

Appendix 11.3: Calibration certificates of noise instruments used

	<p style="text-align: center;">MTS Calibration Ltd, The Grange Business Centre, Belasis Avenue, Billingham TS23 1LG, England Telephone: 01624 876 410</p>																				
<h2 style="margin: 0;">CERTIFICATE OF CALIBRATION</h2>																					
<p>Issued by: MTS Calibration Ltd</p> <p>Date of Issue: 24 January 2019 Certificate Number: 32818</p>	<p style="text-align: right;">Page 1 of 11 pages</p> <p>Approved Signatory:</p> <p style="text-align: center;"><i>RA Sherris</i></p> <p style="text-align: right;">Tony Sherris</p>																				
<h3 style="margin: 0;">Sound Level Meter</h3>																					
<h3 style="margin: 0;">Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1</h3>																					
<p>Client: Environmental Measurements on behalf of Brendan O'Reilly Unit 12, Tallaght Business Centre Whitestown Business Park Co.Dublin 24, Ireland</p>	<p>Instrument Make: Larson Davis Instrument Model: LxT1L Serial Number: 0004643</p>																				
<h1 style="margin: 0;">10</h1>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Associated Equipment</th> <th style="text-align: left; padding: 2px;">Make</th> <th style="text-align: left; padding: 2px;">Model</th> <th style="text-align: left; padding: 2px;">Serial number</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;"><i>Preamplifier</i></td> <td style="padding: 2px;">PCB</td> <td style="padding: 2px;">PRMLxT1L</td> <td style="padding: 2px;">042742</td> </tr> <tr> <td style="padding: 2px;"><i>Microphone</i></td> <td style="padding: 2px;">PCB</td> <td style="padding: 2px;">377B02</td> <td style="padding: 2px;">173111</td> </tr> <tr> <td style="padding: 2px;"><i>Calibrator</i></td> <td style="padding: 2px;">Larson Davis</td> <td style="padding: 2px;">CAL200</td> <td style="padding: 2px;">9175</td> </tr> <tr> <td style="padding: 2px;"><i>Calibrator supplied by</i></td> <td colspan="3" style="padding: 2px;">by MTS for this calibration</td> </tr> </tbody> </table>	Associated Equipment	Make	Model	Serial number	<i>Preamplifier</i>	PCB	PRMLxT1L	042742	<i>Microphone</i>	PCB	377B02	173111	<i>Calibrator</i>	Larson Davis	CAL200	9175	<i>Calibrator supplied by</i>	by MTS for this calibration		
Associated Equipment	Make	Model	Serial number																		
<i>Preamplifier</i>	PCB	PRMLxT1L	042742																		
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<i>Calibrator supplied by</i>	by MTS for this calibration																				
<p>Test results summary, detailed results are shown on subsequent pages.</p>																					
<p>Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1</p>																					
<p>Tests performed</p>	<p>Section</p>	<p>Results of test</p>	<p>Page</p>	<p>Comments</p>																	
Calibration Certificate	22		1																		
Additional information			2																		
Indication with Calibrator Supplied	10	No Limit	3																		
Self-Generated Noise	11	No Limit	3																		
Frequency and Time-weightings at 1kHz	14	Complies	3																		
Long term stability	15	Complies	3																		
High stability	21	Complies	3																		
Acoustic Tests	12	Complies	4																		
Frequency Weighting A	13	Complies	5																		
Frequency Weighting C	13	Complies	6																		
Frequency Weighting Z	13	Complies	7																		
Level Linearity	16	Complies	8																		
Level Linearity Range Control	17		n/a	Only one range																	
Tone-burst Response	18	Complies	9																		
Peak C sound level	19	Complies	10																		
Overload indication	20	Complies	11																		
Additional tests performed																					
Microphone		32820		See additional certificate																	
Filter, third octave or octave		32818F		See additional certificate																	
<p>The instrument was within the above specification as received - no modifications were made</p> <p>The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013</p>																					
<p>This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.</p>																					



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Telephone: 01624 876 410

CERTIFICATE OF CALIBRATION

Page 1 of 11 pages

Issued by: **MTS Calibration Ltd**

Approved Signatory:

Date of Issue: 25 January 2019 Certificate Number: 32815

Tony Sherris

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Environmental Measurements on behalf of Brendan O'Reilly
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co. Dublin 24, Ireland

Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0004647

9

Associated Equipment	Make	Model	Serial number
Preamplifier	PCB	PRMLxT1L	042725
Microphone	PCB	377B02	171552
Calibrator	Larson Davis	CAL200	9175
Calibrator supplied by	by MTS for this calibration		

Test results summary, detailed results are shown on subsequent pages.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1

Tests performed	Section	Results of test	Page	Comments
Calibration Certificate	22		1	
Additional information			2	
Indication with Calibrator Supplied	10	No Limit	3	
Self-Generated Noise	11	No Limit	3	
Frequency and Time-weightings at 1kHz	14	Complies	3	
Long term stability	15	Complies	3	
High stability	21	Complies	3	
Acoustic Tests	12	Complies	4	
Frequency Weighting A	13	Complies	5	
Frequency Weighting C	13	Complies	6	
Frequency Weighting Z	13	Complies	7	
Level Linearity	16	Complies	8	
Level Linearity Range Control	17		n/a	Only one range
Tone-burst Response	18	Complies	9	
Peak C sound level	19	Complies	10	
Overload indication	20	Complies	11	
Additional tests performed				
Microphone		32817		See additional certificate
Filter, third octave or octave		32815F		See additional certificate

