Statement of Calibration

Issued to:	Calibration Reference
Sonitus Systems Unit 1A Trinity Enterprise Campus Pearse St Grand Canal Dock Dublin 2	1800523

Test Date: 02/02/2018

Equipment

Sound Level Monitor:	EM2010	**Serial Number:**	00523
Microphone Assembly:	378B02	**Serial Number:**	300058

Calibration Procedure

The sound level meter was calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), Periodic tests, specification of sound level meters. Tolerances for verification procedures are specified in IEC 61672-1 (2003).

Measurement Results

Test	Result
Self-generated noise	PASS
Frequency and Time Weightings	PASS
Frequency Weighting – A	PASS
Frequency Weighting – C	PASS
Level Linearity	PASS
Toneburst Response	PASS
Acoustical Tests of Frequency Weighting	PASS
Peak C Response	PASS
Overload Indication	PASS
Sensitivity Calibration	PASS

Signed on behalf of Sonitus Systems:

SONITUS SYSTEMS

Calibration Report

Equipment Description

Model:	EM2010	**Microphone Model:**	378B02
Serial Number:	00523	**Microphone Serial Number:**	300058
Microphone Type:	1/2" free field	**Pre-amplifier Number:**	051927

Ambient Conditions

Measurement conditions were within the tolerances defined in IEC 61672-1 and IEC 60942.

Barometric Pressure:	1030 hPa
Temperature:	21.6 °C
Relative Humidity:	23.0 %

Calibration Equipment

Description:	National Instruments PXI-4461		
Serial Number:	19C91D2	Certificate Number:	3970645-1
Calibrator:	CR511ES		
Serial Number:	60871	Calibrator Certificate:	16004

The standards used in this calibration are traceable to NIST and/or other National Measurement Institutes (NMI's) that are signatories of the International Committee of Weights and Measures (CIPM) mutual recognition agreement (MRA).

Results

Self-generated noise
SLM Measuring mode: SPL

SLM Configuration	Freq. Weighting Network	SLM Reading
Microphone Installed	A	26.1
Microphone replaced by electrical signal device and fitted with short circuit	A	16.5
	C	16.5
	Z	

Test Result **PASS**

Frequency and Time Weightings at 1 kHz
SLM Measuring Mode: SPL (dB)

Time Weighting	Freq. Weighting	Expected Level	Deviation	Tol +/-
Fast	A	94.0	ref	
	C	94.0	0.0	0.2
Slow	A	94.0	0.0	0.2
LEQ	A	94.0	0.0	0.2

Test Result **PASS**

Electrical tests of frequency weighting (A-weighting)
SLM Measuring Mode: SPL (dB)

Freq	Expected Level	SLM Reading	Deviation	Tol +	Tol -
63	75	74.9	-0.1	1.5	-1.5
125	75	74.9	-0.1	1.5	-1.5
250	75	74.9	-0.1	1.4	-1.4
500	75	74.9	-0.1	1.4	-1.4
1000	75	75.0	0.0	1.1	-1.1
2000	75	75.0	0.0	1.6	-1.6
4000	75	74.9	-0.1	1.6	-1.6
8000	75	74.8	-0.2	2.1	-3.1
16000	75	73.7	-1.3	3.5	-17.0

Test Result **PASS**

Electrical tests of frequency weighting (C-weighting)
SLM Measuring Mode: SPL (dB)

Freq	Expected Level	SLM Reading	Deviation	Tol +	Tol -
63	75	74.9	-0.1	1.5	-1.5
125	75	75.0	0.0	1.5	-1.5
250	75	74.9	-0.1	1.4	-1.4
500	75	75.0	0.0	1.4	-1.4
1000	75	74.9	-0.1	1.1	-1.1
2000	75	75.0	0.0	1.6	-1.6
4000	75	74.9	-0.1	1.6	-1.6
8000	75	74.8	-0.2	2.1	-3.1
16000	75	73.6	-1.4	3.5	-17.0

Test Result **PASS**

Linearity level on reference range
Input frequency: 8 kHz
SLM Measuring Mode: SPL (dB)

Range	Expected Level	SLM Reading	Deviation	Tol +/-
120 dB	94.0	94.0	0.0	1.1
	99.0	99.0	0.0	1.1
	104.0	104.0	0.0	1.1
	109.0	109.0	0.0	1.1
	114.0	114.0	0.0	1.1
	115.0	115.0	0.0	1.1
	116.0	116.0	0.0	1.1
	117.0	117.0	0.0	1.1
	118.0	118.0	0.0	1.1
	89.0	89.0	0.0	1.1
	84.0	84.0	0.0	1.1
	79.0	79.0	0.0	1.1
	74.0	74.0	0.0	1.1
	69.0	69.0	0.0	1.1
	64.0	64.0	0.0	1.1
	59.0	59.0	0.0	1.1
	54.0	54.0	0.0	1.1
	49.0	49.0	0.0	1.1
	44.0	44.0	0.0	1.1
	39.0	39.0	0.0	1.1
	34.0	34.0	0.0	1.1
	34.0	34.0	0.0	1.1
	33.0	33.0	0.0	1.1
	32.0	32.0	0.0	1.1
	31.0	31.0	0.0	1.1
	30.0	30.0	0.0	1.1

Test Result **PASS**

Toneburst Response
Input frequency: 4 kHz

Burst Type	Response	Expected Level	SLM Reading	Deviation	Tol +	Tol -
200 ms	LAFMAX	91.0	90.9	-0.1	0.8	-0.8
2.0 ms	LAFMAX	100.0	100.0	0.0	1.3	-1.3
0.25 ms	LAFMAX	117.0	117.1	0.1	1.3	-3.3
200 ms	LASMAX	91.0	91.0	0.0	0.8	-0.8
2.0 ms	LASMAX	110.6	110.6	0.0	1.3	-3.3

Test Result **PASS**

Acoustical Tests of Frequency Weighting

Input Level	Freq	Expected Level	SLM Reading	Deviation	Tol +	Tol -
94	1 kHz	94.1	94.1	0.0	1.1	1.1
	125 Hz	93.9	93.8	-0.1	1.5	1.5
	4 kHz	93.3	93.3	0.0	1.6	1.6

Test Result **PASS**

Peak C Sound Level

Pulse Type	Freq	Expected Level	SLM Reading	Deviation	Tol +/-
1 cycle	8 kHz	115.4	115.2	-0.2	2.4
Pos ½ cycle	500 Hz	117.4	117.1	-0.3	1.4
Neg ½ cycle	500 Hz	117.4	117.1	-0.3	1.4

Test Result **PASS**

Overload Indication

Test Description	Overload at	Meas. Diff. (Pos – Neg)	Tol +/-
Pos. ½ cycle at 4 kHz	122.5		
Neg. ½ cycle at 4 kHz	122.5		
Level difference		0.0	1.8

Test Result **PASS**

The microphone sensitivity was tested with a 1 kHz sine tone

SLM Serial No.	Microphone No.	Signal Level	Sensitivity (dB re 1V/Pa)
00523	300058	94 dB	-26.32

Frequency response of the microphone across the range 20Hz – 20kHz was within the tolerance limits specified by the manufacturer.

Calibration Notes