PCB PIEZOTRONICS
A PCB GROUP COMPANY

# Certificate of Calibration and Conformance

Certificate Number 2010-129256

Instrument Model CAL200, Serial Number 7672, was calibrated on 30APR2010. The instrument meets factory specifications per Procedure D0001.8190.

**New Instrument**
**Date Calibrated: 30APR2010**
**Calibration due:**

## Calibration Standards Used

| MANUFACTURER | MODEL | SERIAL NUMBER | INTERVAL | CAL. DUE | TRACEABILITY NO. |
|---|---|---|---|---|---|
| Hewlett Packard | 34401A | US36033460 | 12 Months | 16JUN2010 | 4382218 |
| Hewlett Packard | 34401A | 3146A10352 | 12 Months | 13JUL2010 | 4413817 |
| Larson Davis | PRM915 | 0112 | 12 Months | 09SEP2010 | 2009-121809 |
| Larson Davis | PRM902 | 0480 | 12 Months | 09SEP2010 | 2009-121820 |
| Larson Davis | MTS1000/2201 | 0111 | 12 Months | 09SEP2010 | SM090909-1 |
| Larson Davis | 2559 | 2504 | 12 Months | 29SEP2010 | 16910-1 |
| PCB | 1502B02FJ15PSIA | 1342 | 12 Months | 23NOV2010 | 3341845067 |
| Larson Davis | 2900 | 0661 | 12 Months | 02APR2011 | 2010-128279 |

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

## Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

### Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: Scott Montgomery
Technician: Scott Montgomery

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ISO 9001-2000 Certified

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

# Larson Davis CAL200 Acoustic Calibrator, SN: 7672
# Certificate of Measured Output

## Performance at Reference Conditions

| | | |
|---|---|---|
| Nominal Level (dB SPL): | 94 | 114 |
| Measured Level (dB SPL): | **94.02** | **114.00** |
| Expanded Uncertainty (dB): | 0.154 | 0.149 |
| Level Error Limit (dB): | ±0.35 | ±0.35 |
| Nominal Frequency (Hz): | 1000 | 1000 |
| Measured Frequency (Hz): | **1000.0** | **1000.0** |
| Expanded Uncertainty (Hz): | 0.2 | 0.2 |
| Frequency Error Limit (Hz): | ±10.0 | ±10.0 |
| Measured Distortion (%): | 0.57 | 0.34 |
| Expanded Uncertainty (%): | 0.25 | 0.25 |
| Distortion Limit (%): | 2.0 | 2.0 |

The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity.

### Environmental Conditions

| | | |
|---|---|---|
| Temperature (°C): | 22 | 22 |
| Relative Humidity (%): | 31 | 32 |
| Static Pressure (kPa): | 101.2 | 101.1 |

### Reference Microphone

Model: Larson Davis 2559
Serial Number: 2504
Open Circuit Sensitivity: 11.444 mV/Pascal
Uncertainty: 0.130 dB

## Influence of Static Pressure

Nominal Level (dB SPL): 114

| Nominal Pressure (kPa) | Pressure (kPa) | Level Change (dB) | Frequency Change (Hz) | Distortion (%) |
|---|---|---|---|---|
| 108.0 | 107.9 | -0.03 | 0.00 | 0.33 |
| 101.3 | 101.2 | 0.00 | 0.00 | 0.33 |
| 92.0 | 92.0 | 0.04 | 0.00 | 0.34 |
| 83.0 | 83.0 | 0.04 | 0.00 | 0.36 |
| 74.0 | 73.9 | -0.00 | 0.00 | 0.38 |
| 65.0 | 65.1 | -0.12 | 0.00 | 0.41 |
| Expanded Uncertainty: | 1.0 | 0.04 | 0.20 | 0.25 |
| Limit: | | ±0.30 | ±10.0 | 2.0 |

Reference microphone corrections applied.

### Environmental Conditions

| | |
|---|---|
| Temperature (°C): | 22 |
| Relative Humidity (%): | 39 |

### Reference Microphone

Model: Larson Davis 2559
Serial Number: 2506

Static pressure was measured with a calibrated Motorola pressure sensor MPX2100AP.
Temperature and humidity was measured with a calibrated Fluke 1620A sensor.
Expanded uncertainty of environmental measurements: 0.3 °C, 3 %RH, 1.0 kPa
Uncertainty values are given at 95% confidence level (k = 2).

