC coil for static suspension of the shaker armature. After deploying the design to our production line, we committed to countless redesign iterations as every facet of the shaker was exposed unprecedented usage. The result is a well vetted, highly reliable solution used around the globe. The 9155 System offers vibration calibration to 15 kHz with the 9155D-830 and to 20 kHz with the 9155D-831.
SYSTEM OPTIONS TO SIMPLIFY TESTING

HIGH FREQUENCY VIBRATION
MODEL 9155D-830/831
- Air-bearing exciter eliminates transverse motion
- Internal reference accelerometer mounted resonance > 70 kHz
- 9155D-830 5 Hz to 15 kHz
- 9155D-831 5 Hz to 20 kHz

LOW FREQUENCY VIBRATION
MODEL 9155D-779
- Extends low frequency calibration data to 0.1 Hz
- Adds precision air-bearing long stroke shaker

DYNAMIC PRESSURE
MODELS 9155D-903, -907, -913, -905
- Low (150 psi, 1 MPa), Medium (1000 psi, 6.8 MPa), High (15 000 psi, 103 kPa), and Ultra High (80 000 psi, 550 MPa) pressure versions available
- Reproduce PCB factory calibration techniques

ACOUSTIC MICROPHONES
MODEL 9155D-917
- Comparison Calibration per IEC 61094-5
- Calibrate from 20 Hz to 10 kHz
- Applies field corrections

VISUAL OUTPUT METERS
MODEL 9155D-680
- Calibration of sensors with visual output, such as vibration meters
- Supports both velocity and acceleration

SHOCK
MODEL 9155D-525
- Provides calibration and linearity check from 20 g to 10,000 gpk
- Pneumatically actuated exciter provides controlled and consistent impacts
- Stand-alone version available as Model 9525C PneuShock™

A PARTNER IN YOUR CALIBRATION

While a reliable product ensures its longevity as part of your process, usability makes it a tool rather than a hindrance. From software designed to simplify calibrations axis after axis, to a typical cycle time of one minute, the 9155 Calibration System is an ideal calibration solution.

At the core, our sister company PCB Piezotronics is a sensor company focused on delivering the very best accelerometers, microphones, and pressure sensors available. With high-powered users of our own systems in PCB Piezotronics facilities across the globe, utilizing The Modal Shop’s systems each day, we’ve been able to maintain a high standard of user friendly functionality with regular feedback from technicians and engineers. This, coupled with the vetting by use in our high-volume production facilities, allows us to deliver a proven system and the best possible user experience to you.
SPECIFICATIONS

Performance

Frequency Range, Accelerometers
5 Hz - 15 kHz with 9155D-830 Air-Bearing Shaker
5 Hz - 20 kHz with 9155D-831 Air-Bearing Shaker
0.5 Hz - 500 Hz with 9155D-771 Low Frequency Shaker
0.1 Hz - 500 Hz with 9155D-779 Low Frequency Shaker
20 g – 10 000 g with 9155D-525 PneuShack

Pressure Range, Dynamic Pressure
Up to 150 psi with 9155D-903 Low Pressure
Up to 1000 psi with 9155D-907 Medium Pressure
Up to 15 000 psi with 9155D-913 High Pressure
Up to 30 000 psi with 9155D-905 Ultra High Pressure

Frequency Range, Acoustic Microphones
20 Hz to 10 kHz with 9155D-917 Mic Calibrator

Sensors Supported
Acceleration, Velocity, Dynamic Pressure, Acoustic Microphones, Visual Output Meters, Impact Hammers

TEDS Sensor Support
IEEE 1451.4, IEEE P1451.4

Calibration Data Management
Yes

Automatic pass/fail Classification
Yes

Measurement Units
English, Metric

Core System - Choose Options from Sections A and B to Complete the System

9155D Calibration software, Data acquisition hardware, PC, keyboard, mouse, monitor, printer, Various mounting adaptors, System verification sensor, Database software, Uncertainty budget procedure, On-site installations and training

A - Signal Conditioning Options

9155D-442 Basic ICP Signal Conditioning. Adds signal conditioner for ICP and charge mode sensors.

9155D-443 Dual-mode Charge Amplifier. Computer control and automated switching between ICP and charge mode sensors.


B - Vibration, Shock, Acoustic, and Pressure Exciter Options

9155D-525 Shock Calibration. Provides for verification of shock accelerometers from 20 g to 10 000 g.


9155D-771 Low Frequency (0.5 Hz – 500 Hz). Long stroke shaker with SmartStroke® technology and accelerometer reference sensor.

9155D-779 Low Frequency (0.1 Hz – 500 Hz). Long stroke shaker with SmartStroke® technology, accelerometer and optical reference sensors.


9155D-831 K394B31 Air-Bearing Shaker. Adds precision high-frequency air-bearing shaker 5 Hz – 20 kHz.

9155D-875 High Payload Calibration Shaker. Offers a useable frequency range of 5Hz to 10kHz for heavy payload transducers.

9155D-903 Low Pressure. Step function pulse calibrator to dynamically calibrate pressure transducers up to 150 psi (1 MPa).

SPECIFICATIONS (CONTINUED)

9155D-905 Ultra High Pressure. For dynamic pressure measurements up to 80 000 psi (550 MPa).

9155D-905+AUTO Automated Ultra High Pressure. Auto drive/valve control function offers dynamic pressure measurements up to 80 000 psi (550 MPa).

9155D-907 Medium Pressure. Aronson step pressure calibrator for dynamic pressure calibrations up to 1000 psi (6.9 MPa).

9155D-913 High Pressure. Impulse calibrator for dynamic pressure calibrations up to 15 000 psi (100 MPa).

9155D-917 Acoustic Microphones. IEEE 61094-5 comparison calibration of microphones from 20 Hz to 10 kHz.

Additional Options

9155D-100 19 in Rack Integration. Approx. 36.5 in H x 21.75 in W x 26 in D [93 cm x 55 cm x 66 cm]. Integrates components in 19 in rack.

9155D-120 Shaker Mount. Provides wooden pedestal to support calibration shaker. Requires user to fill with sand (not included).

9155D-160 Tool Kit. Includes torque wrench, screwdrivers, crescent wrenches, toolbox, etc.

9155D-350 Calibration Label Printing. Provides automatic calibration label printing using a Zebra thermal transfer label printer.


9155D-501 Linearity. Provides for multipoint sensor linearity checks via sinusoidal vibration up to 40 g.

9155D-550 Resonance Check. Provides for resonance check of accelerometers up to 50 kHz.


9155D-650 4-20 mA Velocity Sensor Calibration.

9155D-680 Visual Output Sensor Calibration. Software only option supporting sensors with visual output, such as vibration meters.

9155D-901 Environmental Monitoring Option. Includes calibrated external temperature, humidity and pressure gauge.

9155D-961 Hammer Calibration. Allows calibration of instrumented impact hammers, includes 9661C cal fixture.

GLOBAL CALIBRATION SUPPORT TEAM

For information on offices in your region, visit modalshop.com/sales

The Modal Shop, Inc. offers structural vibration and acoustic sensing systems and services for various applications in design and test laboratories as well as manufacturing plants. An extensive sound and vibration rental program, precision calibration systems, and both modal and vibration shakers are designed to simplify test phases. Non Destructive Testing Systems help manufacturers provide 100% quality inspection of metal components. The Modal Shop, Inc. is a subsidiary of PCB Piezotronics, Inc., and PCB® is a wholly owned subsidiary of MTS Systems Corporation.