The instrument was within the above specification as received - no modifications were made

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013

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CERTIFICATE OF CALIBRATION

Page 1 of 11 pages

Issued by: **MTS Calibration Ltd**

Approved Signatory:

Date of Issue: **25 January 2019** Certificate Number: **32812**

Tony Sherris

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Environmental Measurements on behalf of Brendan O'Reilly
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0004570

8

Associated Equipment	Make	Model	Serial number
Preamplifier	PCB	PRMLxT1L	036058
Microphone	PCB	377B02	152974
Calibrator	Larson Davis	CAL200	9175
Calibrator supplied by	by MTS for this calibration		

Test results summary, detailed results are shown on subsequent pages.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1

Tests performed	Section	Results of test	Page	Comments
Calibration Certificate	22		1	
Additional information			2	
Indication with Calibrator Supplied	10	No Limit	3	
Self-Generated Noise	11	No Limit	3	
Frequency and Time-weightings at 1kHz	14	Complies	3	
Long term stability	15	Complies	3	
High stability	21	Complies	3	
Acoustic Tests	12	Complies	4	
Frequency Weighting A	13	Complies	5	
Frequency Weighting C	13	Complies	6	
Frequency Weighting Z	13	Complies	7	
Level Linearity	16	Complies	8	
Level Linearity Range Control	17		n/a	Only one range
Tone-burst Response	18	Complies	9	
Peak C sound level	19	Complies	10	
Overload indication	20	Complies	11	
Additional tests performed				
Microphone		32814		See additional certificate
Filter, third octave or octave		32812F		See additional certificate

The instrument was within the above specification as received - no modifications were made

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013

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Calibration Certificate

Certificate Number 2019012216

Customer:

Environmental Measurement

Unit 12

Dublin, 24, Ireland

Model Number	LxT SE	Procedure Number	D0001.8384
Serial Number	0005990	Technician	Ron Harris
Test Results	Pass	Calibration Date	1 Oct 2019
Initial Condition	As Manufactured	Calibration Due	
Description	Sound Expert LxT Class 1 Sound Level Meter Firmware Revision: 2.402	Temperature	23.6 °C ± 0.25 °C
		Humidity	49.6 %RH ± 2.0 %RH
		Static Pressure	85.93 kPa ± 0.13 kPa

Evaluation Method **Tested with:** **Data reported in dB re 20 µPa.**

Larson Davis PRMLxT1L. S/N 055804
PCB 377B02. S/N 316349
Larson Davis CAL200. S/N 9079
Larson Davis CAL291. S/N 0108

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the Instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.

Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert LxT, I770.01 Rev J Supporting Firmware Version 2.301, 2015-04-30

LARSON DAVIS - A PCB PIEZOTRONICS DIV.
1681 West 820 North
Provo, UT 84601, United States
716-684-0001



LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Calibration Certificate

Certificate Number 2019012218

Customer:

Environmental Measurement

Unit 12

Dublin, 24, Ireland

Model Number	LxT SE	Procedure Number	D0001.8384
Serial Number	0005992	Technician	Ron Harris
Test Results	Pass	Calibration Date	1 Oct 2019
Initial Condition	As Manufactured	Calibration Due	
Description	Sound Expert LxT Class 1 Sound Level Meter Firmware Revision: 2.402	Temperature	23.84 °C ± 0.25 °C
		Humidity	49.5 %RH ± 2.0 %RH
		Static Pressure	85.93 kPa ± 0.13 kPa

Evaluation Method **Tested with:** **Data reported in dB re 20 µPa.**

Larson Davis PRMLxT1L. S/N 055806
PCB 377B02. S/N 318352
Larson Davis CAL200. S/N 9079
Larson Davis CAL291. S/N 0108

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the Instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.

Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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LARSON DAVIS
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Calibration Certificate

Certificate Number 202009385

Customer:
Environmental Measurement
Unit 12 Tallaght Business Centre
Whitestown Business Park
Dublin, 24, Ireland

Model Number CAL200
Serial Number 18140
Test Results Pass
Initial Condition As Manufactured
Description Larson Davis CAL200 Acoustic Calibrator

Procedure Number D0001.8386
Technician Scott Montgomery
Calibration Date 26 Aug 2020
Calibration Due
Temperature 23 °C ± 0.3 °C
Humidity 35 %RH ± 3 %RH
Static Pressure 101.2 kPa ± 1 kPa

Evaluation Method The data is acquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2017 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	08/04/2020	08/04/2021	001021
Larson Davis Model 2900 Real Time Analyzer	04/02/2020	04/02/2021	001051
Microphone Calibration System	03/03/2020	03/03/2021	005446
1/2" Preamplifier	09/17/2019	09/17/2020	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/06/2020	08/06/2021	006507
1/2 inch Microphone - RI - 200V	12/06/2019	12/06/2020	006511
Pressure Transducer	10/18/2019	10/18/2020	007204

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