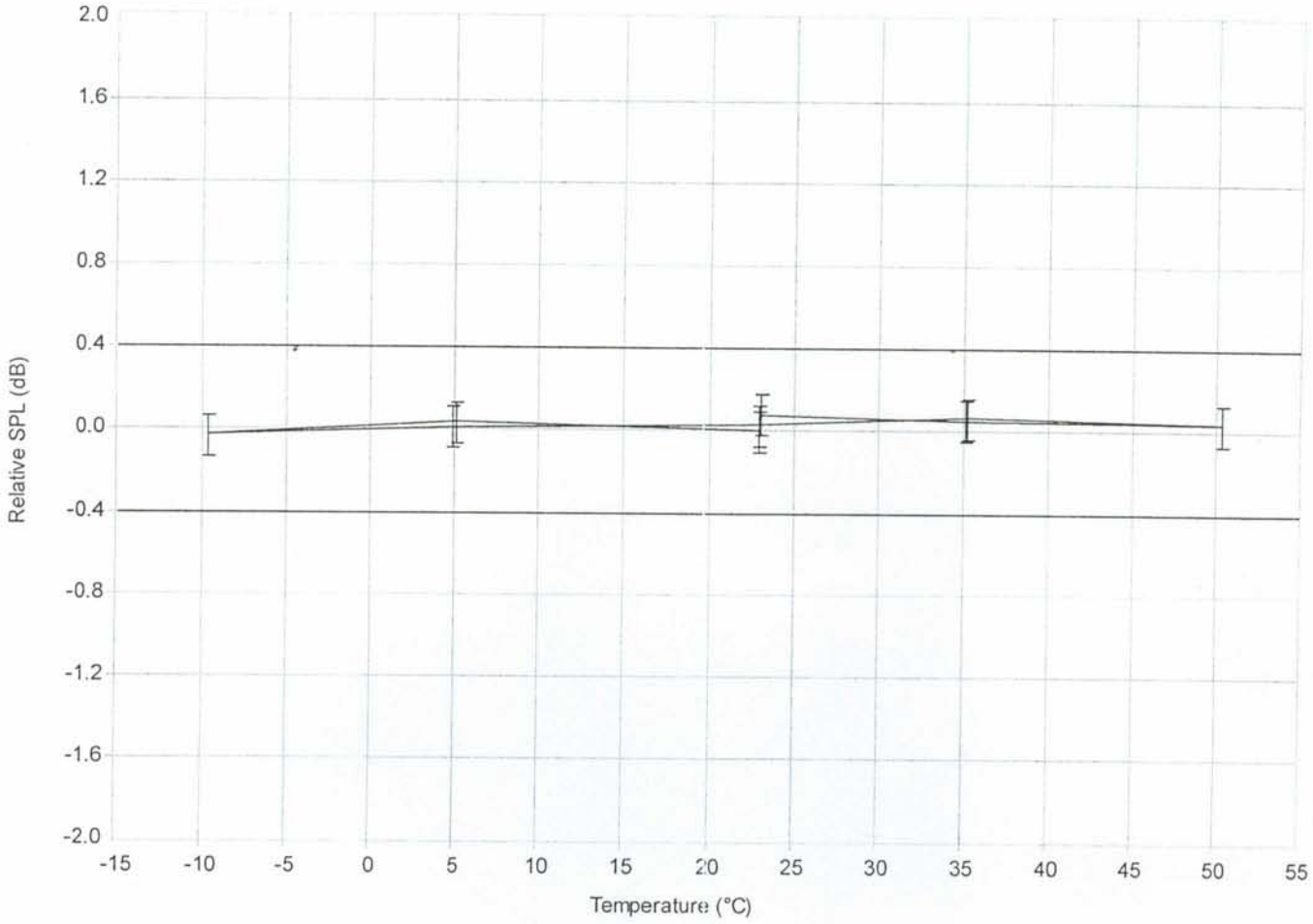
A Sound Level Meter can be calibrated to a level (L) defined as: L = measured level + pressure sensitivity
or if a Sound Level Meter is calibrated using the nominal level, the adjustments to data (X) are defined as:
X = measured level - nominal level - pressure sensitivity

Scott Montgomery | Larson Davis Calibrator Calibration System | 04 / 30 / 2010

# Model CAL200 Relative SPL vs. Temperature
## Larson Davis Model CAL200 Serial Number: 7672

Model CAL200 Relative SPL vs. Temperature at 50% RH.
A 2259 Mic (SN: 2993) with a PRM901 Preamp (SN: 0208), station 17 was used to check the levels.

