



THE AMERICAN ASSOCIATION FOR  
LABORATORY ACCREDITATION

## ACCREDITED LABORATORY

A2LA has accredited

### **AUDIO PRECISION CALIBRATION SERVICES** **Beaverton, OR**

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/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. 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 18 June 2005*).

Presented this 16<sup>th</sup> day of December 2008.

A handwritten signature in black ink, appearing to read "Peter M. Meyer", written over a horizontal line.

President

For the Accreditation Council

Certificate Number: 2527.01

Valid to: January 31, 2011



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

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

AUDIO PRECISION CALIBRATION SERVICES

5750 S.W. Arctic Drive

Beaverton, OR 97005

William Bunnell Phone: 503 627 0832 X273

CALIBRATION

Valid To: January 31, 2011

Certificate Number: 2527.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1</sup>:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	Best Uncertainty <sup>2,3,4</sup> ( $\pm$ )	Comments
DC Voltage – Measure	(0 to 120) mV (0.12 to 1.20) V (1.2 to 12) V (12 to 120) V (120 to 300) V	11 $\mu$ V/V + 0.3 $\mu$ V 10 $\mu$ V/V + 0.3 $\mu$ V 10 $\mu$ V/V + 0.5 $\mu$ V 12 $\mu$ V/V + 30 $\mu$ V 13 $\mu$ V/V + 100 $\mu$ V	HP 3458A
DC Voltage – Generate	(0 to 329.999) mV (0.330000 to 3.29999) V (3.30000 to 32.9999) V (33.0000 to 329.999) V	20 $\mu$ V/V + 1 $\mu$ V 11 $\mu$ V/V + 2 $\mu$ V 12 $\mu$ V/V + 20 $\mu$ V 18 $\mu$ V/V + 150 $\mu$ V	Fluke 5520A

Parameter/Equipment	Range	Best Uncertainty <sup>2,4</sup> (±)	Comments
Resistance – Measure	(0 to 12) Ω	18 μΩ/Ω + 50 μΩ	HP 3458A
	(12 to 120) Ω	15 μΩ/Ω + 500 μΩ	
	120 Ω to 1.2 kΩ	13 μΩ/Ω + 500 μΩ	
	(1.2 to 12) kΩ	13 μΩ/Ω + 5 mΩ	
	(12 to 120) kΩ	13 μΩ/Ω + 50 mΩ	
	120 kΩ to 1.2 MΩ	18 μΩ/Ω + 2 Ω	
	(1.2 to 12) MΩ	53 μΩ/Ω + 100 Ω	
	(12 to 120) MΩ	0.05 % + 1 kΩ	

Parameter/Range	Frequency	Best Uncertainty <sup>2,4</sup> (±)	Comments
AC Voltage – Measure	(1.2 to 12) mV	(1 to 40) Hz	HP 3458A
		40 Hz to 1 kHz	
		(1 to 20) kHz	
		(20 to 50) kHz	
		(50 to 100) kHz	
		(100 to 300) kHz	
	(12 to 120) mV	(1 to 40) Hz	
		40 Hz to 1 kHz	
		(1 to 20) kHz	
		(20 to 50) kHz	
		(50 to 100) kHz	
		(100 to 300) kHz	

Parameter/Range	Frequency	Best Uncertainty <sup>2,4</sup> (±)	Comments
AC Voltage – Measure (cont)			
120 mV to 1.2 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.012 % + 40 µV 0.012 % + 20 µV 0.019 % + 20 µV 0.035 % + 20 µV 0.085 % + 20 µV 0.31 % + 100 µV	HP 3458A
(1.2 to 12) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.012 % + 400 µV 0.012 % + 200 µV 0.019 % + 200 µV 0.035 % + 200 µV 0.085 % + 200 µV 0.31 % + 1 mV	
(12 to 120) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.025 % + 4 mV 0.025 % + 2 mV 0.025 % + 2 mV 0.04 % + 2 mV 0.13 % + 2 mV 0.41 % + 10 mV	
(120 to 700) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.045 % + 40 mV 0.045 % + 20 mV 0.065 % + 20 mV 0.13 % + 20 mV 0.31 % + 20 mV	

Parameter/Range	Frequency	Best Uncertainty <sup>2,3,4</sup> (±)	Comments
AC Flatness – Measure  @ 1 kHz reference	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.0016 dB 0.0014 dB 0.0018 dB 0.0031 dB 0.0074 dB 0.028 dB	HP 3458A
AC Voltage – Generate  (1.6500 to 16.4999) mV          (1.000 to 32.999) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz      (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.028 % + 0.2 μV 0.018 % + 0.24 μV 0.021 % + 0.24 μV 0.028 % + 0.2 μV 0.058 % + 0.5 μV 0.19 % + 2.4 μV      0.064 % + 4.8 μV 0.012 % + 4.8 μV 0.016 % + 4.8 μV 0.08 % + 4.8 μV 0.28 % + 9.6 μV 0.64 % + 40 μV	Fluke 5520A

Parameter/Range	Frequency	Best Uncertainty <sup>2,3</sup> (±)	Comments
AC Voltage – Generate (cont)			
(33.000 to 329.999) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.04 % + 6.4 μV 0.012 % + 6.4 μV 0.013 % + 6.4 μV 0.028 % + 6.4 μV 0.064 % + 26 μV 0.16 % + 56 μV	Fluke 5520A
(0.33000 to 3.29999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.024 % + 40 μV 0.012 % + 48 μV 0.015 % + 48 μV 0.024 % + 40 μV 0.056 % + 100 μV 0.19 % + 480 μV	
(3.3000 to 32.9999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.024 % + 520 μV 0.012 % + 480 μV 0.019 % + 480 μV 0.028 % + 480 μV 0.072 % + 1.3 mV	
(33.000 to 329.999) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.015 % + 1.6 mV 0.016 % + 4.8 mV 0.02 % + 4.8 mV 0.024 % + 4.8 mV 0.16 % + 40 mV	

II. Time and Frequency

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
Frequency – Measure	0.1 Hz to 225 MHz	0.2 µHz/Hz	HP 53131 w/ opt 010

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<sup>1</sup> This laboratory offers commercial calibration service.

<sup>2</sup> “Best Uncertainty” 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 of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer’s device and to influences from the circumstances of the specific calibration.

<sup>3</sup> The measurands stated are generated with the Fluke 5520A instrument. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. Best measurement uncertainties are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

<sup>4</sup> The measurands stated are measured with the HP 3458A instrument. This capability is suitable for the calibration of the devices intended to generate the measurand in the ranges indicated. Best measurement uncertainties are expressed as either a specific value that covers the full range or as a combination of the fraction of the reading/output plus a range specification.