SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994

THE MODAL SHOP, INC.
A PCB GROUP COMPANY
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Cincinnati OH 45241
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CALIBRATION

Valid To: April 30, 2020 Certificate Number: 2649.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Acoustical Quantities

Parameter/Equipment	Frequency	CMC[2] (±)	Comments
Condenser Microphone –	(10 to 100 000) Hz	0.25 dB	Microphone
With Pre-Amp	(10 to 100 000) Hz	0.25 dB	Microphone

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 3] (±)	Comments
DC Voltage – Measure	100 mV to 100 V	0.20 %	DMM, oscilloscope function generator, calibrated capacitor, DAQ
AC Voltage Ratio – Measure	100 mV to 10 V	0.20 %	DMM, oscilloscope function generator, calibrated capacitor, DAQ

III. Mechanical

Parameter/Equipment	Range	CMC[2, 3] (±)	Comments
Impulse Force Hammer	(0 to 5000) lbf	2.5 %	Data acquisition card accelerometer w/ calibrated masses
Force Sensor/Load Cell	(0 to 3.5) lbf	2.0 %	Data acquisition card w/ calibrated masses
Low Frequency Accelerometer Calibration	(0.5 to 1) Hz (> 1 to 10) Hz	1.1 % 0.8 %	Data acquisition card w/ low frequency long stroke shaker w/ optical reference
Laser Primary Calibration	($0.5 \leq f \leq 10$) Hz 5 Hz ($5 < f < 100$) Hz 100 Hz, 159 Hz ($159 < f \leq 1000$) Hz ($1000 < f \leq 5000$) Hz ($5000 < f \leq 15\,000$) Hz ($15\,000 < f \leq 20\,000$) Hz	0.30 % 1.0 % 0.50 % 0.20 % 0.50 % 0.70 % 1.5 % 2.0 %	Data acquisition card w/ air bearing low frequency shaker Data acquisition card w/ primary laser reference air bearing shaker *f* represents the calibration frequency

Parameter/Equipment	Frequency	CMC[2, 3] (±)	Comments
Accelerometers –			Data acquisition card
vs. Primary Standard	(5 to 9) Hz (10 to 99) Hz 100 Hz (101 to 920) Hz (921 to 5000) Hz (5001 to 10 000) Hz (10 to 15) kHz (15 to 20) kHz	1.7 % 1.2 % 0.75 % 1.0 % 1.4 % 1.9 % 2.2 % 2.8 %	w/ 396C10/C11 air bearing shaker
vs. Secondary Standard	(10 to 99) Hz 100 Hz (101 to 920) Hz (921 to 2000) Hz	3.0 % 1.3 % 1.5 % 3.0 %	w/ MB CAL 50
Calibration of Portable Vibration Calibrator	(7 to 9) Hz (10 to 29) Hz (30 to 99) Hz 100 Hz 101 Hz to 2 kHz (2 to 10) kHz	4.0 % 3.0 % 1.5 % 1.5 % 1.5 % 4.0 %	DMM, signal conditioner, standard accelerometer

Parameter/Equipment	Range	CMC[2, 3] (±)	Comments
Shock Accelerometer Calibration	(20 to 10 000) g	2.2 %	Data acquisition card shock reference shock exciter

[1] This laboratory offers commercial calibration service.

[2] Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] In the statement of CMC, percentages are to be read as percent of reading unless otherwise noted.

Accredited Laboratory

A2LA has accredited

THE MODAL SHOP INC, A PCB GROUP COMPANY

Cincinnati, OH

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSLI Z540-1-1994 and R205 – *Specific Requirements: Calibration Laboratory Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 10th day of April 2018.

President and CEO
For the Accreditation Council
Certificate Number 2649.01
Valid to April 30, 2020
Revised April 23, 2018

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.