Test Date: 20 Apr 2010 16:56:50




0.1dB expanded uncertainty at ~95% confidence level (k=2)

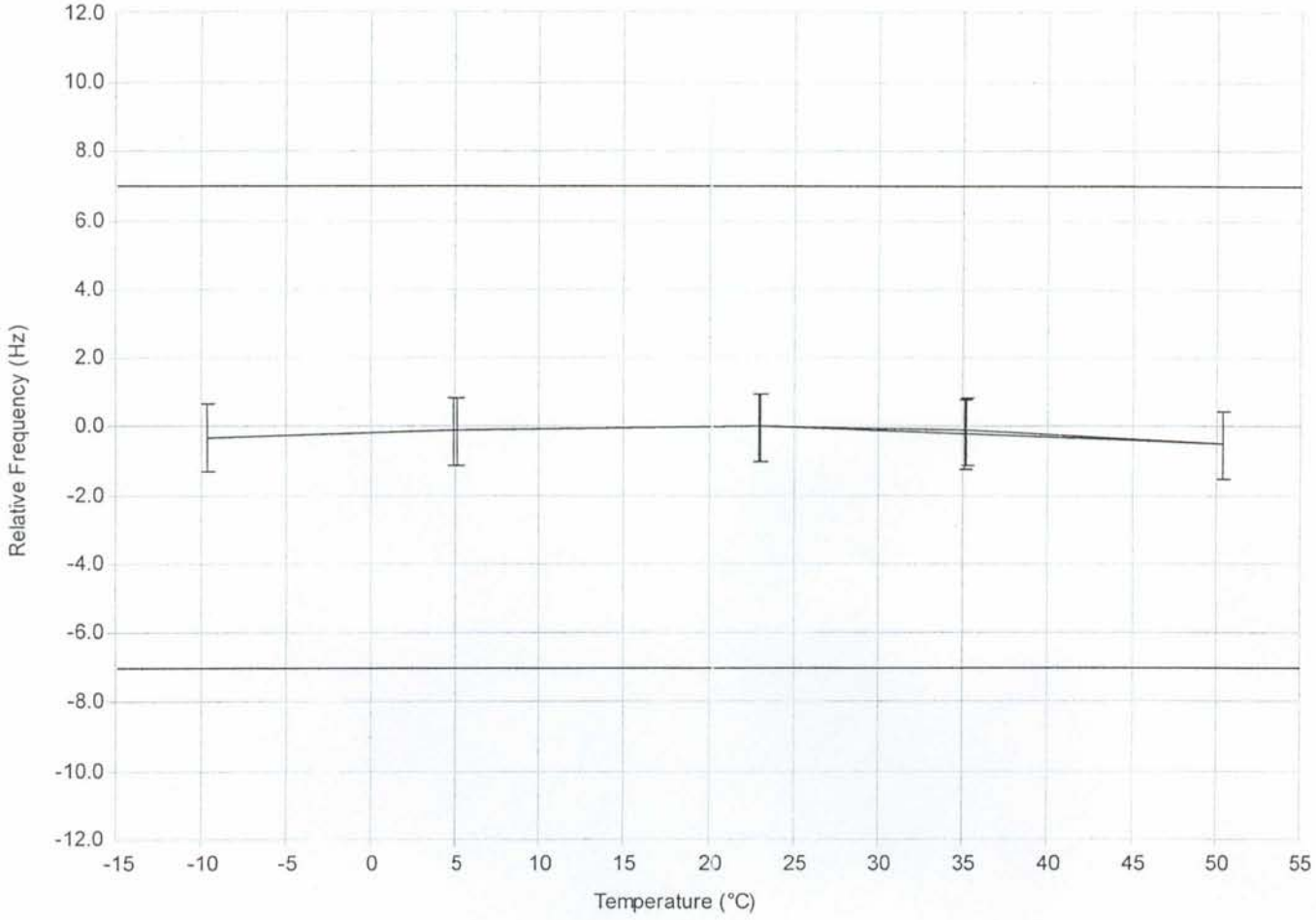
Test performed at: Larson Davis, a division of PCB Piezotronics, Inc.
1681 West 820 North, Provo, Utah 84601

Larson Davis, a division of PCB Piezotronics, Inc.
Tel: 716 684-0001 www.LarsonDavis.com

# Model CAL200 Relative Frequency vs. Temperature
## Larson Davis Model CAL200 Serial Number: 7672

Model CAL200 Relative Frequency vs. Temperature at 50% RH.
A 2259 Mic (SN: 2993) with a PRM901 Preamp (SN: 0208), station 17 was used to check the levels.

Test Date: 20 Apr 2010 16:56:50




1.0 Hz expanded uncertainty at ~95% confidence level (k=2)

Test performed at: Larson Davis, a division of PCB Piezotronics, Inc.
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